The Authors

REGINALD H. BARRETT is an assistant professor of forestry, University of California, Berkeley. **HAROLD E. BASEY** is an instructor of biological sciences, Modesto Junior College, Modesto, Calif. **EDWARD C. BEEDY** is a graduate student in zoology, University of California, Davis. **ALLAN S. BOSS,** formerly forest biologist, Eldorado National Forest, Placerville, Calif., is now forest biologist, Boise National Forest, Boise, Idaho. **STEPHEN L. GRANHOLM** is a graduate student in zoology, University of California, Davis. **THOMAS F. NEWMAN** is a wildlife biologist, Plumas National Forest, Blairsden, Calif. **THOMAS J. RAHN** is an assistant wildlife management biologist, California Department of Fish and Game, Sacramento. **LYMAN V. RITTER** is a wildlife biologist with the Pacific Southwest Forest and Range Experiment Station's sensitive species research unit, headquartered in Fresno, Calif. **DAVID A. SINCLEAR** is a wildlife biologist, Modoc National Forest, Tulelake, Calif. **EDWARD F. TOTH** is a planning biologist, Six Rivers National Forest, Eureka, Calif. **JARED VERNER**, a research wildlife biologist, is in charge of the Pacific Southwest Forest and Range Experiment Station's sensitive species research unit, at Fresno, Calif. **MARSHALL WHITE** is associate research biologist, Department of Forestry and Resource Management, University of California, Berkeley. **DANIEL F. WILLIAMS** is associate professor of biology, California State College-Stanislaus, Turlock.

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Verner, Jared, and Allan S. Boss, technical coordinators.

1980. **California wildlife and their habitats: western Sierra Nevada**. Gen. Tech. Rep. PSW-37, 439p., illus. Pacific Southwest Forest and Range Exp. Stn., Forest Serv., U.S. Dep. Agric., Berkeley, Calif.

The relationships between 355 wildlife species and their habitats are examined in a series of matrices, life history notes, and distribution maps covering 26 amphibians, 27 reptiles, 208 birds, and 94 mammals. The information is useful in identifying and evaluating the consequences of proposed land management activities-particularly those that manipulate vegetation. Although designed for use by land managers, the publication provides information useful to both professionals and lay persons interested in California wildlife.

Retrieval Terms: habitat management, amphibians, reptiles, birds, mammals, conifer forests, annual grasslands, oak woodlands, riparian deciduous, mountain meadows, Sierra Nevada, California.

Preface

This report is one of a series from the California Wildlife Habitat Relationships Program sponsored by the California (now Pacific Southwest) Region, Forest Service, U.S. Department of Agriculture, in cooperation with the Pacific Southwest Forest and Range Experiment Station; Fish and Wildlife Service and Bureau of Land Management, U.S. Department of the Interior; California Department of Fish and Game; Nevada Department of Fish and Game; and the Southern California Edison Company. The initial stimulus for the Program came from the development of guidelines for management of wildlife species in the Blue Mountains of Oregon and Washington (Thomas 1979).

The program is seeking to develop a system for providing land managers with quantitative information on the responses of wildlife species to land management alternatives on the forests and rangelands of California and parts of Nevada. Its aim is to apply the knowledge of habitat requirements of wildlife species in identifying and evaluating the consequences of proposed land management activities--particularly those activities that manipulate vegetation. It is designed specifically to help improve wildlife planning by land managers. It is not intended to set management policy. That is the manager's responsibility, given knowledge of the consequences of available options.

The Program area is divided into four zones (*fig.* 1). Each zone has a Working Group responsible for identifying the wildlife species, habitat types, and interrelationships applicable to the ecological attributes of the zone. Each group is developing for its zone a matrix showing relationships of wildlife to habitats, notes on life history, and a distribution map for each species.

This volume covers Zone 1-The Western Sierra Nevada. Its boundaries are: north-boundary between Shasta and Siskiyou Counties; east-Sierran Crest; south-Kern Gap (State Highway 178); and west-the 1000-foot (305-m) elevation contour.

Management documents for selected habitats and wildlife species are also being developed for the Program area as a whole.

The approach taken is to rely on specialists to provide the necessary wildlife information, based on their personal field experience, consultation with experts, and review of the appropriate literature. These specialists are Harold E. Basey, Modesto Jr. College (amphibians and reptiles), Edward C. Beedy and Stephen L. Granholm, University of California, Davis (birds), and Dr. Marshall White, University of California, Berkeley (mammals).

The information in the publication has been stored on a computer accessible through the California (now Pacific Southwest) Region, Forest Service, San Francisco. Ways are being explored to use the computer for efficient application of the extensive data base to land management decisions. A description and explanation of the methods finally adopted will be published as a product of the Program.

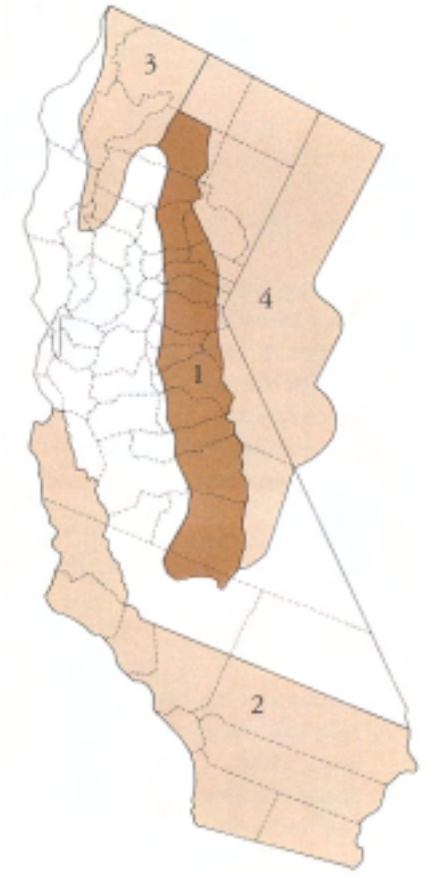


Figure 1-*The California Wildlife/ Habitat Relationships Program is divided into four zones: 1 (Western Sierra Nevada), 2 (Southern), 3 (North Coast), and 4 (Eastside). The Eastside Zone includes a portion of Nevada.*

Introduction and Scope

Jared Verner and *Allan S. Boss*

The Forest Service, U.S. Department of Agricul ture, 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 Range-land 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 manage ment 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 Na tional 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

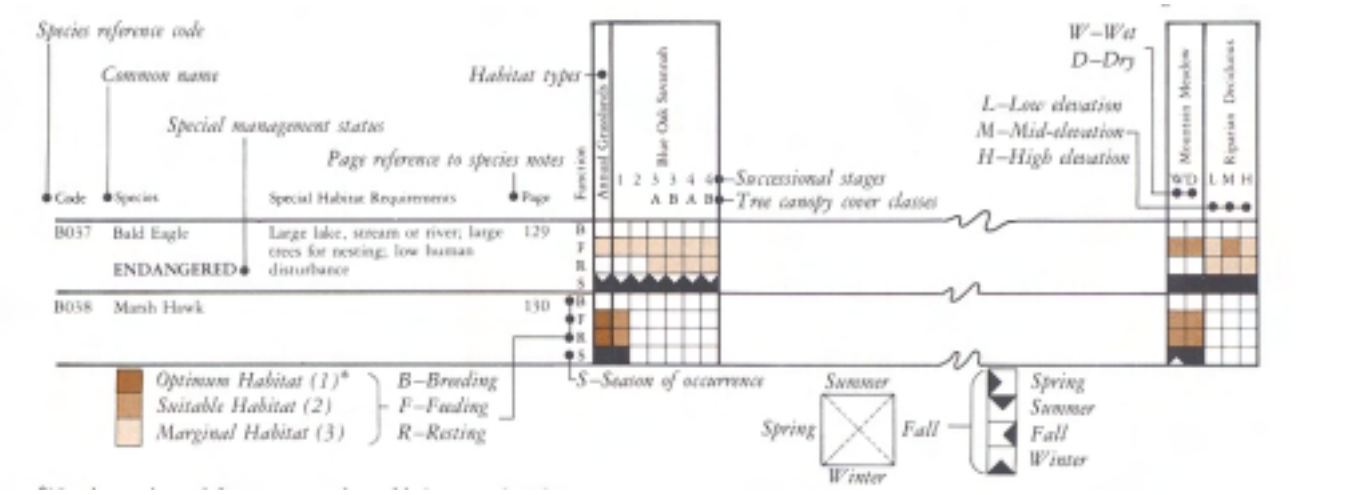
- *Open Terrain*: Extensive open areas, not necessarily surrounded by forest, although forests may form an ecotone along one or more sides of such terrain, including extensive alpine meadows above treeline and expansive annual grasslands at low elevations.
- *Low human disturbance*: Any sort of human 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 (*Aces 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/forbstage*): 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.

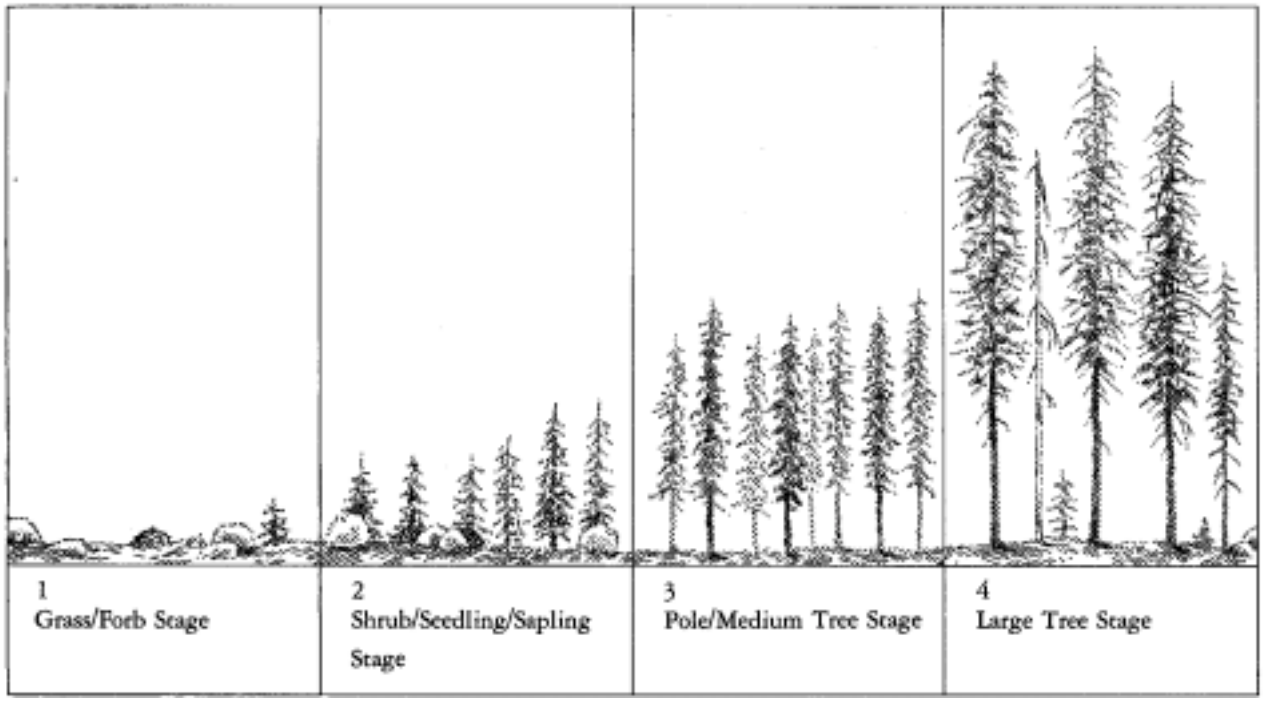


Figure 3-*Successional stages for forest types in the Sierra Nevada of California.*

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 frequency 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.

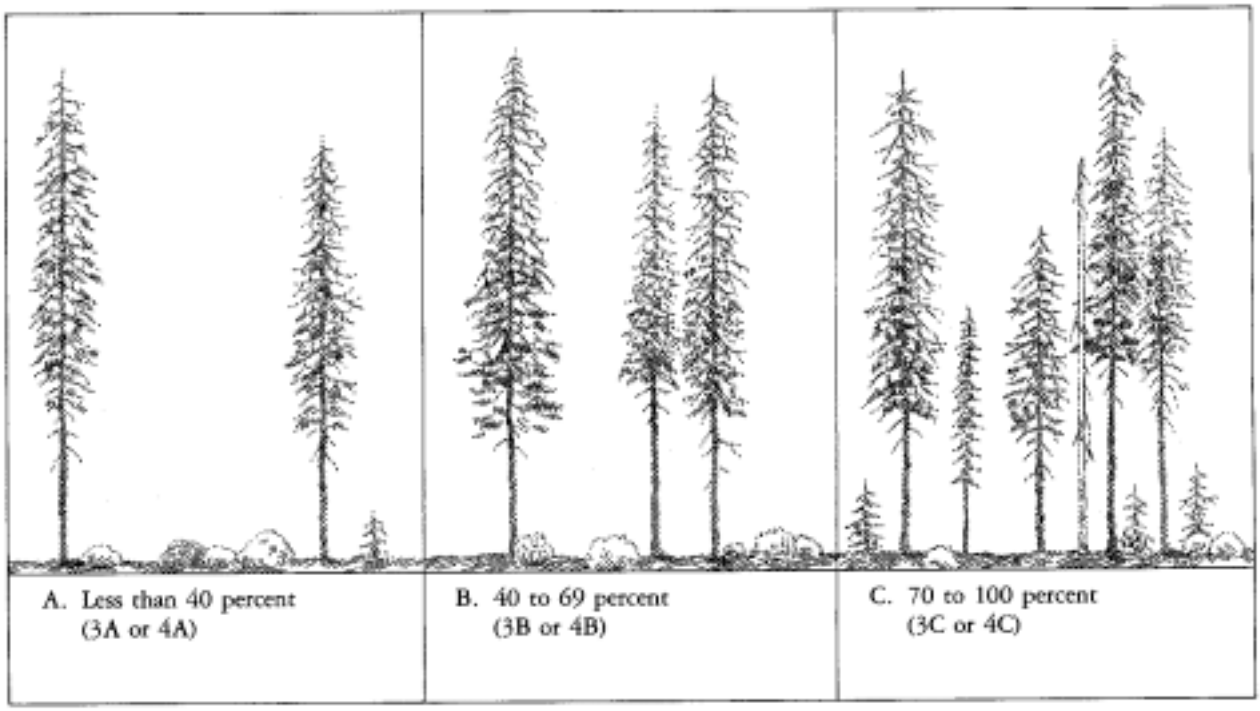


Figure 4-*Canopy closure classes for successional stages 3 and 4 in the Sierra Nevada of California.*

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.

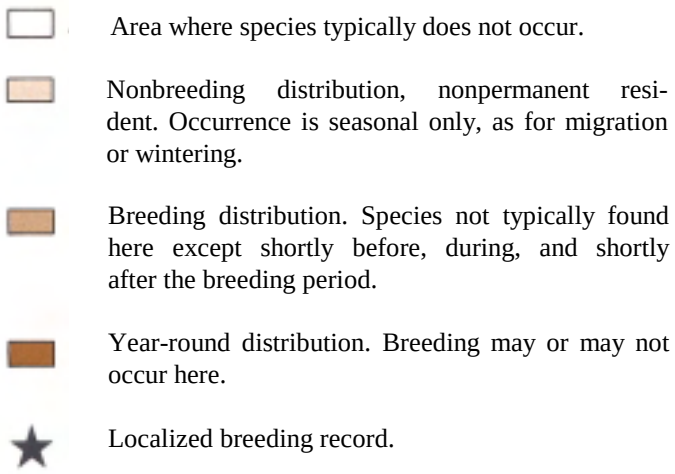


Figure 5-*Key to distribution codes for birds.*

Literature Cited

Arbib, R.

1977. **The blue list for 1978.** Amer. Birds 31:1087-1096.

Rundel, P. W. , D.J. Parsons, and D.T. Gordon.

1977. **Montane and subalpine vegetation of the Sierra Nevada and Cascade ranges**. *In* **Terrestrial vegetation of California.** M. G. Barbour and J. Major, eds. p. 559-599. John Wiley and Sons, Inc., New York.

Society of American Foresters.

1954. **Forest cover types of North America.** Washington, D.C. 67 p., illus.

Thomas, Jack Ward, tech. ed.

1979. **Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington.** U.S. Dep. Agric., Agric. Handb. 553, 512 p., illus.

Using the Publication

Jared Verner and *Allan S. Boss*

Application of Data

If used properly, the information in this publication can effectively assist the land manager in assessing potential effects on animals of proposed habitat management activities, and in identifying management opportunities for wildlife species. In addition, it would allow the man ager to formulate and evaluate with greater confidence alternatives for land and resource management planning, with reference to wildlife species. The information gathered puts wildlife habitat needs into practicable terms, so management objectives can be set, measured, cost assessed, and programmed over time.

The information reported is useful in forming judgments about potential responses of amphibians, rep tiles, birds, and mammals to identifiable habitat changes in the western Sierra Nevada. It can all but eliminate the possibility of approving projects that might adversely affect Threatened, Endangered, or Rare species, or any other species worthy of special consideration. *But the application of this process is not a .substitute for field work and sound biological and management judgment.*

The biologist still will need to conduct thorough field investigations, using the data as a framework for the field work. Once the basic habitats and broad wildlife effects have been determined, the biologist will need to refine the analysis based on such things as interspersion of habitat types, the presence or absence of special habitats, specific requirements of species for water, space, and cover, and a host of other factors beyond broad habitat needs that enter into determining habitat suitability for a particular species.

The data are especially applicable in land management planning, compartment planning[1], and most pro ject planning. It is important, however, to understand the *limits of resolution* of the data base. Larger areas tend to include more of the special habitat requirements of species, to have a greater variety and interspersion of habitat types and seral stages, and to include larger blocks of the various habitats. Consequently, the larger the area analyzed the more accurate will be the predictions of project impacts on habitats, while the smaller (or more site specific) the area is, the less accurate will be the predictions. Thus, the smaller the project site, the greater is the need for biological expertise in refining the wildlife predictions based on information in this publica tion.

Application of the data reported in making project assessments can be done at different levels, some simple and easily done by hand. More complex assessments, however, are beyond reach of the paper-and-pencil approach. An example is the assessment of probable effects of a large timber sale, involving vegetation changes in several habitat stages, on all vertebrate species within the sale area. For this reason, all of the basic information contained in this publication has been computerized for greater accessibility.

Even without access to a computer, however, it is still possible to use the information for simple analyses, by following these steps:

First, tailor the information to your particular area of interest-for example, for forest biologists, it could be a National Forest or Ranger District-by identifying all the animal species that do not occur in your management area. Use the distribution maps to determine the species not found in your area, and shade over, with a coloring pen, for example, the full species/habitat matrix entry for each species. You can then ignore shaded entries in future use of the species/habitat matrix. If local observations show that a species regularly occurs in your management area, even though the distribution map does not, consider the distribution map to be in error.

Second, use the information for reference on any species you have a particular question about. If the information supplied is not adequate, consult the references listed for that species.

Third, use the information to compile a list of species, likely to be found in any given habitat stage by scanning down the species/habitat matrix under the habitat stage of interest. Each time you find an entry for a species, *check across to the special habitat requirements for that species.* If it has special habitat requirements that are not provided on the project site, do not add it to your list of species. You will see from this step that compiling the species list is *a two-step process of eliminating species not likely to use an area.* Note in the species/habitat matrix, for example, that mallards may be found in any stage of any habitat, but only if a suitable aquatic site is available. Because of the importance of the special habitat requirements in screening out species not likely to utilize a project site, it is important that you visit the project area before compiling the species list. During the visit you should record the occurrence and extent of such features as riparian zones, lakes, ponds, marshes, rock outcrops, cliffs, litter, snags, and other special habitat require ments.

Fourth, and perhaps most important, use the information to get an idea of the species whose populations

likely will be affected, either positively or negatively, by a project. If you know the nature of the change in vegetation to be expected in a given habitat stage, as a result of a project, you may compile "before" and "after" lists of species. At least a simple level of assessment is possible by comparing the two lists.

Any Threatened, Endangered, Rare, or Sensitive animal species likely to be affected by the project should be brought to your attention. This no doubt will require thorough inventory of the project site to learn whether or not the species is actually present. If it is, take steps to learn more about its use of that site, to start (for Threatened or Endangered species) the required consultation process with the Fish and Wildlife Service, U.S. Department of Interior, and to explore possible ways to avoid all negative effects.

Many other ways exist in which animal species lists generated from the species/habitat matrix can be developed to serve the management function. The only constraint is that conclusions should not be drawn that exceed the limits of accuracy of the original data.

Accuracy of Data

This publication should be considered just the beginning in the task of assembling the needed wildlife information to enable comprehensive management of western Sierra Nevada habitats. It is, however, the best single source available for permitting forest managers to assess the effects of habitat modification on wildlife species. Nonetheless, the data base still can be expanded, improved, and made more accurate. For this reason, the California Wildlife Habitat Relationships Program will be involved in the future with testing the data in this and other documents in the series, and in evaluating predictions based on those documents.

Comments and suggestions from users and other readers are welcomed. Address correspondence to:

Director, Fisheries and Wildlife Management Staff
Pacific Southwest Region
Forest Service, U.S. Department of Agriculture
630 Sansome Street
San Francisco, California 94111

Periodically, as more information accumulates, this publication will be updated or supplemented, and new methods will be developed to evaluate management proposals.

The recognized limitations in the information assembled here call for some caution by users in applying it to management decisions:

- It is not a substitute for professional field work and experience. In particular, it is not a substitute for ground checking each site proposed for a management project.

The very nature of the way the information is organized-especially its method of dealing with special habitat requirements-calls for field time of a person informed about how to apply this information.

- The scoring system for designating habitat suitability uses ordinal numbers (1, 2, and 3) for ranking purposes only. These numbers are not intended to indicate that optimum habitat is twice as good as suitable or three times as good as marginal habitat. Therefore, any application of these suitability classes to management problems should be done in a manner consistent with the intended ranking system.
- Only habitat *potentially* suitable for any given species is identified. A list of species potentially using any given habitat stage, for example, a block of mature mixed-conifer forest 100 acres (40 ha) in size, with 80 percent canopy cover, no doubt would include more species than actually could be found on the site. This condition reflects the fact that factors other than just features of a habitat stage have an important influence on a species' occurrence in any given area. This *effect diminishes with increasing size of the sample area.* For example, Marcot[2] found that "potential" lists developed from the North Coastal Zone were three to four times longer than "actual" lists produced by field verification of species occurrence. Marcot's plots, on the Six Rivers National Forest in northern California, were only about 5 acres (2 ha) in size. An analysis at the compartment level, however, should produce a potential list much more closely matching the actual list. In any case, if any analysis using the speies/habitat matrix information indicates that the manager should be concerned for a certain species' welfare, *it will be necessary to inventory the area five or more times to determine whether or not that species actually* occurs there.
- The species/habitat matrix does not account for patch size of any given habitat stage, in terms of whether or not it is likely to be used by a species. Obviously small patches of habitat are more likely to be suitable for small animal species, or for species with small territory or home range requirements, than they are for large species with large territories and home ranges. The wildlife biologist will need to study the home range or territory size requirements, or both, or emphasis species guidelines when available, to determine whether patch sizes likely would accommodate a species in question.
- The related question of how many animals of a given species can occupy a patch of known size is also not answered here. A very crude guess might be made by dividing patch size by average territory or home range size, but we do not recommend this procedure. Typically, not all parts of a given patch will be equally suitable for use by the animal species, so not all the patch will be

occupied. As a result, dividing patch size by territory or home range size will overestimate animal density by an unknown amount. Until much more is known about these relationships, so that specific guidelines may be established for relating home range size to estimates of population numbers, the safest procedure for estimating population size is to undertake an accepted field counting procedure. In practice, it is likely that for most projects a knowledge of actual population size will be necessary only for a limited number of species.

[1] A land area delineated by the Forest Service, U.S. Department of Agriculture, for resource record-keeping. Compartments in the Pacific Southwest Region generally range in size from 3,000 to 12,000 acres.

[2] Personal communication from Bruce Marcot, Six Rivers National Forest, Eureka, Calif, March 1979.

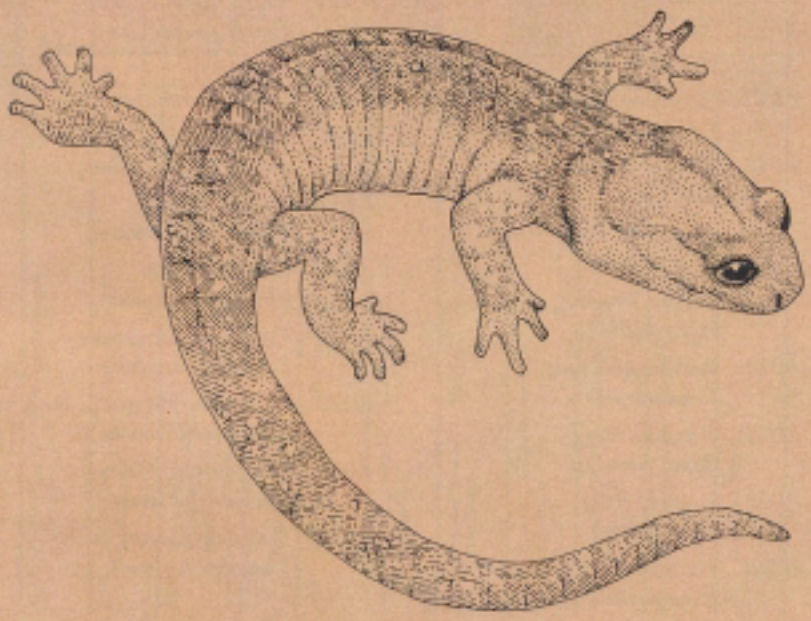
Amphibians and Reptiles

Harold E. Basey and *David A. Sinclair*

This chapter offers the most recent information available on the habitat relationships of the 26 species of amphibians and 27 species of reptiles known to occur on the west slope of the Sierra Nevada. Nomenclature used follows that in the most recent literature for each species. The species are arranged in phylogenetic order and numbered in sequence, with prefix "A" (amphibians) or "R" (reptiles), for purposes of internal cross-referencing and computer access coding.

In addition to the literature cited for the various species treated in this chapter, several general sources will be invaluable to the forest manager in assessing the effects of forest management on amphibians and reptiles. The sources include Van Denburg (1922), Grinnell and Storer (1924), Storer (1925), Grinnell *et al.* (1930), Adams (1942), Smith (1946), Bishop (1947), Wright and Wright (1949, 1957), and Wake (1974).

The species notes identify numerous areas in which our knowledge of the biology of amphibians and reptiles is inadequate to permit wise management decisions. To this extent, this publication will serve as a useful guide to researchers and others interested in pursuing field work on the species covered here.



Species List

A001 Tiger Salamander
Ambystoma tigrinum

A002 Long-toed Salamander
Ambystoma macrodactylum

A003 California Newt
Taricha torosa

A004 Rough-skinned Newt
Taricha granulosa

A005 Pacific Giant Salamander
Dicamptodon ensatus

A006 Mount Lyell Salamander
Hydromantes platycephalus

A007 Limestone Salamander
Hydromantes brunus

A008 Shasta Salamander
Hydromantes shastae

A009 Ensatina
Ensatina eschscholtzi

A010 California Slender Salamander
Batrachoseps attenuatus

A011 Relictual Slender Salamander
Batrachoseps relictus

A012 Kern Canyon Slender Salamander
Batrachoseps simatus

A013 Tehachapi Slender Salamander
Batrachoseps stebbinsi

A014 Arboreal Salamander
Aneides lugubris

A015 Black Salamander
Aneides flavipunctatus

A016 Tailed Frog
Ascaphus truei

A017 Western Spadefoot
Scaphiopus hammondii

A018 Western Toad
Bufo boreas

A019 Yosemite Toad
Bufo canorus

A020 Pacific Treefrog
Hyla regilla

A021 Red-legged Frog
Rana aurora

A022 Cascades Frog
Rana cascadae

A023 Leopard Frog
Rana pipiens

A024 Foothill Yellow-legged Frog
Rana boylei

A025 Mountain Yellow-legged Frog
Rana muscosa

A026 Bullfrog
Rana catesbeiana

R001 Western Pond Turtle
Clemmys marmorata

R002 Western Fence Lizard
Sceloporus occidentalis

R003 Sagebrush Lizard
Sceloporus graciosus

R004 Side-blotched Lizard
Uta stansburiana

R005 Coast Horned Lizard
Phrynosoma coronatum

R006 Gilbert's Skink
Eumeces gilberti

R007 Western Skink
Eumeces skiltonianus

R008 Western Whiptail
Cnemidophorus tigris

R009 Southern Alligator Lizard
Gerrhonotus multicarinatus

R010 Northern Alligator Lizard
Gerrhonotus coeruleus

R011 California Legless Lizard
Anniella pulchra

R012 Rubber Boa
Charina bottae

R013 Ringneck Snake
Diadophis punctatus

R014 Sharp-tailed Snake
Contia tenuis

R015 Racer
Coluber constrictor

R016 Coachwhip
Masticophis flagellum

R017 Striped Racer
Masticophis lateralis

R018 Gopher Snake
Pituophis melanoleucus

R019 Common Kingsnake
Lampropeltis getulus

R020 California Mountain Kingsnake
Lampropeltis zonata

R021 Long-nosed Snake
Rhinocheilus lecontei

R022 Common Garter Snake
Thamnophis sirtalis

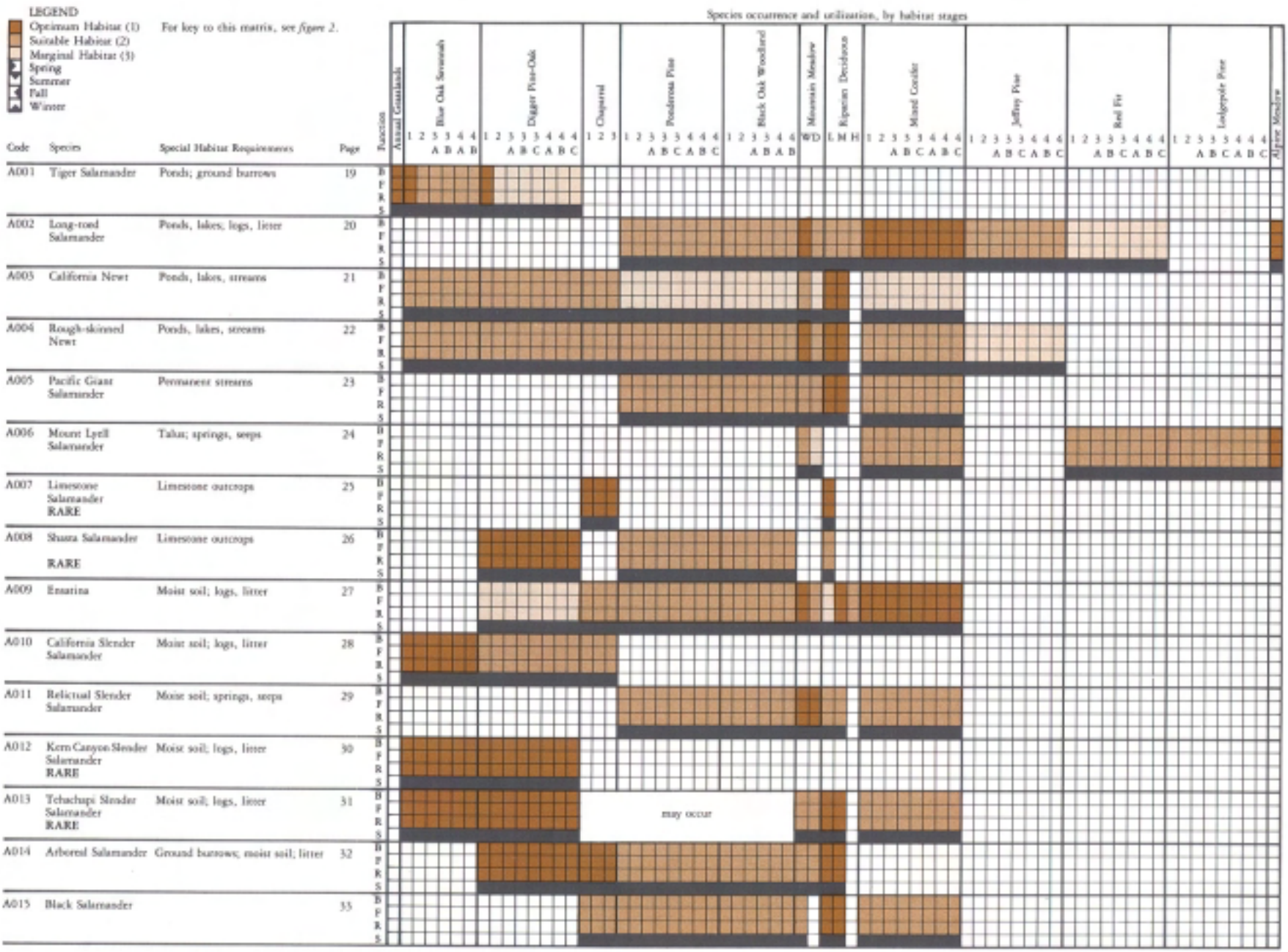
R023 Western Terrestrial Garter Snake
Thamnophis elegans

R024 Western Aquatic Garter Snake
Thamnophis couchi

R025 Western Black-headed Snake
Tantilla planiceps

R026 Night Snake
Hypsiglena torquata

R027 Western Rattlesnake
Crotalus viridis

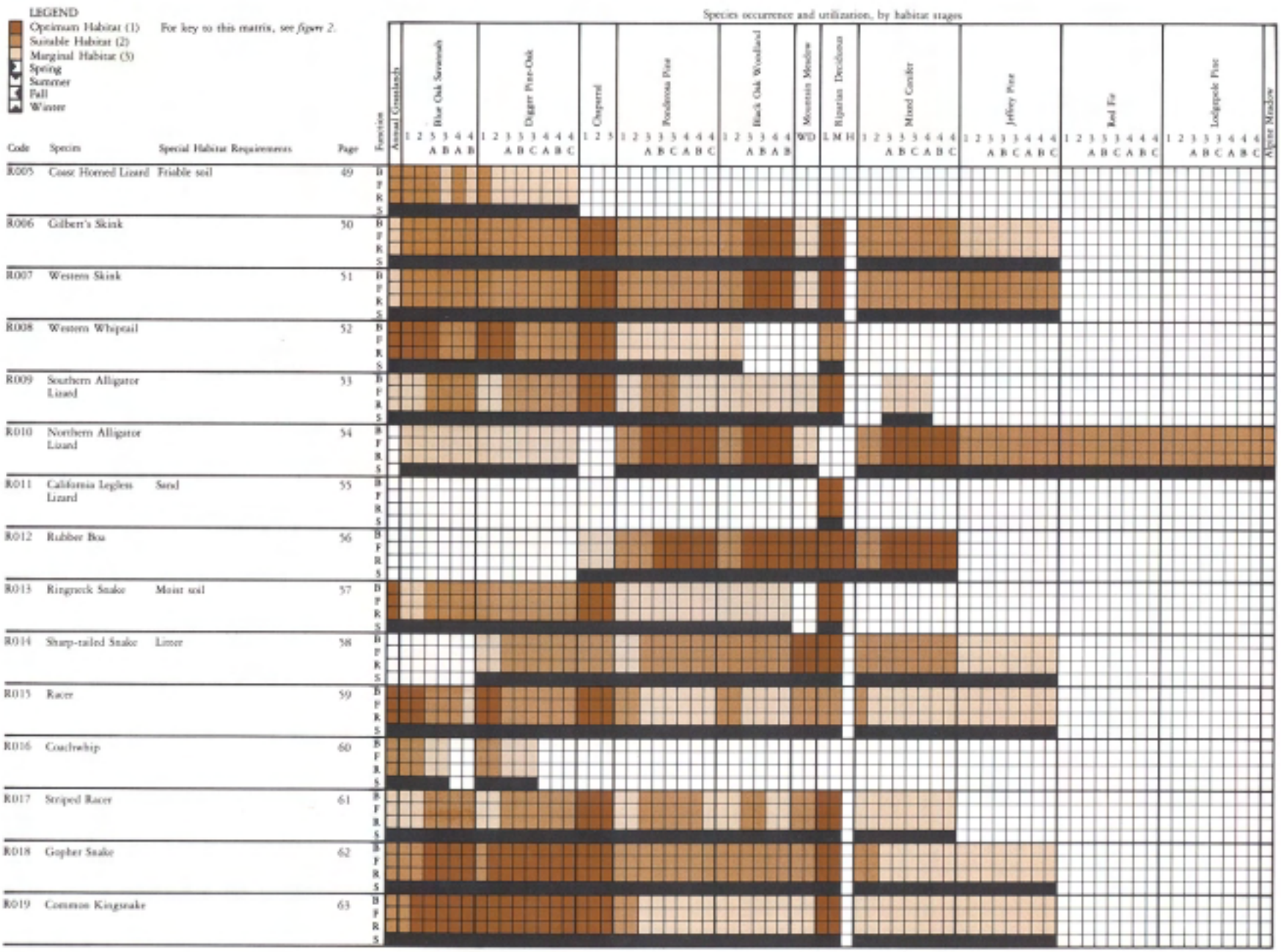

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
Summer
Fall
Winter
For key to this matrix, see figure 2.
Species occurrence and utilization, by habitat stages
Code
Species
Special Habitat Requirements
Page
Function
Annual Grasslands
Blue Oak Savannah
Digger Pine-Oak
Chaparral
Ponderosa Pine
Black Oak Woodland
Mountain Meadow
Riparian Deciduous
Mixed Conifer
Jeffrey Pine
Red Fir
Lodgepole Pine
Alpine Meadow
A001 Tiger Salamander Ponds; ground burrows 19
A002 Long-toed Salamander Ponds, lakes; logs, litter 20
A003 California Newt Ponds, lakes, streams 21
A004 Rough-skinned Newt Ponds, lakes, streams 22
A005 Pacific Giant Salamander Permanent streams 23
A006 Mount Lyell Salamander Talus; springs, seeps 24
A007 Limestone Salamander RARE Limestone outcrops 25
A008 Shasta Salamander RARE Limestone outcrops 26
A009 Ensatina Moist soil; logs, litter 27
A010 California Slender Salamander Moist soil; logs, litter 28
A011 Relictual Slender Salamander Moist soil; springs, seeps 29
A012 Kern Canyon Slender Salamander RARE Moist soil; logs, litter 30
A013 Tehachapi Slender Salamander RARE Moist soil; logs, litter 31
A014 Arboreal Salamander Ground burrows; moist soil; litter 32
A015 Black Salamander 33
may occur

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
Summer
Fall
Winter

For key to this matrix, see *figure 2.*

Species occurrence and utilization, by habitat stages

Code	Species	Special Habitat Requirements	Page	Function	Annual Grasslands 1	Blue Oak Savannah 2 A	3 B	3 A	4 B	4 A	4 B	Digger Pine-Oak 1	2 A	3 B	3 C	4 A	4 B	4 C	Chaparral 1	2	3	Ponderosa Pine 1	2 A	3 B	3 C	4 A	4 B	4 C	Black Oak Woodland 1	2 A	3 B	3 A	4 B	4 A	4 B	Mountain Meadow WD	Riparian Deciduous L	M	H	Mixed Conifer 1	2 A	3 B	3 C	4 A	4 B	4 C	Jeffrey Pine 1	2 A	3 B	3 C	4 A	4 B	4 C	Red Fir 1	2 A	3 B	3 C	4 A	4 B	4 C	Lodgepole Pine 1	2 A	3 B	3 C	4 A	4 B	4 C	Alpine Meadow
A016	Tailed Frog	Permanent streams	34	B F R S																																																																				
A017	Western Spadefoot	Ponds	35	B F R S																																																																				
A018	Western Toad	Water; ponds	36	B F R S																																																																				
A019	Yosemite Toad	Water; ponds	37	B F R S																																																																			
A020	Pacific Treefrog	Water	38	B F R S																																																																			
A021	Red-legged Frog	Permanent streams	39	B F R S																																																																		
A022	Cascades Frog	Ponds, streams	40	B F R S																																																																	
A023	Leopard Frog	Ponds, lakes	41	B F R S																																																																	
A024	Foothill Yellow-legged Frog	Permanent streams	42	B F R S																																																																	
A025	Mountain Yellow-legged Frog	Permanent streams, ponds, lakes	43	B F R S																																																																
A026	Bullfrog	Water; ponds, pools, lakes, streams	44	B F R S																																																															
R001	Western Pond Turtle	Permanent streams, lakes	45	B F R S																																																														
R002	Western Fence Lizard	Rock outcrops, friable soil	46	B F R S																																																													
R003	Sagebrush Lizard	Rock outcrops, friable soil	47	B F R S																																																												
R004	Side-blotched Lizard	Friable soil	48	B F R S																																																												


LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
Summer
Fall
Winter
For key to this matrix, see figure 2.
Species occurrence and utilization, by habitat stages
Code
Species
Special Habitat Requirements
Page
Function
Annual Grassland
Blue Oak Savannah
Digger Pine-Oak
Chaparral
Ponderosa Pine
Black Oak Woodland
Mountain Meadow
Riparian Deciduous
Mixed Conifer
Jeffrey Pine
Red Fir
Lodgepole Pine
Alpine Meadow
R005 Coast Horned Lizard Friable soil 49
R006 Gilbert's Skink 50
R007 Western Skink 51
R008 Western Whiptail 52
R009 Southern Alligator Lizard 53
R010 Northern Alligator Lizard 54
R011 California Legless Lizard Sand 55
R012 Rubber Boa 56
R013 Ringneck Snake Moist soil 57
R014 Sharp-tailed Snake Litter 58
R015 Racer 59
R016 Coachwhip 60
R017 Striped Racer 61
R018 Gopher Snake 62
R019 Common Kingsnake 63
B F R S

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
S Spring
U Summer
F Fall
W Winter

For key to this matrix, see *figure 2*.

Species occurrence and utilization, by habitat stages

Code	Species	Special Habitat Requirements	Page	Function	Annual Grasslands	Blue Oak Savannah	Digger Pine-Oak	Chaparral	Ponderosa Pine	Black Oak Woodland	Mountain Meadow	Riparian Deciduous	Mixed Conifer	Jeffrey Pine	Red Fir	Lodgepole Pine	Alpine Meadow
					1	1 2 5 3 4 4 6 A B A B	1 2 5 3 3 4 4 6 A B C A B C	1 2 3	1 2 5 5 3 4 4 4 A B C A B C	1 2 5 3 4 4 A B A B	WD	L M H	1 2 3 3 5 4 4 4 A B C A B C	1 2 3 3 3 4 4 4 A B C A B C	1 2 5 5 3 4 4 4 A B C A B C	1 2 5 5 3 4 4 4 A B C A B C	
R020	California Mountain Kingsnake		64	B													
				F													
				R													
				S													
R021	Long-nosed Snake		65	B			may occur										
				F													
				R													
				S													
R022	Common Garter Snake		66	B													
				F													
				R													
				S													
R023	Western Terrestrial Garter Snake	Permanent streams, ponds, lakes	67	B													
				F													
				R													
				S													
R024	Western Aquatic Garter Snake	Permanent streams, ponds	68	B													
				F													
				R													
				S													
R025	Western Black-headed Snake		69	B			may occur										
				F													
				R													
				S													
R026	Night Snake	Rock outcrops; crevices	70	B													
				F													
				R													
				S													
R027	Western Rattlesnake	Rock outcrops	71	B													
				F													
				R													
				S													

Tiger Salamander

A001 (*Ambystoma tigrinum*)

STATUS: No official listed status. Considered fragile because conversions of grassland to other types and use of poisons in ponds could have deleterious effects on species.

DISTRIBUTION/HABITAT: Found primarily in grasslands at elevations below 1000 ft (305 m), but has been sighted in an oak woodland habitat on the San Joaquin Experimental Range, Madera County.

SPECIAL HABITAT REQUIREMENTS: Ponds for breeding and ground burrows for summer dormancy.

BREEDING: Breeds from December to February in streams, ponds, reservoirs, and wells. Peak breeding varies with rain patterns from year to year. Females lay as many as 500 eggs attached singly or in clumps to submerged objects; many clutches. Mean clutch size 3 to 4 (range 1 to 15).

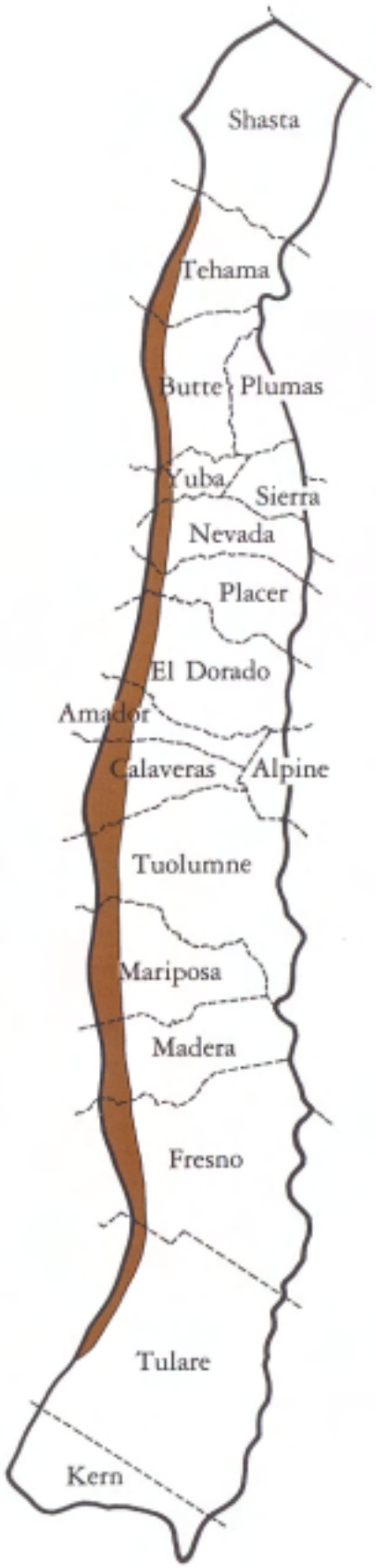
TERRITORY/HOME RANGE: Not territorial. Home range estimated as 1 acre (0.4 ha); species found up to 600 ft (180 m) from breeding sites.

FOOD HABITS: Aquatic and terrestrial insects and other invertebrates stalked or searched for in ponds, on land surfaces, and under objects.

OTHER:

REFERENCES: Stebbins 1951, 1954a, 1966, 1972; Gehlbach 1967.





Long-toed Salamander

A002 (*Ambystoma macrodactylum*)

STATUS: No official listed status. Common in preferred habitat.

DISTRIBUTION/HABITAT: Found from Stanislaus River drainage northward, with an elevational range of 1000 to 9000 ft (305 to 2740 m). Observed in all successional stages of ponderosa pine type to red fir type with mountain meadow and mixed-conifer types as favored habitats. Permanent bodies of water required at 7400 ft (2265 m), but temporary ponds suffice at 6000 ft (1830 m).

SPECIAL HABITAT REQUIREMENTS: Ponds and lakes for breeding; surface objects, such as logs, around breeding sites.

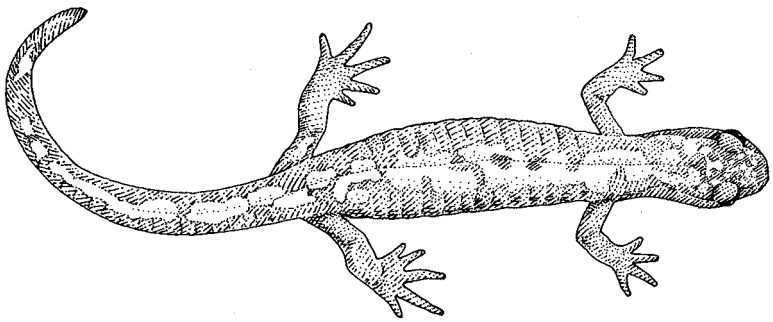
BREEDING: Breeds in May and June, with peak breeding depending on snowmelt. Eggs laid singly (range 85 to 345). Reproduces in small to large bodies of water where eggs are attached to submerged logs or other objects.

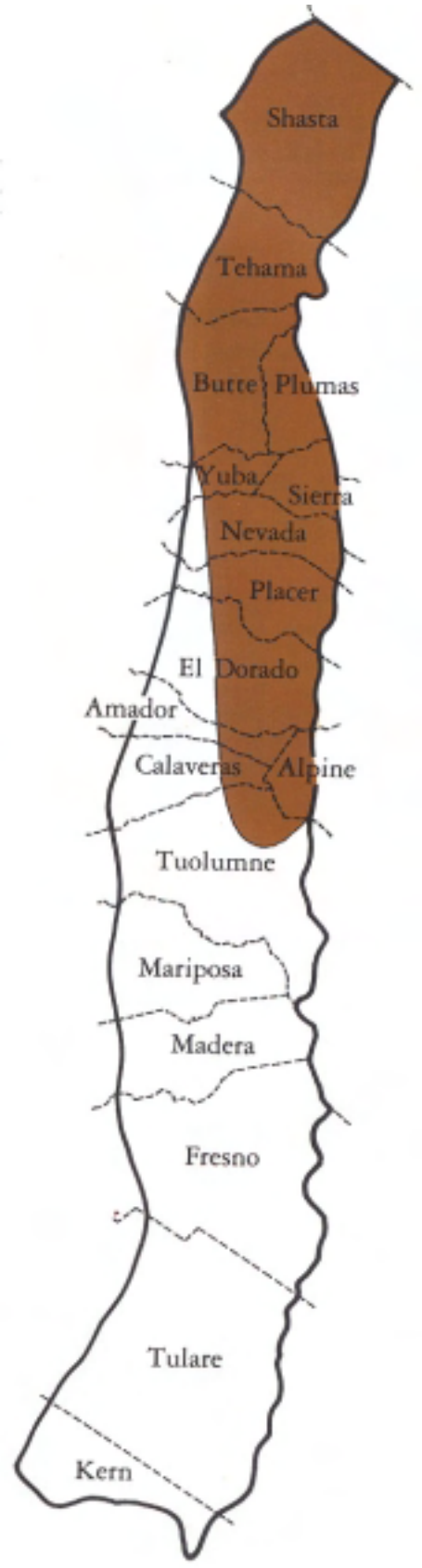
TERRITORY/HOME RANGE: Not territorial. Home ranges estimated up to 1 acre (0.4 ha).

FOOD HABITS: Stalks or scavenges for spiders, insects or insect parts under forest surface objects and in ponds.

OTHER:

REFERENCES: Stebbins 1951, 1954a, 1972; Ferguson 1961, 1963; Anderson 1967.





California Newt

A003 (*Taricha torosa*)

STATUS: No official listed status. Common in preferred habitat.

DISTRIBUTION/HABITAT: Found in all successional stages from blue oak savannah to mixed-conifer types; prefers riparian deciduous. Elevation range up to 6000 ft (1830 m).

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, and streams.

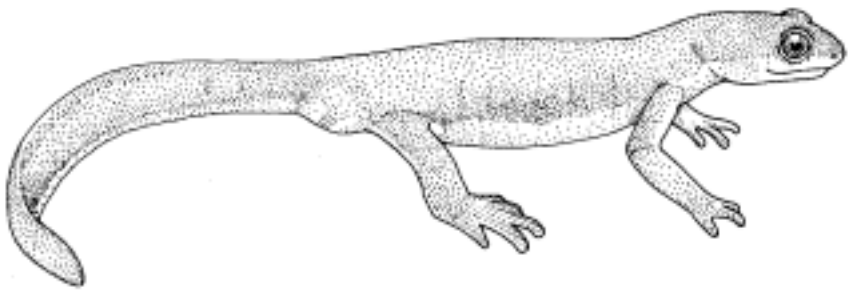
BREEDING: Breeds from February to June, with peak in March and April. Eggs laid in clumps (mean 16, range 6 to 30). Clumps attached to submerged vegetation and underside of boulders. Pools in streams (some lakes and reservoirs) are required breeding sites.

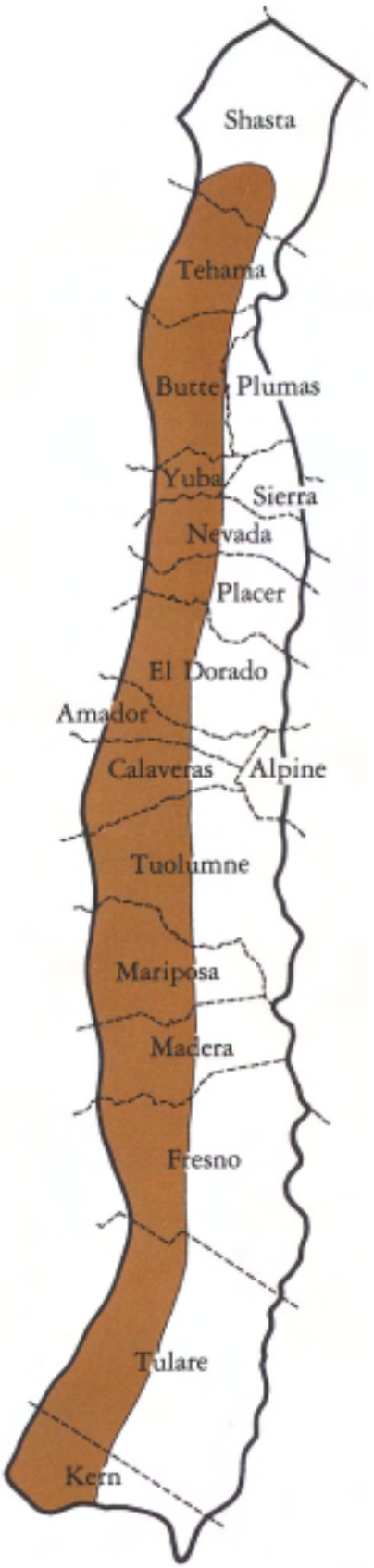
TERRITORY/HOME RANGE: Not thought to be territorial. Home ranges estimated at 1 acre (0.4 ha). Movement to and from breeding sites not included in home range.

FOOD HABITS: Searches for insects under surface objects and in streams.

OTHER: Inactive during late summer and early fall (until it rains). Evidently estivates in burrows and crevices; only a few found at this time of year.

REFERENCES: Stebbins 1951, 1954a, 1972.





Rough-skinned Newt

A004 (*Taricha granulosa*)

STATUS: No official listed status. Common in preferred habitat.

DISTRIBUTION/HABITAT: Found from blue oak savannah to Jeffrey pine types in all successional stages; prefers mountain meadows and riparian deciduous types. Elevation range up to 5000 ft (1520 m). Distribution from east of Chico, Butte County, northward.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, and streams for breeding.

BREEDING: Breeds from January to June, with peak activity in March and April. Females found with 1 to 40 eggs; eggs deposited singly.

TERRITORY/HOME RANGE: Not thought to be territorial. Home range estimated to be 1 acre (0.4 ha).

FOOD HABITS: Searches under surface objects and in ponds for insects and other arthropods (primarily aquatic).

OTHER: Inactive during late summer and early fall. Evidently estivates in burrows and crevices; only a few found at this time of year.

REFERENCES: Stebbins 1951, 1954a, 1972.





Pacific Giant Salamander

A005 (*Dicamptodon ensatus*)

STATUS: No official listed status. Common in preferred habitat.

DISTRIBUTION/HABITAT: Found up to 6000 ft (1830 m) in all successional stages of ponderosa pine, black oak woodland, mountain meadow, and mixed-conifer types; prefers riparian deciduous. Lives in damp forests in or near clear streams and rocky shores of mountain lakes in the area of Shasta County, but not in the Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS: Permanent streams for feeding and breeding.

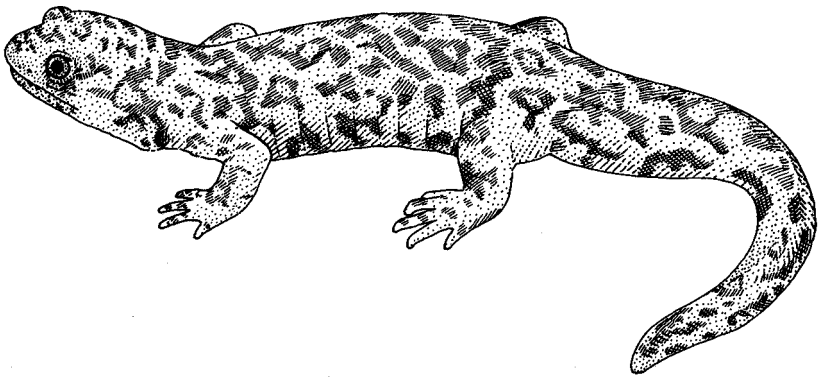
BREEDING: Breeds from March to May, with peak breeding in early May. Eggs laid in concealed locations several feet beneath the surface in cold, slowly flowing water of springs, channels, under streambanks, and beneath rocks in stream bottoms. Mean clutch size unknown but suspected to be 100 (range 70 to 146).

TERRITORY/HOME RANGE: Not thought to be territorial. Home range unknown.

FOOD HABITS: Searches under logs and other surface objects for insects, snails and slugs, shrews, mice and other amphibians.

OTHER:

REFERENCES: Stebbins 1951, 1954a, 1966, 1972; Anderson 1969.





Mount Lyell Salamander

A006 (*Hydromantes platycephalus*)

STATUS: No official listed status. Fragile species; total population relatively small, composed of scattered local populations.

DISTRIBUTION/HABITAT: Wet spots in the high Sierra Nevada-edges of snowbanks, seeps, wet meadows. Found in all successional stages of mixed conifer, red fir, and lodgepole pine. Elevation range 4000 to 11,600 ft (1220 to 3540 m).

SPECIAL HABITAT REQUIREMENTS: Wet areas (springs and seeps), under large granite slabs and boulders at the base of talus slopes.

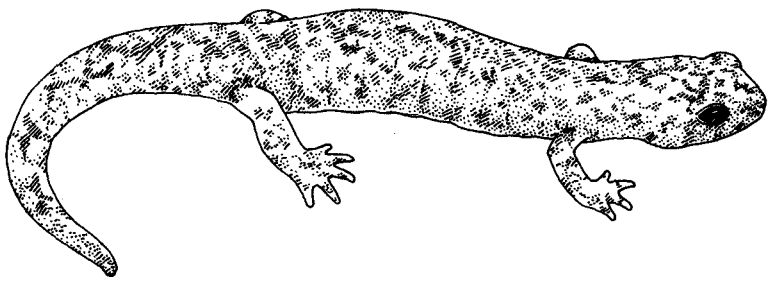
BREEDING: Breeding season unknown. Peak thought to be May and June depending on year. Clutch size unknown; nest site unknown.

TERRITORY/HOME RANGE: Not thought to be territorial. Home range may be up to 1 acre (0.4 ha), probably less.

FOOD HABITS: Searches for insects and spiders under surface objects.

OTHER: Thought to be a relict of a once widespread species in past Sierra glacial periods. Recent population reported in Desolation Wilderness, El Dorado County, but not confirmed. Species endemic to the Sierra Nevada.

REFERENCES: Adams 1942, Stebbins 1951, 1954a; Gorman 1964.





Limestone Salamander

A007 (*Hydromantes brunus*)

STATUS: Rare (State of California).

DISTRIBUTION/HABITAT: Very limited distribution. Found only along riparian deciduous zone in Merced River Canyon, Mariposa County. Elevation range 840 to 2500 ft (255 to 760 m). Associated with limestone outcrops.

SPECIAL HABITAT REQUIREMENTS: Moist limestone outcrops and caverns.

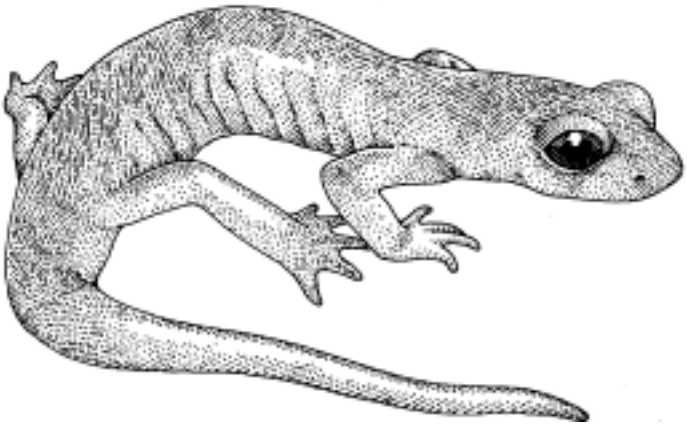
BREEDING: Little definite information. Suspected that it breeds in limestone caverns from May to July, with peak in June. Mean clutch size *7* (range 5 to 14).

TERRITORY/HOME RANGE: Not thought to be territorial. Home range may be as large as 1 acre (0.4 ha).

FOOD HABITS: Searches for insects and other invertebrates under surface objects and in caverns.

OTHER:

REFERENCES: Gorman 1964, Leach *et al.* 1976.





Shasta Salamander

A008 (*Hydromantes shastae*)

STATUS: Rare (State of California).

DISTRIBUTION/HABITAT: Restricted in distribution to limestone outcrops in Lake Shasta area, Shasta County. Found in all successional stages of digger pine-oak, ponderosa pine, and black oak types. Elevation range up to 2500 ft (760 m).

SPECIAL HABITAT REQUIREMENTS: Moist limestone outcrops and caverns.

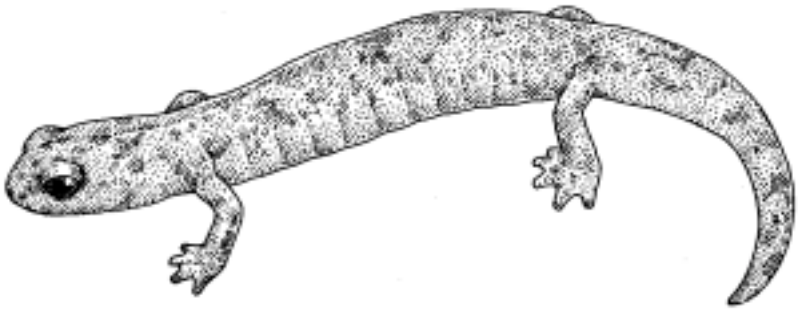
BREEDING: Probably breeds from May to July, with peak breeding in June. Mean clutch size 7 (range 5 to 12). Thought that it breeds in moist limestone caverns.

TERRITORY/HOME RANGE: Not thought to be territorial. Home range may be up to 1 acre (0.4 ha).

FOOD HABITS: Searches for insects and other invertebrates under surface objects and in caverns.

OTHER:

REFERENCES: Gorman and Camp 1953, Gorman 1964, Leach *et al.* 1976, Papenfuss and Carufel 1977.





Ensatina

A009 (*Ensatina eschscholtzi*)

STATUS: No official listed status. Common in preferred habitat.

DISTRIBUTION/HABITAT: A forest dweller, found in all successional stages from chaparral to mixed-conifer types. Prefers mountain meadow and mixed-conifer types. Elevation range 1900 to 8000 ft (580 to 2440 m). An upper foothill subspecies, *E. e. xanthoptica*, found from Mokelumne River south to Bass Lake, Madera County.

SPECIAL HABITAT REQUIREMENTS: Moist subsurface areas to lay eggs (under logs and litter).

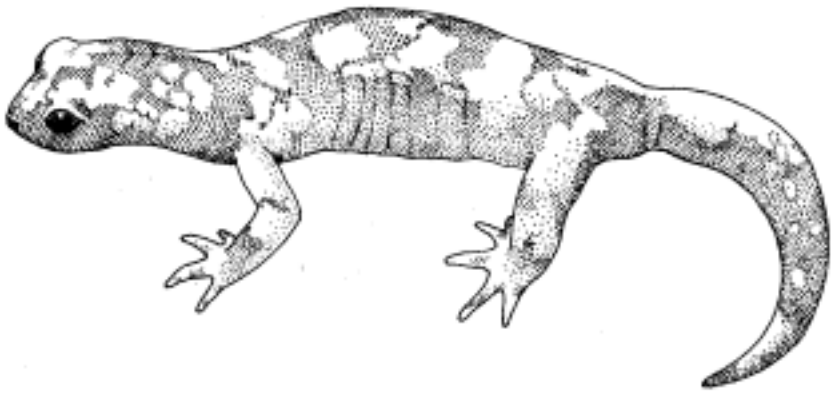
BREEDING: Lays eggs from April to June, with peak activity varying from year to year. Clutch size averages 11 (range 5 to 16).

TERRITORY/HOME RANGE: Not thought to be territorial. Home range estimated to be up to 1 acre (0.4 ha).

FOOD HABITS: Searches for insects and other invertebrates under surface objects.

OTHER:

REFERENCES: Stebbins 1954a, 1954b; Brown 1974.





California Slender Salamander

A010 (*Batrachoseps attenuatus*)

STATUS: No official listed status. Common in preferred habitat.

DISTRIBUTION/HABITAT: Found in all successional stages of blue oak savannah, digger pine-oak and chaparral types; prefers blue oak savannah. The only slender salamander found in oak woodlands north of Merced River. Elevation range to 5000 ft (1520 m).

SPECIAL HABITAT REQUIREMENTS: Moist soil under logs and litter.

BREEDING: Breeds from October to January, with peak breeding in November. Mean clutch size 9 (range 4 to 25). Eggs laid in moist places under surface objects and in burrows.

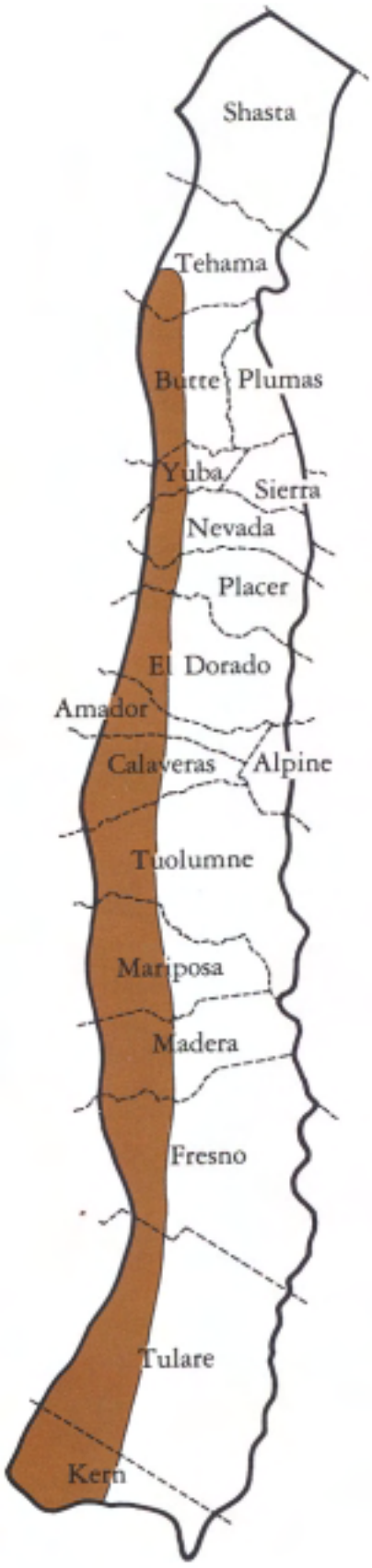
TERRITORY/HOME RANGE: Not thought to be territorial. Home range up to 0.5 acre (0.2 ha).

FOOD HABITS: Searches for small insects and other invertebrates under surface objects.

OTHER:

REFERENCES: Hendrickson 1954, Brame and Murray 1968.





Relictual Slender Salamander

A011 (*Batrachoseps relictus*)

STATUS: No official listed status. Common in preferred habitat.

DISTRIBUTION/HABITAT: Prefers mountain meadows; also found in ponderosa pine, black oak woodland, riparian-deciduous and mixed-conifer types, from Merced River Canyon, Tuolumne County, south. Elevation range up to 8000 ft (2440 m).

SPECIAL HABITAT REQUIREMENTS: Moist soil, springs, and seeps.

BREEDING: Lays eggs in moist places under surface objects from May to July, with peak activity suspected to be in June. Mean clutch size 4 (range 1 to 12).

TERRITORY/HOME RANGE: Not thought to be territorial. Home range suspected to be 0.5 acre (0.2 ha).

FOOD HABITS: Searches for small insects and other invertebrates under surface objects.

OTHER: Species first described in 1968; little ecological information available.

REFERENCES: Stebbins 1966, 1972; Brame and Murray 1968.





Kern Canyon Slender Salamander

A012 (*Batrachoseps simatus*)

STATUS: Rare (State of California).

DISTRIBUTION/HABITAT: Found only in Kern River Canyon, Tulare and Kern Counties. Observed in all successional stages of blue oak savannah; prefers digger pine-oak types. Elevation range 1000 to 4000 ft (305 to 1220 m).

SPECIAL HABITAT REQUIREMENTS: Logs, litter, and moist soil.

BREEDING: Lays eggs in moist places under surface objects. Clutch size unknown. Suspected to breed from November to February, with peak activity in November.

TERRITORY/HOME RANGE: Not thought to be territorial. Home range suspected to be 0.5 acre (0.2 ha).

FOOD HABITS: Forages by searching and waiting for small insects and other invertebrates under surface objects.

OTHER: Species first described in 1968; little ecological information available.

REFERENCES: Brame and Murray 1968, Leach *et al.* 1976.





Tehachapi Slender Salamander

A013 (*Batrachoseps stebbinsi*)

STATUS: Rare (State of California).

DISTRIBUTION/HABITAT: Found only in Tulare and Kern Counties. Reported found from 2500 to 8300 ft (760 to 2530 m). Prefers all successional stages of blue oak savannah, digger pine-oak, and riparian deciduous types. Other habitats are mountain meadow and all successional stages of mixed conifer.

SPECIAL HABITAT REQUIREMENTS: Moist places under logs and litter.

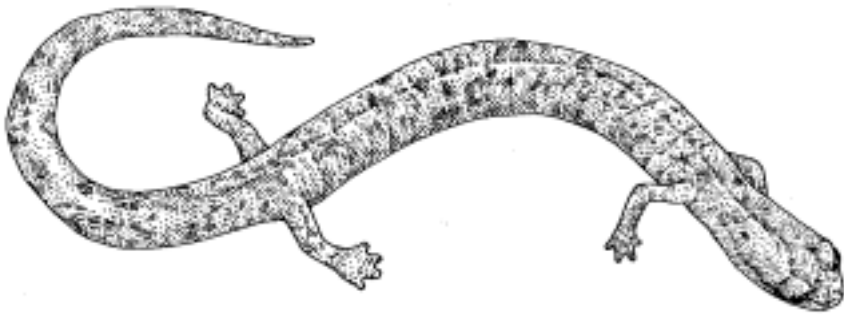
BREEDING: Eggs laid in moist places under surface objects. Breeding season suspected to be from November to February, with peak activity in November and December. Clutch size unknown.

TERRITORY/HOME RANGE: Not thought to be territorial. Home range suspected to be 0.5 acre (0.2 ha).

FOOD HABITS: Searches or waits for small insects and other invertebrates under surface objects.

OTHER: First described in 1968; little ecological information available.

REFERENCES: Brame and Murray 1968, Leach *et al.* 1976.





Arboreal Salamander

A014 (*Aneides lugubris*)

STATUS: No official listed status. Common in preferred habitat.

DISTRIBUTION/HABITAT: Found from 1000 to 5000 ft (305 to 1520 m) from Madera County north to El Dorado County. Prefers digger pine-oak, chaparral, and riparian deciduous types. Also found in ponderosa pine, black oak woodland, and mountain meadow types. Usually found in association with interior live oak.

SPECIAL HABITAT REQUIREMENTS: Moist places under logs and litter. Uses ground burrows during summer.

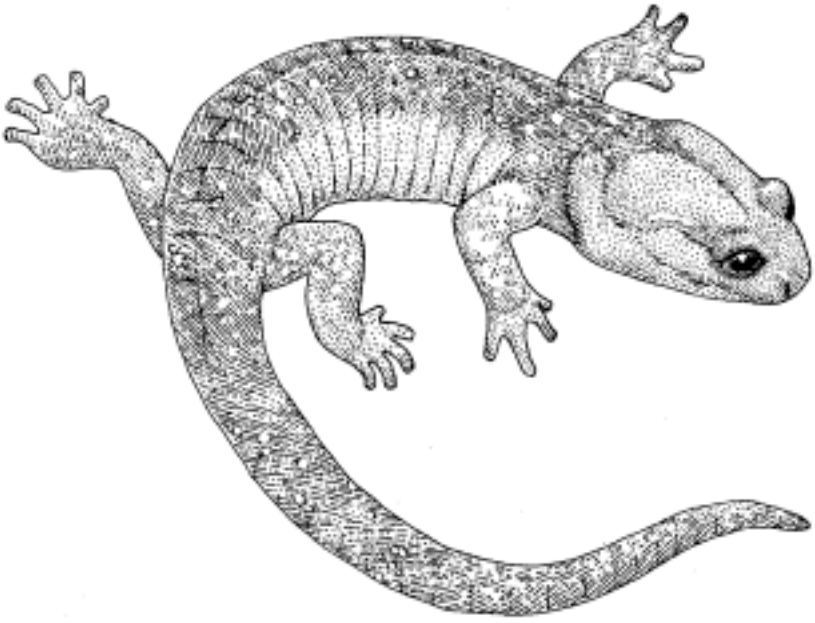
BREEDING: Eggs laid from May to June in moist places under surface objects, in logs, and occasionally up in trees, with peak activity around June 1. Mean clutch size 17 (range 12 to 23).

TERRITORY/HOME RANGE: Not thought to be territorial. Home range suspected to be 1 acre (0.4 ha).

FOOD HABITS: Searches or waits for insects and other invertebrates under surface objects. Also eats some fungi.

OTHER: Primarily a foothill species.

REFERENCES: Stebbins 1951, 1954a, 1966, 1972; Rosenthal 1957, Lynch and Wake 1974.





Black Salamander

A015 (*Aneides flavipunctatus*)

STATUS: No official listed status. Common in its preferred habitat.

DISTRIBUTION/HABITAT: Distributed in Shasta Lake area, Shasta County. Found in all successional stages of digger pine-oak, chaparral, ponderosa pine, black oak woodland, and mixed-conifer types. Also occurs in wet mountain meadows and riparian deciduous types. Elevation range 1000 to 4000 ft (305 to 1220 m).

SPECIAL HABITAT REQUIREMENTS: Unknown.

BREEDING: Eggs laid in moist places under surface objects from June to August, with peak activity in July. Mean clutch size 15 (range 5 to 30).

TERRITORY/HOME RANGE: Not thought to be territorial. Suspected home range 1 acre (0.4 ha).

FOOD HABITS: Searches or waits for insects and other invertebrates under surface objects.

OTHER:

REFERENCES: Stebbins 1951, 1954a, 1966, 1972; Lynch 1974.





Tailed Frog

A016 (*Ascaphus truei*)

STATUS: No official listed status. Status needs study.

DISTRIBUTION/HABITAT: Edge of its range in the McCloud River drainage, Shasta County, and not reported in the Sierra Nevada. Found in fast-moving streams from ponderosa pine to red fir type in all successional stages. Prefers riparian deciduous and mixed-conifer types.

SPECIAL HABITAT REQUIREMENTS: Permanent streams for breeding.

BREEDING: Eggs laid in cool streams in summer; mates in August and September. Mean clutch size 40 (range 35 to 50).

TERRITORY/HOME RANGE: Not territorial. Home range unknown.

FOOD HABITS: Adults wait for prey (insects and other invertebrates) in streams and on wet forest surfaces. Larvae eat algae and pollen.

OTHER:

REFERENCES: Stebbins 1951, 1954a, 1972; Bury 1968, Metter 1968.





Western Spadefoot

A017 (*Scaphiopus hammondii*)

STATUS: No official listed status. Habitat loss because of agricultural conversion.

DISTRIBUTION/HABITAT: Common in grassland at lower elevations. Found above 1000 ft (305 m) in only a few areas, such as the San Joaquin Experimental Range, Madera County.

SPECIAL HABITAT REQUIREMENTS: Winter-spring ponds.

BREEDING: Eggs laid in vernal pools (ponds) and occasionally in slow streams from February to April, with peak activity in March. Mean clutch size 400 (range 300 to 500).

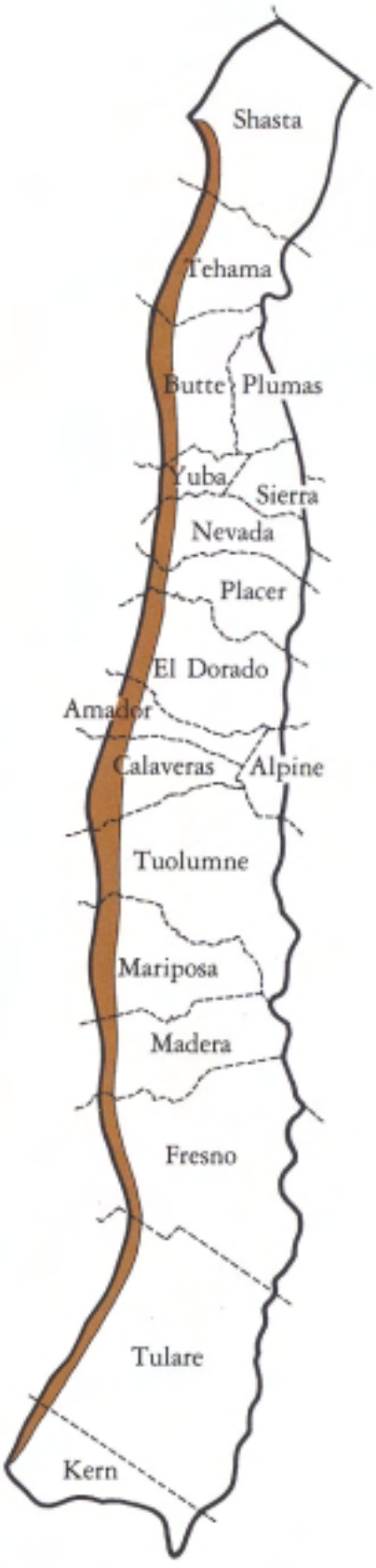
TERRITORY/HOME RANGE: Territory restricted to vicinity of calling male. Home range suspected to be up to 1 acre (0.4 ha).

FOOD HABITS: Waits for insects and other invertebrates on surface of ponds.

OTHER:

REFERENCES: Stebbins 1951, 1954a, 1966, 1972.





Western Toad

A018 (*Bufo boreas*)

STATUS: No official listed status. Common in preferred habitat.

DISTRIBUTION/HABITAT: Elevation range 1000 to 10,000 ft (305 to 3050 m) in mountain meadow and riparian deciduous types at lower elevations. Uncommon at higher elevations.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, streams, or rivers for breeding.

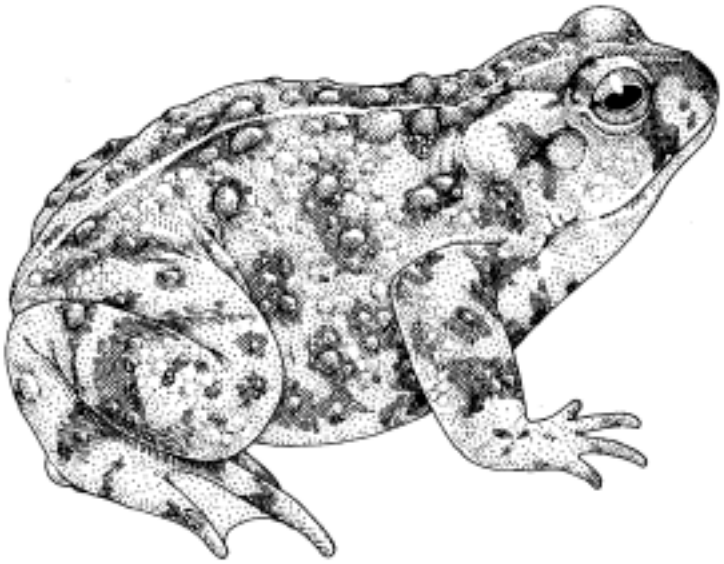
BREEDING: Eggs laid in open water from February to July, with peak activity in April. Peak activity varies with elevation and from year to year. Mean clutch size 10,000 (range 100 to 15,000).

TERRITORY/HOME RANGE: Territory limited to vicinity of calling male. Home range up to 0.5 acre (0.2 ha).

FOOD HABITS: Waits for prey (moving insects) on surface of ground or in shallow burrows.

OTHER: Common toad of California.

REFERENCES: Stebbins 1951, 1954a, 1966, 1972; Karlstrom 1962.





Yosemite Toad

A019 *(Bufo canorus)*

STATUS: No official listed status. Fragile; limited distribution of total species.

DISTRIBUTION/HABITAT: Restricted to central high Sierra Nevada. Prefers mountain meadow, lodgepole pine, and alpine meadow types. Also found in all successional stages of mixed-conifer, Jeffrey pine, and red fir types. Elevation range 6400 to 11,300 ft (1950 to 3440 m).

SPECIAL HABITAT REQUIREMENTS: Relatively warm-water ponds for breeding (usually in meadows).

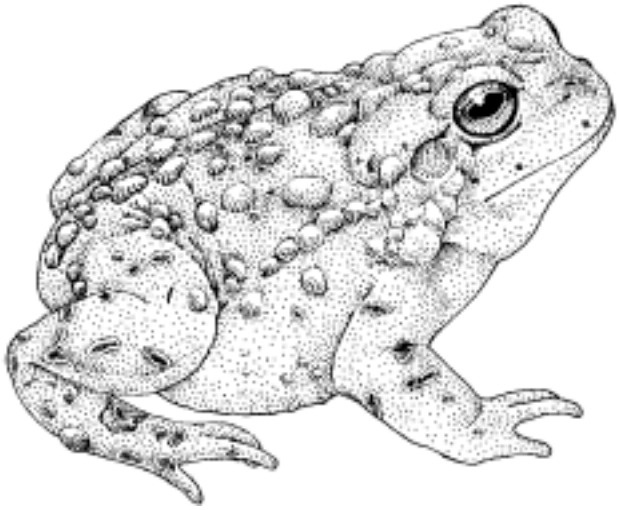
BREEDING: Eggs laid in ponds from April to June, with peak activity in late May (varies from year to year). Karlstrom (1962) indicates they lay "eggs in shallow water where heating effect [of sun] is pronounced." Water temperatures at egg-laying sites range from 45°F to 73° F (7°C to 23°C). Mean clutch size 8000 (range 6000 to 15,000).

TERRITORY/HOME RANGE: Territory restricted to vicinity of calling male. Suspected home range 0.5 acre (0.2 ha).

FOOD HABITS: Waits and pounces on insects and other invertebrates. Forages on the surface of ground.

OTHER: Endemic to the Sierra Nevada.

REFERENCES: Stebbins 1951, 1954a, 1966, 1972; Karlstrom 1962, 1973.





Pacific Treefrog

A020 (*Hyla regilla*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Widespread; found in all habitat types; more common in annual grassland, mountain meadow, and riparian deciduous types. Elevation range to 13,000 ft (3960 m).

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, streams, or rivers for breeding.

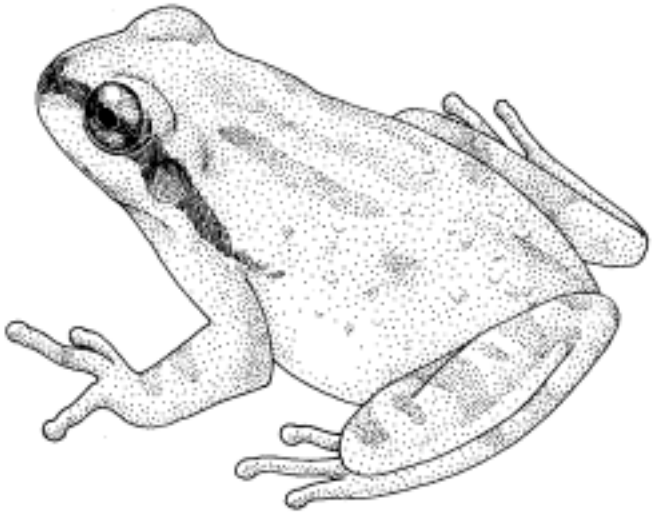
BREEDING: Eggs laid in ponds, lakes, streams, and rivers from February to July. Peak activity from March to June, but varies with elevation and from year to year. Mean clutch size 600 (range 500 to 700).

TERRITORY/HOME RANGE: Territory restricted to vicinity of calling male. Home range unknown.

FOOD HABITS: Waits for and pounces on small insects and other invertebrates in moist areas (meadows and stream edges).

OTHER: A subspecies found in forested areas of the Sierra Nevada; terrestrial and lives away from meadows and streams.

REFERENCES: Stebbins 1951, 1954a, 1966, 1972.





Red-legged Frog

A021 (*Rana aurora*)

STATUS: No official listed status. Fragile. Range recently reduced when Bullfrog introduced. Populations in the central and southern Sierra Nevada rare, perhaps extinct. Detailed study underway.

DISTRIBUTION/HABITAT: Found in blue oak savannah, digger pine-oak, and chaparral habitat types. Prefers riparian deciduous. Primarily found from Mariposa County northward. Elevation range 1000 to 6000 ft (305 to 1830 m). Few present locations known above 1000 ft (305 m).

SPECIAL HABITAT REQUIREMENTS: Quiet pools in permanent streams; pools at least 3 ft (1 m) deep.

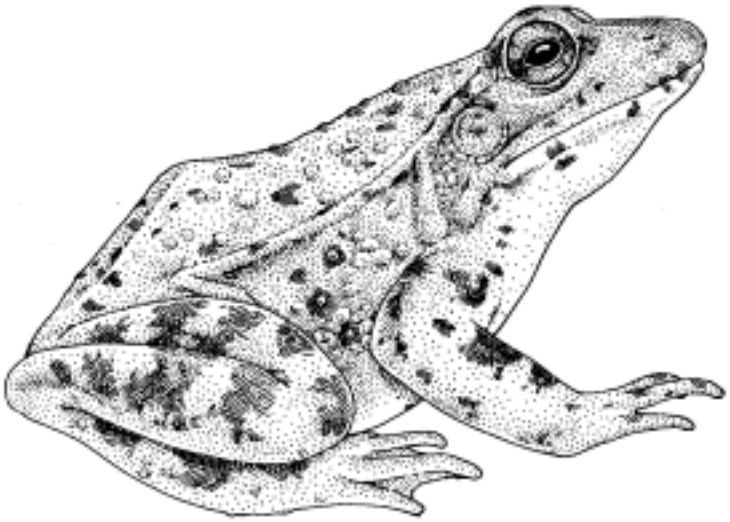
BREEDING: Eggs laid in February and March in pools of permanent, slow-moving streams. Mean clutch size 300 (range 100 to 600).

TERRITORY/HOME RANGE: Not thought to be territorial. Home range unknown.

FOOD HABITS: Waits for and pounces on insects and other small animals near water's edge.

OTHER:

REFERENCES: Stebbins 1951, 1954a, 1966, 1972; Altig and Dumas 1972.





Cascades Frog

A022 (*Rana cascadae*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Limited distribution in the western Sierra Nevada Zone, from northern tip of Butte County northward. Found in forested types-mixed conifer, Jeffrey pine, red fir, and lodgepole pine; prefers mountain meadow, riparian deciduous, and alpine meadow types. Elevation range 1000 to 9000 ft (305 to 2740 m).

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, streams, or rivers.

BREEDING: Eggs laid in streams, rivers, ponds, and lakes from March to June, with peak activity in April. Mean clutch size 300 (range 100 to 600).

TERRITORY/HOME RANGE: Not thought to be territorial. Home range unknown.

FOOD HABITS: Waits for and pounces on insects and other small animals in water (ponds and streams).

OTHER: Best work done in Washington, but data may not apply to California.

REFERENCES: Slater 1939, Stebbins 1951, 1954a, 1966, 1972; Altig and Dumas 1971.





Leopard Frog

A023 (*Rana pipiens*)

STATUS: No official listed status. Reported in Lake Tahoe Basin, El Dorado County. Present status unknown.

DISTRIBUTION/HABITAT: Found in mountain meadow, riparian deciduous, and mixed-conifer types. Distribution limited to Tahoe Basin. Elevation range 6200 to 7000 ft (1890 to 2130 m).

SPECIAL HABITAT REQUIREMENTS: Streams, rivers, ponds, or lakes.

BREEDING: Eggs laid in open water in May and June, with peak activity around June 1. Mean clutch size 4000 (range 3000 to 6000).

TERRITORY/HOME RANGE: Not territorial, except in vicinity of male. Home range unknown.

FOOD HABITS: Waits for and pounces on insects and other small animals near open water.

OTHER: An introduced species in the Sierra Nevada; might displace native frogs; could be considered a pest.

REFERENCES: Bryant 1917, Stebbins 1954a.





Foothill Yellow-legged Frog

A024 (*Rana boylei*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Native of foothill streams. Found the entire length of the Sierra Nevada in streams and mountain meadows from 1000 to 6000 ft (305 to 1830 m).

SPECIAL HABITAT REQUIREMENTS: Permanent foothill streams.

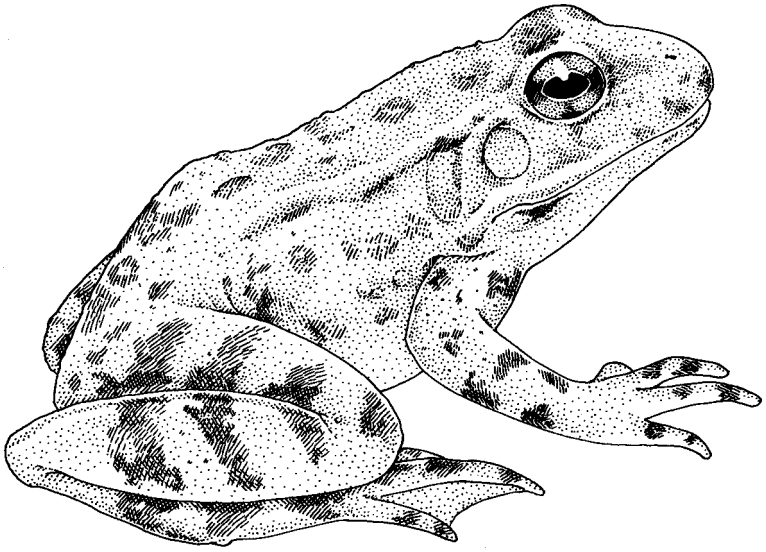
BREEDING: Eggs laid in streams, often where water moves over rocks at increased flow, in April and May. Mean clutch size 200 to 300 eggs (range 100 to 1000).

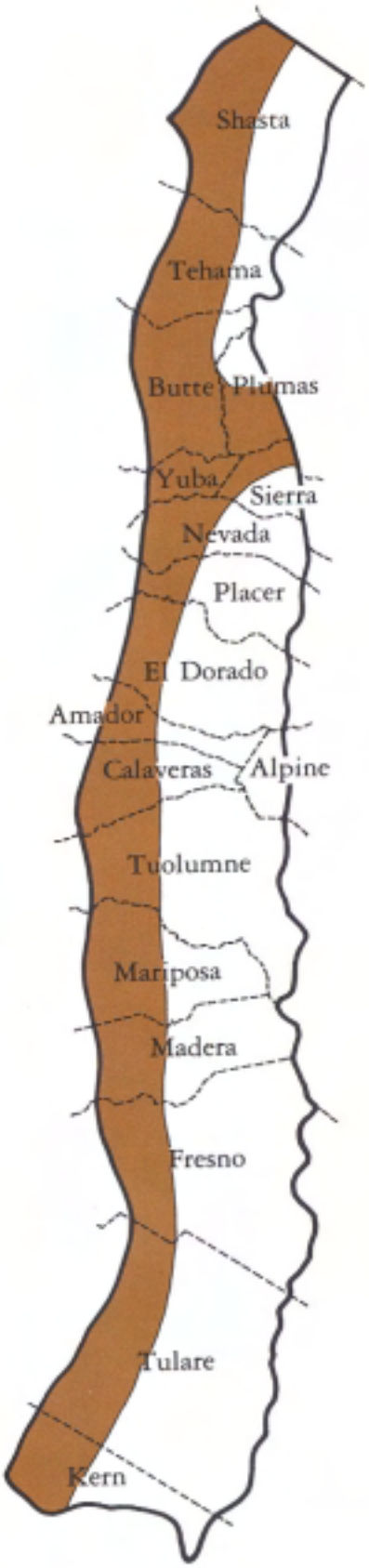
TERRITORY/HOME RANGE: Not territorial. Home range thought to be small.

FOOD HABITS: Waits for and pounces on any small animal moving at stream edge or in water.

OTHER: Affected by reduced flow in foothill streams.

REFERENCES: Zweifel 1955, 1968a.





Mountain Yellow-legged Frog

A025 (*Rana muscosa*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Found year-round in streams, rivers, ponds, and lakes from 5000 to 13,000 ft (1520 to 3960 m). Prefers mountain meadow, riparian deciduous, and alpine meadow types. Distributed from the southern Sierra Nevada north to Plumas and Butte Counties.

SPECIAL HABITAT REQUIREMENTS: Permanent streams, rivers, ponds, and lakes.

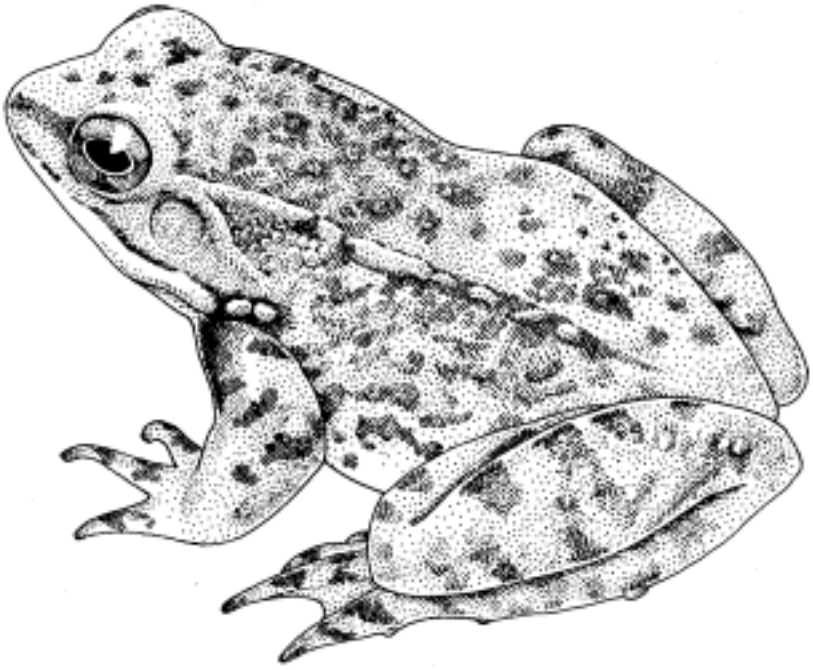
BREEDING: Eggs laid in rivers, streams, ponds, and lakes from May to July, with peak activity in June. Mean clutch size 200 to 300 (range 100 to 500).

TERRITORY/HOME RANGE: Not thought to be territorial; home range thought to be small.

FOOD HABITS: Waits for and pounces on small animals at stream and lake edges.

OTHER: Numbers reduced when trout introduced into high lakes.

REFERENCES: Zweifel 1955, 1968b.





Bullfrog

A026 (*Rana catesbeiana*)

STATUS: No official listed status. Game species (State of California).

DISTRIBUTION/HABITAT: Found year-round in ponds, pools, lakes, ditches, and streams in annual grassland, blue oak savannah, digger pine-oak, and chaparral types. Also found in forested types up to 6000 ft (1830 m). Distributed the entire length of the Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS: Ponds, pools, lakes, ditches, rivers, and streams.

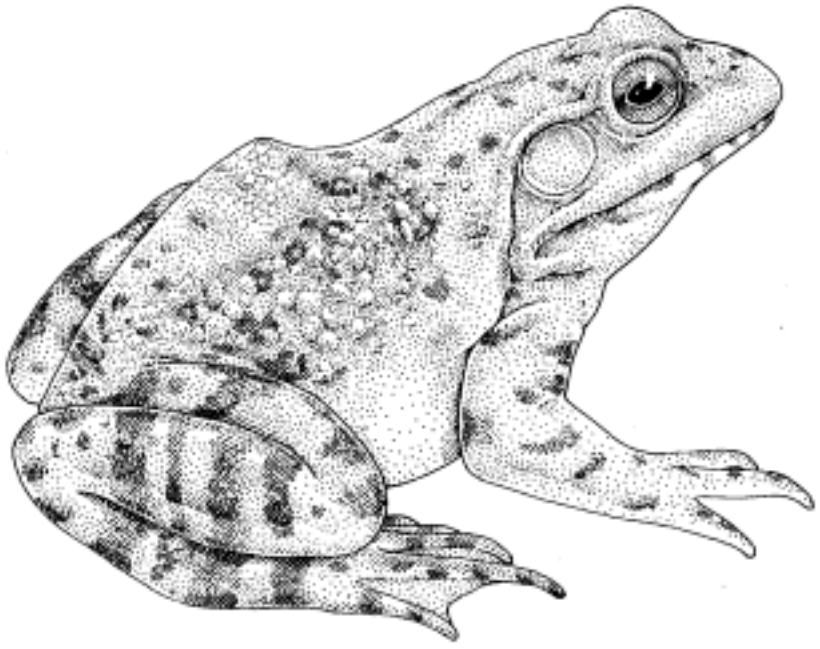
BREEDING: Eggs laid in permanent water from April to June, with peak activity in May. Clutch size numbers in the thousands.

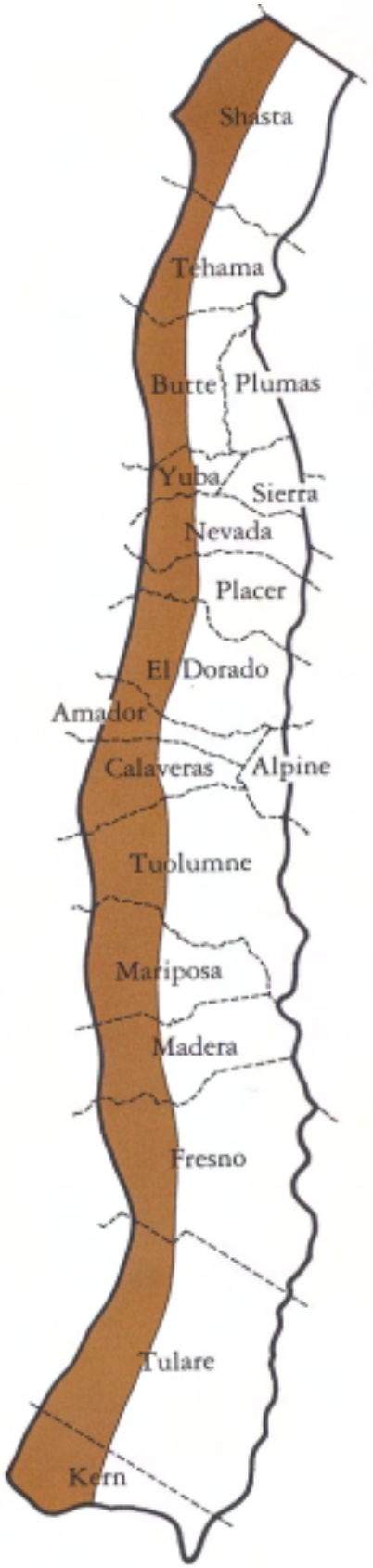
TERRITORY/HOME RANGE: Territory restricted to the vicinity of calling male. Home range size unknown.

FOOD HABITS: A voracious feeder, waits for and pounces on anything it can catch and swallow near pond edges and streams.

OTHER: An introduced species in the Sierra Nevada. Known to be detrimental to native species of frogs. Only a few populations above 4000 ft (1220 m).

REFERENCES: Stebbins 1951, 1954a, 1966, 1972; Moyle 1973.





Western Pond Turtle

R001 (*Clemmys marmorata*)

STATUS: No official listed status

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DISTRIBUTION/HABITAT: Found year-round in ponds and streams, primarily in the foothills. Also found in suitable habitat in forested types up to 6000 ft (1830 m).

SPECIAL HABITAT REQUIREMENTS: Permanent streams, rivers, ponds, and lakes (may survive long periods of drought by burrowing into mud).

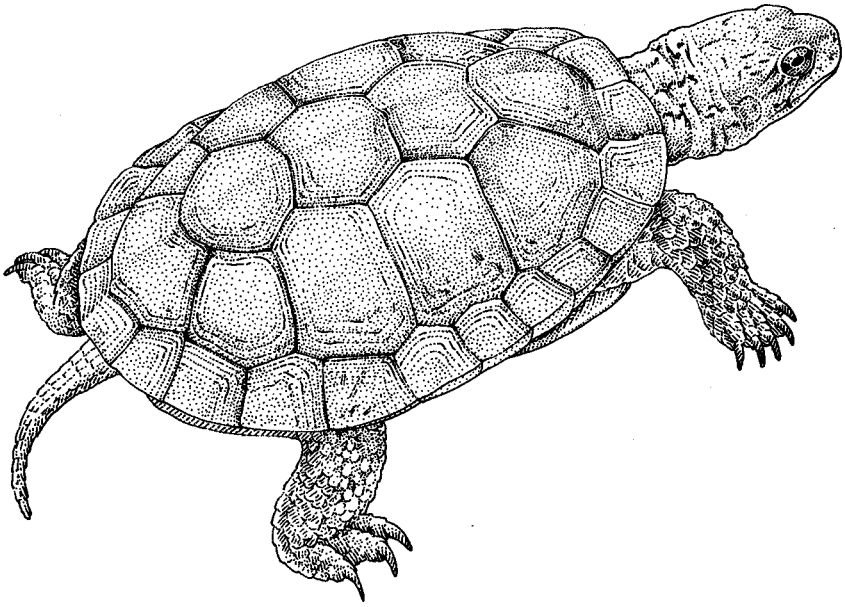
BREEDING: Eggs laid in moist sand or soil from March to May, with peak activity in April. Mean clutch size 7 (range 5 to 11).

TERRITORY/HOME RANGE: May not be territorial. Home range thought to be small.

FOOD HABITS: Searches for aquatic plants, carrion, and insects in streams and ponds.

OTHER: Only turtle in this management area.

REFERENCES: Stebbins 1954a, 1966, 1972; Bury 1970, 1972.





Western Fence Lizard

R002 (*Sceloporus occidentalis*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Found throughout the Sierra Nevada in all successional stages of numerous habitat types up to 9000 ft (2740 m). Prefers annual grassland, blue oak savannah, digger pine-oak, chaparral, and riparian deciduous types. Also found in forested areas.

SPECIAL HABITAT REQUIREMENTS: Rock outcrops and friable soil for breeding.

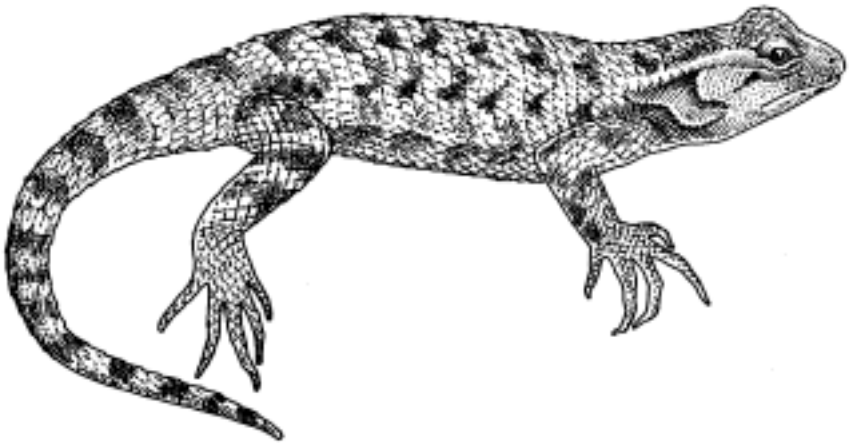
BREEDING: Eggs laid in damp, well-aerated soil from mid-May to mid-July, with peak activity in June. Mean clutch size 9 (range 5 to 15).

TERRITORY/HOME RANGE: Territory thought to be within 25 ft (7.5 m) radius of adult male. Home range estimated to be up to 0.25 acre (0.1 ha).

FOOD HABITS: Waits and searches for insects in rock outcrops.

OTHER: Subspecies, *S. o. taylori*, endemic to the central high Sierra Nevada.

REFERENCES: Stebbins 1954a, 1966, 1972.





Sagebrush Lizard

R003 (*Sceloporus graciosus*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Found in forested areas throughout the Sierra Nevada. Prefers mixed-conifer type in shrub seedling and open, pole-size successional stages. Also found in the black oak woodland and Jeffrey pine types. Elevation range 6000 to 9000 ft (1830 to 2740 m).

SPECIAL HABITAT REQUIREMENTS: Rock outcrops and friable soil for breeding.

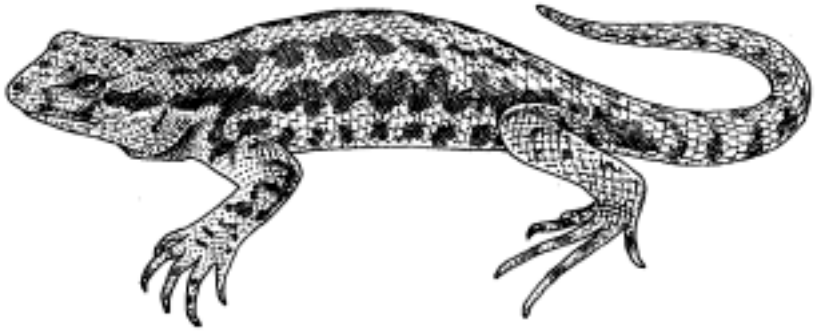
BREEDING: Eggs laid in loose, well-aerated soil in June and July, with peak activity in late June. Mean clutch size 3 or 4 (range 2 to 7).

TERRITORY/HOME RANGE: Territory thought to be within 25 ft (7.5 m) radius of adult male. Home range estimated to be up to 0.5 acre (0.2 ha).

FOOD HABITS: Waits and searches for insects and other small animals in rock outcrops and around bushes.

OTHER:

REFERENCES: Stebbins 1944, 1954a, 1966, 1972.





Side-blotched Lizard

R004 (*Uta stansburiana*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Generally found below 1000 ft (305 m) from Mariposa County southward. Found on the San Joaquin Experimental Range, Madera County, up to 2000 ft (610 m) in annual grassland, blue oak savannah, and digger pine-oak types. No optimum habitat in the Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS: Friable soil for breeding.

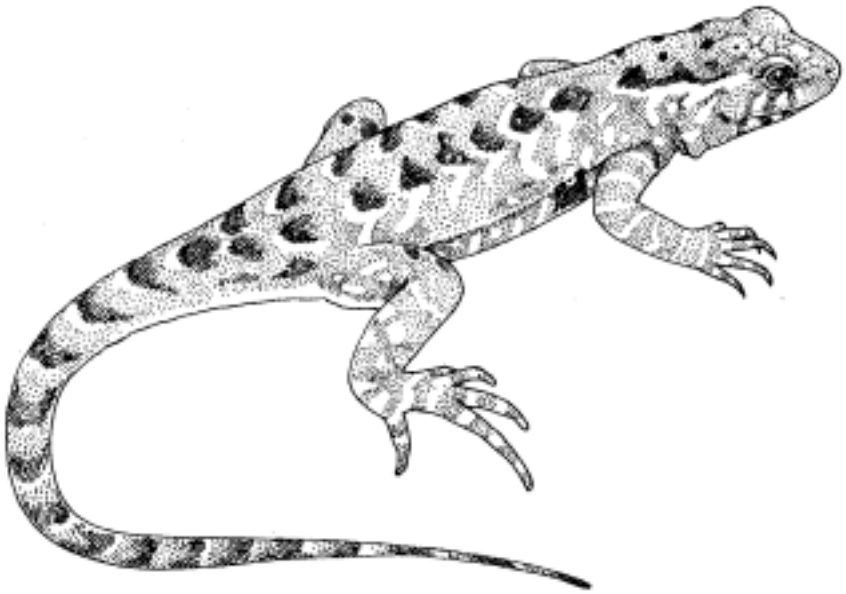
BREEDING: Eggs laid in loose, well-aerated soil from March to June, with peak activity in May. Mean clutch size 4 (range 2 to 5).

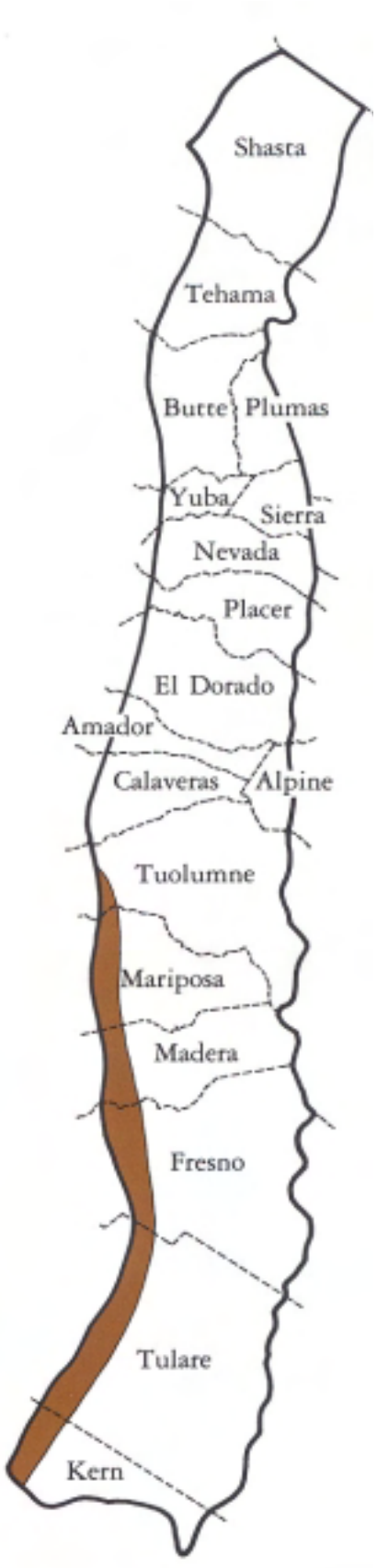
TERRITORY/HOME RANGE: May not be territorial. Home range estimated to be up to 0.5 acre (0.2 ha).

FOOD HABITS: Searches for insects on ground surface.

OTHER:

REFERENCES: Stebbins 1954a, Newman and Duncan 1973.





Coast Horned Lizard

R005 (*Phrynosoma coronatum*)

STATUS: No official listed status. Considered fragile.

DISTRIBUTION/HABITAT: Few specimens from the Sierra Nevada, particularly above 1000 ft (305 m). Distributed from Butte County south to Fresno County. Limited habitat in annual grassland, blue oak savannah, and digger pine-oak types. May range up to 4000 ft (1220 m).

SPECIAL HABITAT REQUIREMENTS: Friable soil for breeding.

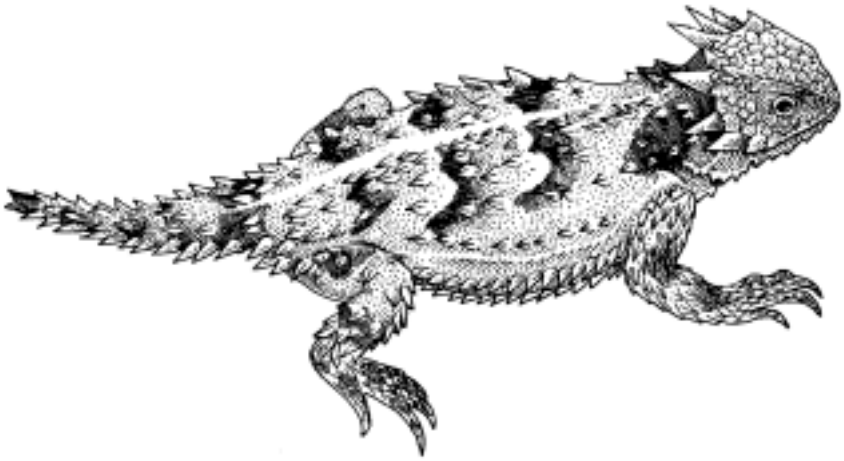
BREEDING: Eggs laid in loose, well-aerated soil from April to June, with peak activity in May. Mean clutch size 11 (range 6 to 16).

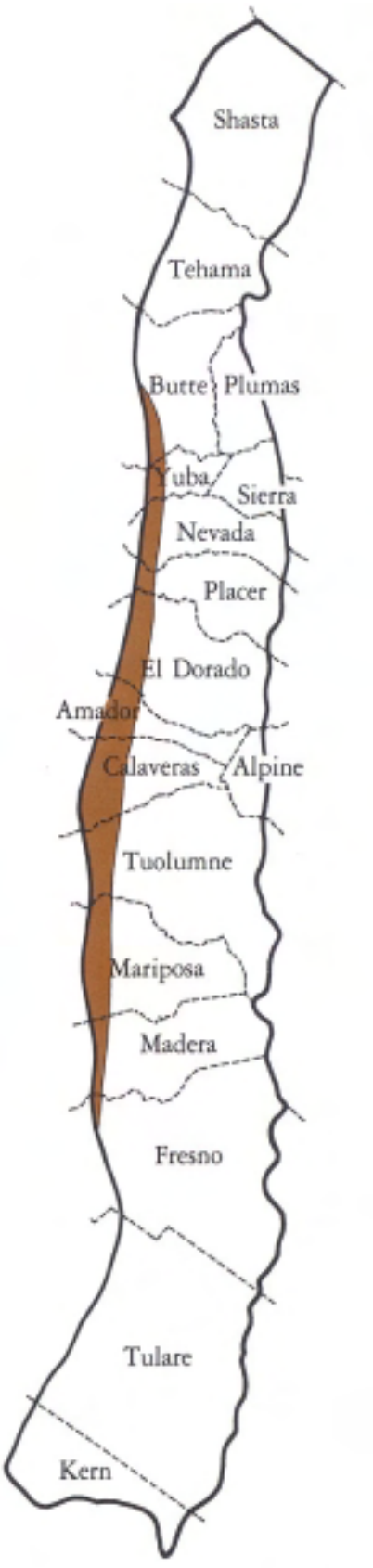
TERRITORY/HOME RANGE: Not thought to be territorial. Home range unknown, but thought to be small.

FOOD HABITS: Waits and searches for insects on ground surface and under surface objects.

OTHER: Notes of sightings above 1000 ft (305 m) should be recorded.

REFERENCES: Stebbins 1954a.





Gilbert's Skink

R006 (*Eumeces gilberti*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Primarily found in foothills up to 6500 ft (1980 m), in all successional stages of numerous habitat types. Prefers chaparral, black oak woodland, and riparian deciduous. Distributed from Butte County southward.

SPECIAL HABITAT REQUIREMENTS:

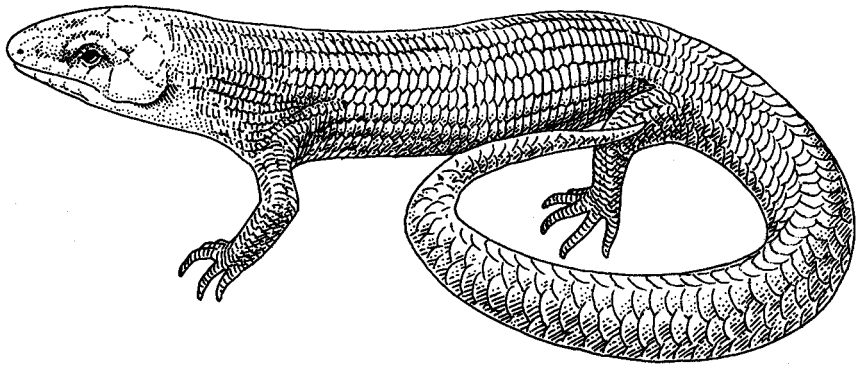
BREEDING: Eggs laid in chambers in loose, aerated soil in June and July, with peak activity around July 1. Mean clutch size 7 (range 5 to 10).

TERRITORY/HOME RANGE: Not thought to be territorial. Home range estimated to be 1 acre (0.4 ha).

FOOD HABITS: Searches for insects and other small animals under leaves and other surface objects.

OTHER:

REFERENCES: Stebbins 1954a.





Western Skink

R007 (*Eumeces skiltonianus*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Primarily found in foothills of the Sierra Nevada from Amador County northward. May range up to 7000 ft (2130 m) in the forested types. Inhabits all successional stages; prefers chaparral, black oak woodland, and riparian types.

SPECIAL HABITAT REQUIREMENTS:

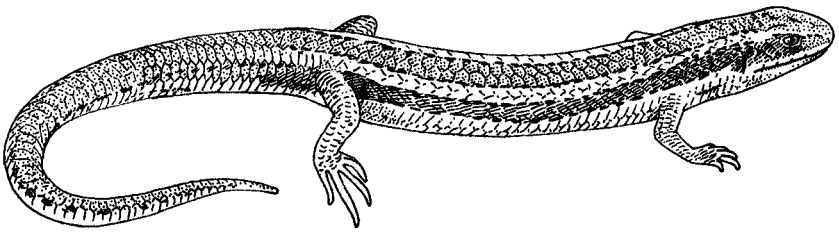
BREEDING: Eggs laid in chambers in loose, aerated soil in June and July, with peak activity around July 1. Mean clutch size 7 (range 5 to 10).

TERRITORY/HOME RANGE: Not thought to be territorial. Home range estimated to be 1 acre (0.4 ha).

FOOD HABITS: Searches for insects and other small animals under leaves and other surface objects.

OTHER:

REFERENCES: Stebbins 1954a.





Western Whiptail

R008 (*Cnemidophorus tigris*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Found in openings in vegetation from foothills to mixed-conifer forests. Prefers annual grassland, chaparral, and early successional stages of blue oak savannah and digger pine-oak types. Distributed the length of the Sierra Nevada up to 7500 ft (2290 m).

SPECIAL HABITAT REQUIREMENTS:

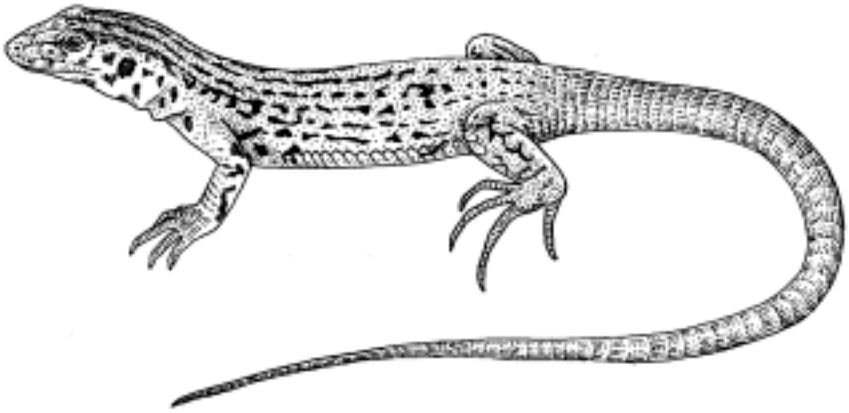
BREEDING: Eggs laid in loose, well-aerated soil in May and June, with peak activity around June 1. Mean clutch size 5 (range 2 to 8).

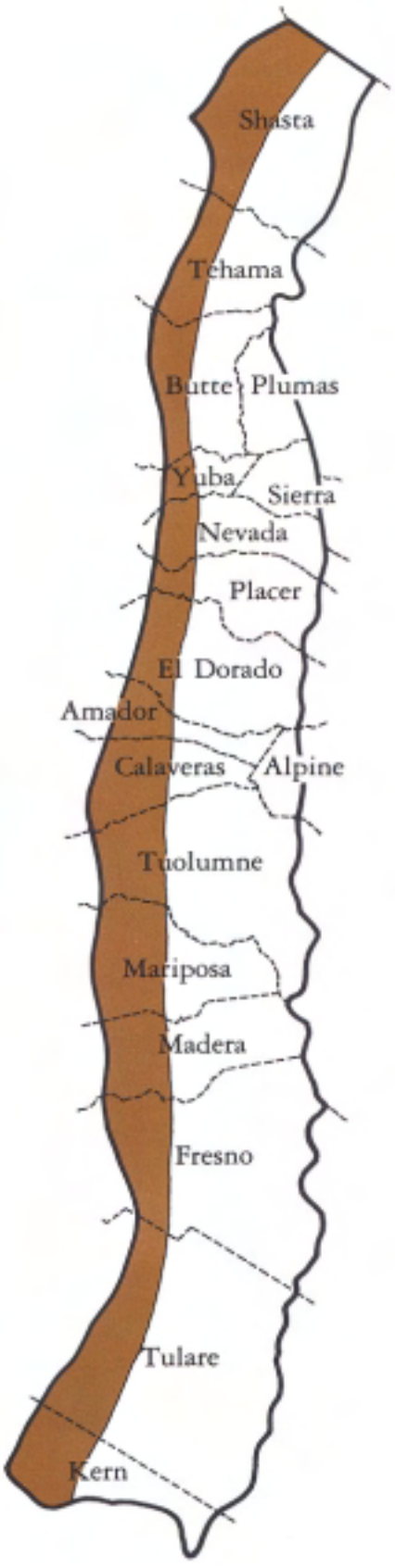
TERRITORY/HOME RANGE: Not thought to be territorial. Home range estimated to be 1 acre (0.4 ha).

FOOD HABITS: Searches for and stalks insects and other small animals on ground surface.

OTHER:

REFERENCES: Stebbins 1954a.





Southern Alligator Lizard

R009 (*Gerrhonotus multicarinatus*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Primarily a foothill species, but can be found up to 6000 ft (1830 m) in the mixed-conifer type. Prefers chaparral and riparian deciduous types. Distributed the length of the Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS:

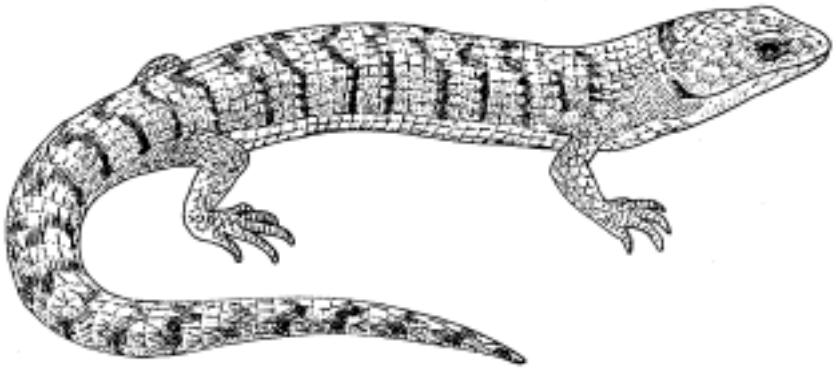
BREEDING: Eggs laid in loose, well-aerated soil from April to June, with peak activity in May. Mean clutch size 12 (range 6 to 20).

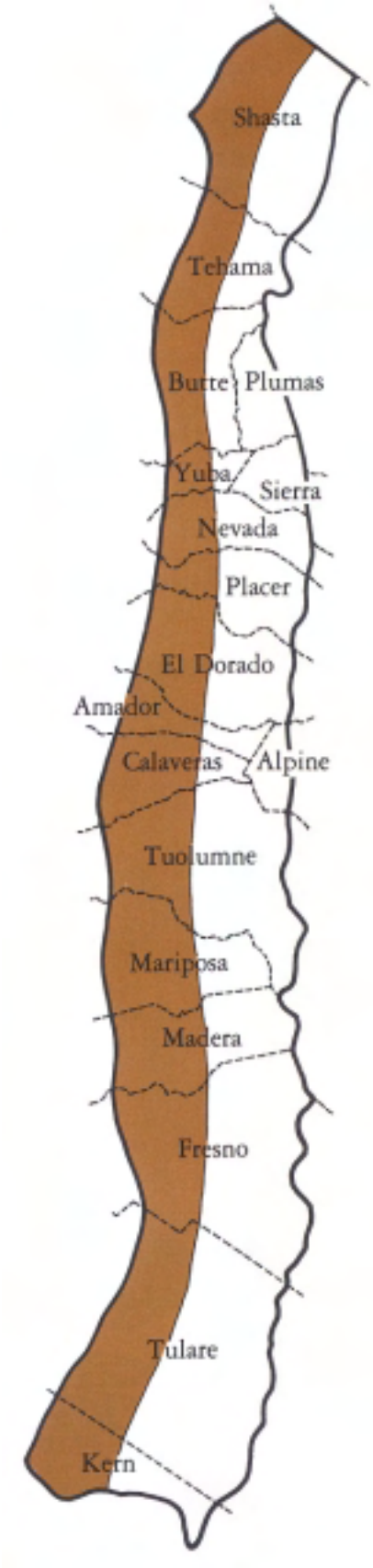
TERRITORY/HOME RANGE: Not thought to be territorial. Home range estimated to be 2 acres (0.8 ha).

FOOD HABITS: Searches for insects and other small animals on ground surface and under surface objects.

OTHER:

REFERENCES: Stebbins 1954a.





Northern Alligator Lizard

R010 (*Gerrhonotus coeruleus*)

STATUS: No official listed status. Common in preferred habitat.

DISTRIBUTION/HABITAT: Primarily found in forest areas. Prefers pole to mature successional stages of ponderosa pine, black oak woodland, and mixed-conifer types. Also found in other forested types the length of the Sierra Nevada. Elevational range 1000 (at least in northern counties) to 11,000 ft. (305 to 3350 m).

SPECIAL HABITAT REQUIREMENTS:

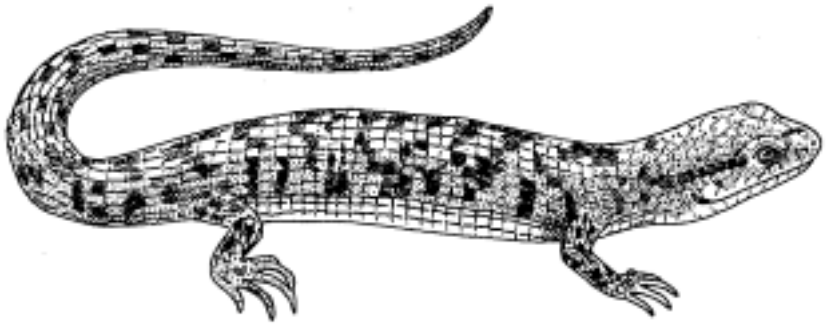
BREEDING: Mates in May and June, with peak activity varying from year-to-year. Young born in fall without use of nest. Mean number of young born 5 (range 2 to 15).

TERRITORY/HOME RANGE: Not territorial. Home range thought to be 1 acre (0.4 ha).

FOOD HABITS: Searches under surface objects for insects and other small animals.

OTHER:

REFERENCES: Stebbins 1954a, Lais 1976.





California Legless Lizard

R011 (*Anniella pulchra*)

STATUS: No official listed status. Considered fragile.

DISTRIBUTION/HABITAT: Restricted to areas of bush lupine in Kaweah River drainage; possibly also found in lower Kern River drainage. Prefers riparian deciduous type. Elevation range unknown, possibly up to 6000 ft (1830 m).

SPECIAL HABITAT REQUIREMENTS: Sandy streams or riverbanks.

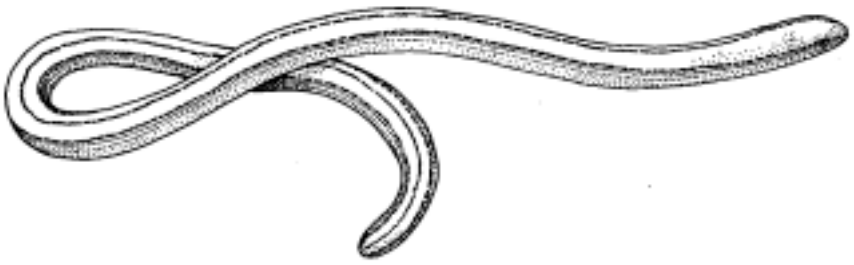
BREEDING: Mates from April to June, with peak activity in May. Young born in damp, loose soil in fall. Mean number of young 2 (range 1 to 4).

TERRITORY/HOME RANGE: Not territorial. Home range unknown, probably restricted.

FOOD HABITS: Searches in loose soil for insects, particularly larvae.

OTHER: Burrowing animal; watch for during excavations.

REFERENCES: Stebbins 1954a.





Rubber Boa

R012 (*Charina bottae*)

STATUS: No official listed status. Considered stable.

DISTRIBUTION / HABITAT: Found near streams and meadows in all forested types; prefers pole to mature successional stages of ponderosa pine, black oak woodland, and mixed-conifer types. Distributed the length of the Sierra Nevada. Elevation jange 5000 to 9000 ft (1520 to 2740 m).

SPECIAL HABITAT REQUIREMENTS:

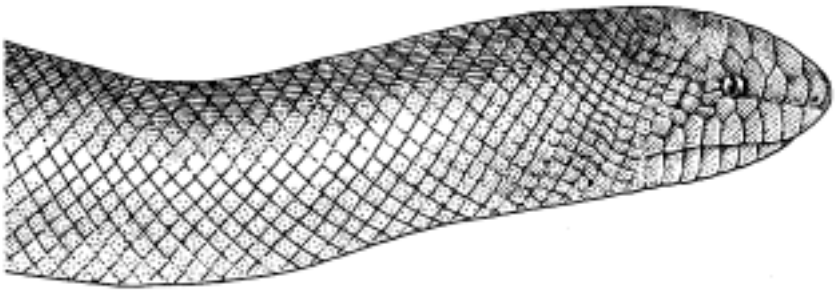
BREEDING: Mates from April to June, with peak activity in May. Young born in early fall in loose, aerated soil. Mean number of young 4 (range 1 to 6).

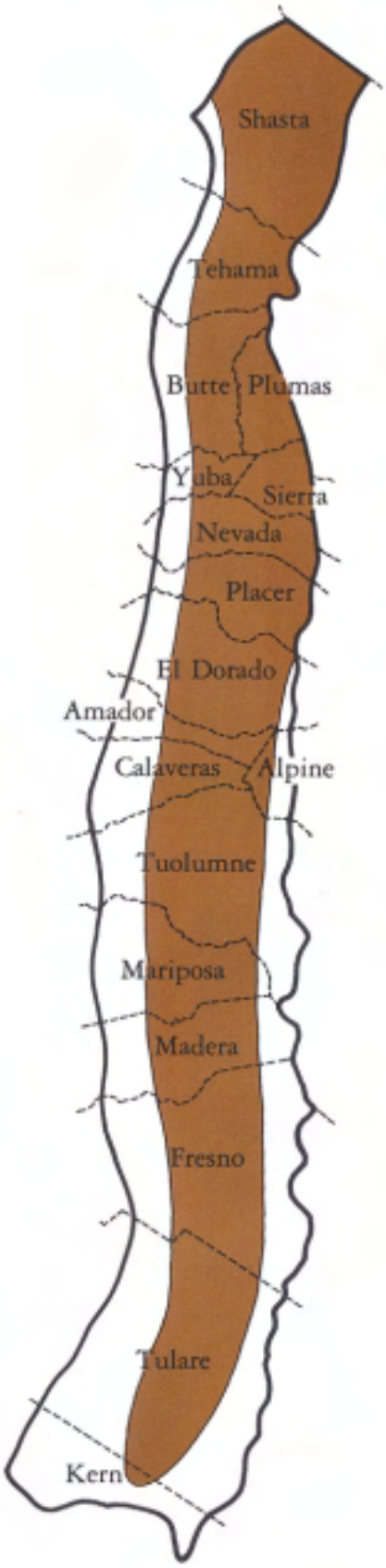
TERRITORY / HOME RANGE: Not territorial. Home range unknown.

FOOD HABITS: Searches for mice, young birds, lizards, and snakes on forest floor and near meadow types.

OTHER: Good burrower.

REFERENCES: Stebbins 1954a.





Ringneck Snake

R013 (*Diadophus punctatus*)

STATUS: No official listed status. Uncommon.

DISTRIBUTION/HABITAT: Usually found on north-facing slopes of foothill canyons; also found up to 6000 ft (1830 m) in mixed-conifer types. Prefers annual grassland, chaparral, and riparian deciduous types. Distributed the length of the Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS: Moist soil related to north-facing slopes.

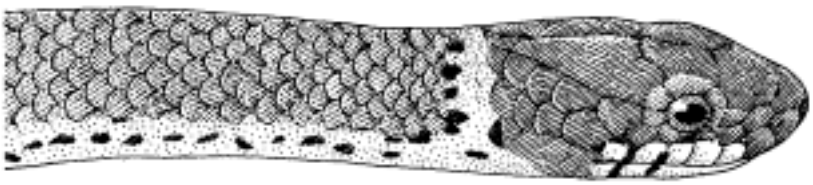
BREEDING: Eggs laid in loose, well-aerated soil from April to June, with peak activity in May. Mean clutch size 2 (range 1 to 4).

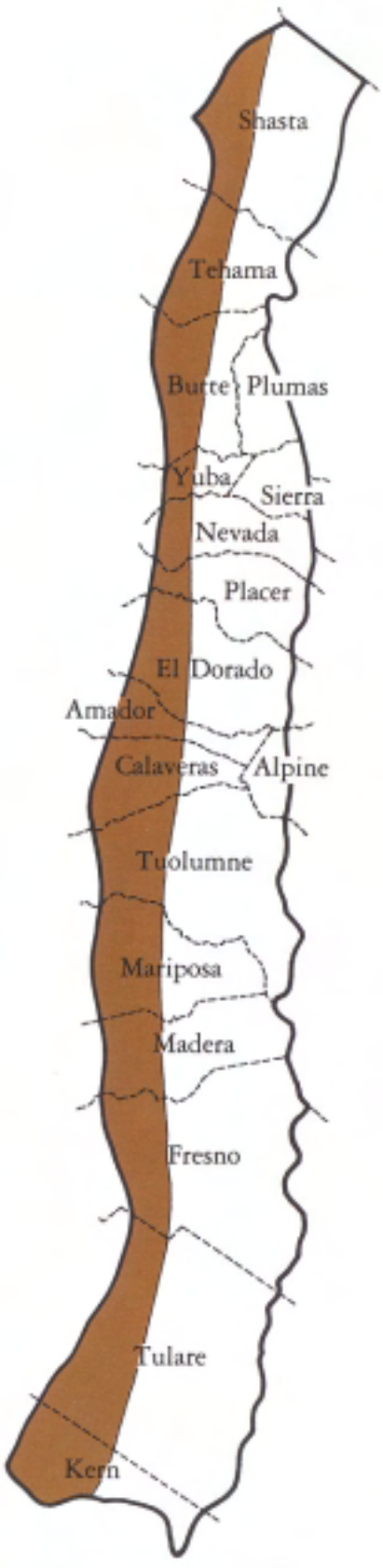
TERRITORY/HOME RANGE: Not thought to be territorial. Home range unknown.

FOOD HABITS: Eats mainly slender salamanders; also treefrogs and small lizards.

OTHER:

REFERENCES: Stebbins 1954a.





Sharp-tailed Snake

R014 (*Contia tenuis*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Found in all successional stages of numerous habitat types up to 7000 ft (2130 m) the length of the Sierra Nevada. Optimum habitat found in riparian deciduous and mountain meadow types. Not found in annual grassland and blue oak savannah types.

SPECIAL HABITAT REQUIREMENTS: Litter and other surface objects.

BREEDING: Mates from April to June, with peak activity in May. Eggs laid in summer in loose soil; mean clutch size 3 or 4 (range 2 to 8).

TERRITORY/HOME RANGE: Not thought to be territorial. Home range is unknown; thought to be restricted.

FOOD HABITS: Searches under surface objects for small slugs, slender salamanders, and insects.

OTHER:

REFERENCES: Stebbins 1954a.





Racer

R015 (*Coluber constrictor*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Primarily grassland up into forested areas. Optimum habitat in annual grassland and early successional stages of blue oak savannah types. Most common in the northern Sierra Nevada, with few specimens collected south of Lake Tahoe, El Dorado County. Elevation range to 6000 ft (1830 m).

SPECIAL HABITAT REQUIREMENTS:

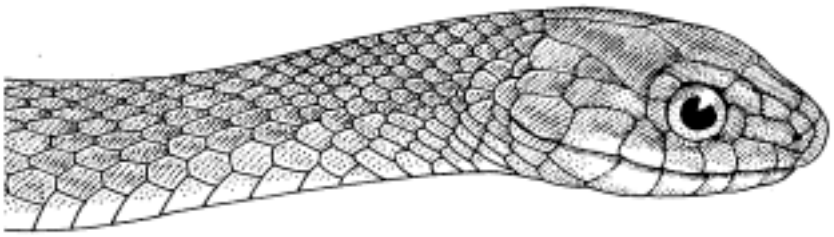
BREEDING: Mates in April and May. Eggs laid in early summer in loose, aerated soil; mean clutch size 18 to 20 (range 12 to 24).

TERRITORY/HOME RANGE: Not thought to be territorial. Home range unknown, may be extensive.

FOOD HABITS: Searches on ground surface for mice, fledgling birds, and lizards.

OTHER:

REFERENCES: Stebbins 1954a.





Coachwhip

R016 (*Masticophis flagellum*)

STATUS: No official listed status. Very few records from the Sierra Nevada.

DISTRIBUTION/HABITAT: Not usually found in the Sierra Nevada above 1000 ft (305 m). No optimum habitat in the Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS:

BREEDING: Mates in April and May, with peak activity near April 1. Mean clutch size 8 (range 4 to 11).

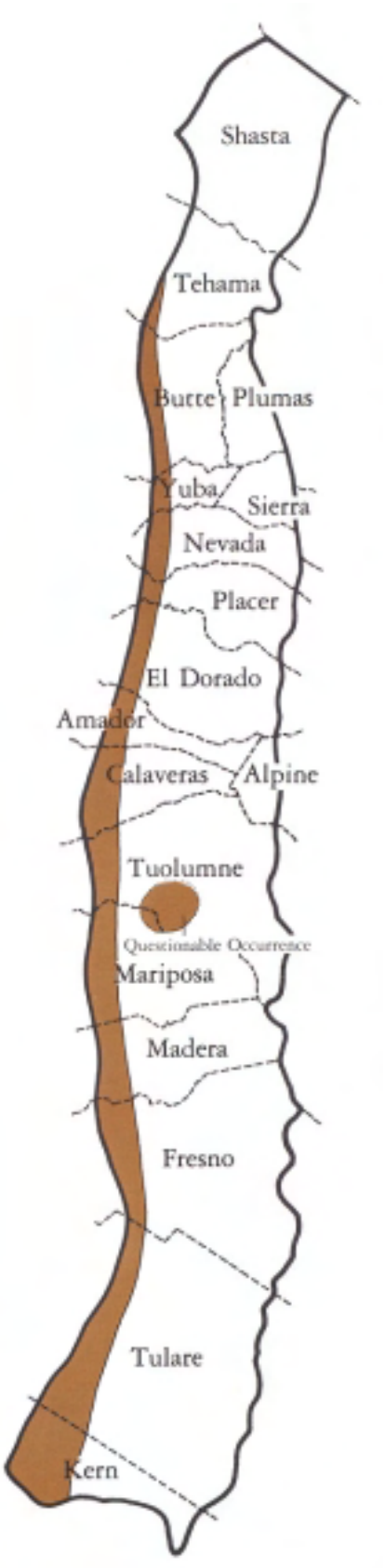
TERRITORY/HOME RANGE: Not territorial. Home range unknown, thought to be large.

FOOD HABITS: Stalks and searches for rodents, birds, bird eggs, and lizards on ground surface and under objects.

OTHER: Reported at 4000 ft (1220 m) in Yosemite Valley, Tuolumne County.

REFERENCES: Stebbins 1954a, 1966, 1972; Wilson 1973.





Striped Racer

R017 (*Masticophis lateralis*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Primarily chaparral with optimum habitat also in riparian deciduous type. Less commonly found in other habitat types. Found the length of the Sierra Nevada up to 5500 ft (1680 m).

SPECIAL HABITAT REQUIREMENTS:

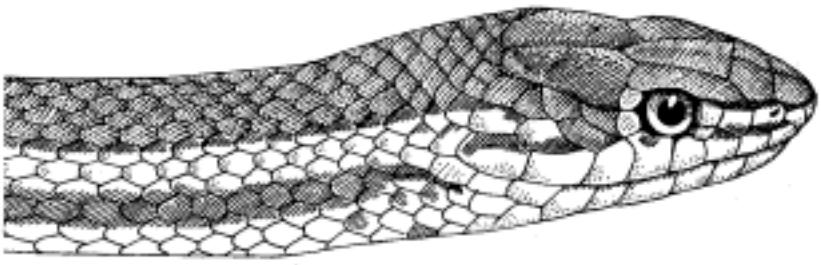
BREEDING: Mates in April and May, with peak activity near May 1. Eggs laid in summer in loose, well-aerated soil. Mean clutch size 6 (range 4 to 10).

TERRITORY/HOME RANGE: Territory unknown; may not be territorial. Home range unknown; may be extensive.

FOOD HABITS: Searches in bushes and on ground surface for snakes, lizards, rodents, and fledgling birds.

OTHER:

REFERENCES: Stebbins 1954a.





Gopher Snake

R018 (*Pituophis melanoleucus*)

STATUS: No official listed status. A common, widespread species.

DISTRIBUTION/HABITAT: Found in many habitats the length of the Sierra Nevada up to 7000 ft (2130 m). Optimum habitat in blue oak savannah, digger pine-oak, chaparral, and riparian deciduous types.

SPECIAL HABITAT REQUIREMENTS:

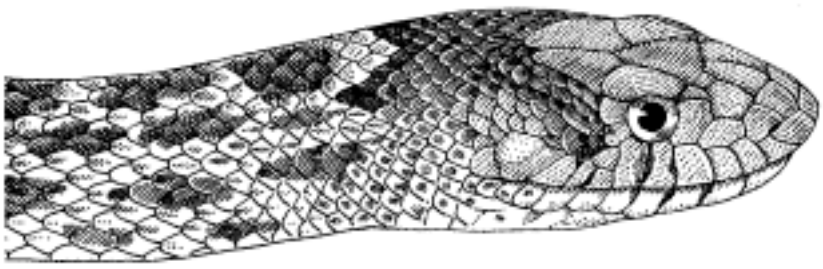
BREEDING: Mates from April to June, with peak activity in May. Eggs laid in damp, loose, well-aerated soil in summer. Mean clutch size 7 (range 3 to 12).

TERRITORY/HOME RANGE: Not thought to be territorial. Home range unknown.

FOOD HABITS: Searches on surface and under objects for small mammals (squirrels, mice, gophers, and others).

OTHER:

REFERENCES: Stebbins 1954a.





Common Kingsnake

R019 (*Lampropeltis getulus*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Found the length of the Sierra Nevada in annual grasslands, blue oak savannah, digger pine-oak, chaparral, and riparian deciduous types. Also found in forested areas up to 6000 ft (1830 m). Observed in all successional stages of its many habitats.

SPECIAL HABITAT REQUIREMENTS:

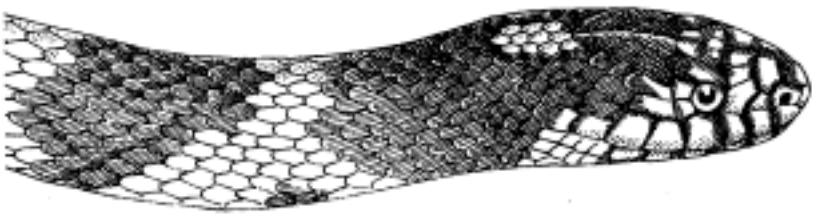
BREEDING: Mates from March to May, with peak activity in April. Eggs laid in loose, well-aerated soil in summer. Mean clutch size 9 (range 6 to 12).

TERRITORY/HOME RANGE: Territory unknown; may not be territorial. Home range unknown; may be extensive.

FOOD HABITS: Searches under surface objects for snakes, lizards, and mice.

OTHER:

REFERENCES: Stebbins 1954a.





California Mountain Kingsnake

R020 (*Lampropeltis zonata*)

STATUS: No official listed status; may be considered fragile.

DISTRIBUTION/HABITAT: Usually found near streams of upper foothills the length of the Sierra Nevada. Found in numerous habitats; optimum habitats are mountain meadow and riparian deciduous types. Elevation range 1000 to 6500 ft (305 to 1980 m).

SPECIAL HABITAT REQUIREMENTS:

BREEDING: Mates in April and May, with peak activity near May 1. Eggs laid in loose, well-aerated soil in summer. Mean clutch size 6 (range 4 to 8).

TERRITORY/HOME RANGE: Territory unknown; may not be territorial. Home range unknown.

FOOD HABITS: Searches under surface objects for lizards, small snakes, and bird eggs.

OTHER: Bright colors make this species a target of pet collectors.

REFERENCES: Stebbins 1954a, Zweifel 1974.





Long-nosed Snake

R021 (*Rhinocheilus lecontei*)

STATUS: No official listed status. May be considered fragile.

DISTRIBUTION/HABITAT: Seldom recorded above 1000 ft (305 m). No optimum habitat in the Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS:

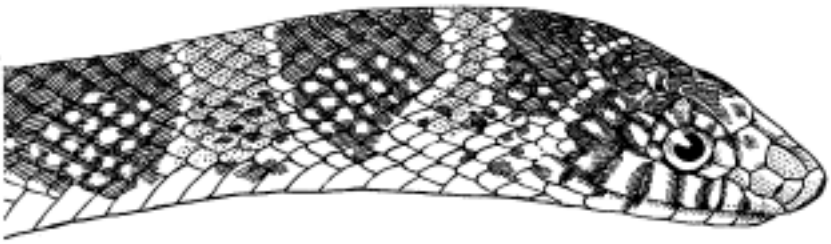
BREEDING: Mates from March to May, with peak activity in April. Eggs laid in loose, moist, well-aerated soil. Mean clutch size 5 (range 3 to 8).

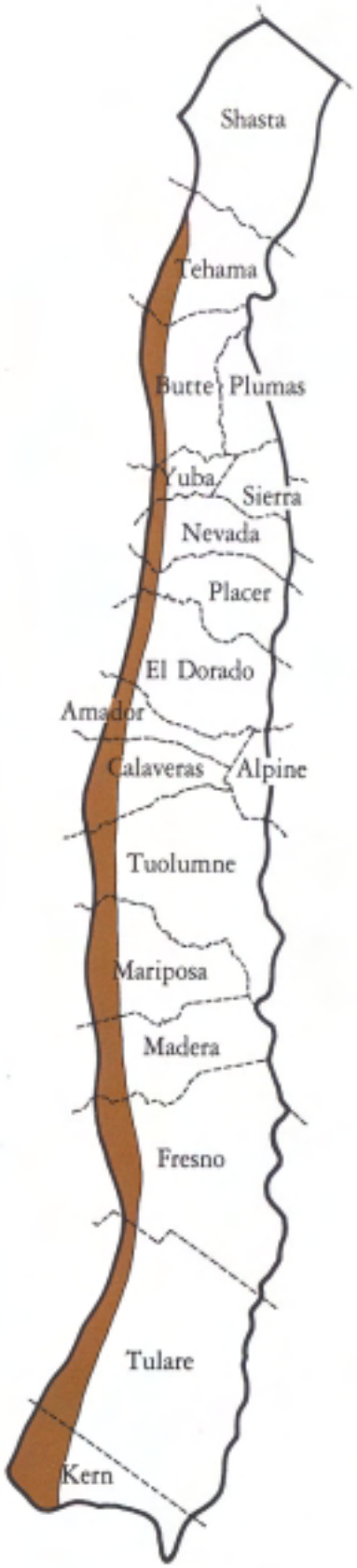
TERRITORY/HOME RANGE: Not territorial. Home range unknown.

FOOD HABITS: Stalks and searches for lizards, small mammals, and insects on ground surface and under objects.

OTHER: Once recorded at San Joaquin Experimental Range, Madera County.

REFERENCES: Stebbins 1954a, 1966, 1972; Medica 1975.





Common Garter Snake

R022 (*Thamnophis sirtalis*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Usually found in foothill streams and ponds, with optimum habitat in annual grassland, blue oak savannah, digger pine-oak, chaparral, and riparian deciduous types. Found the length of the Sierra Nevada at elevations up to 6000 ft (1830 m).

SPECIAL HABITAT REQUIREMENTS: Streams, rivers, ponds, or lakes.

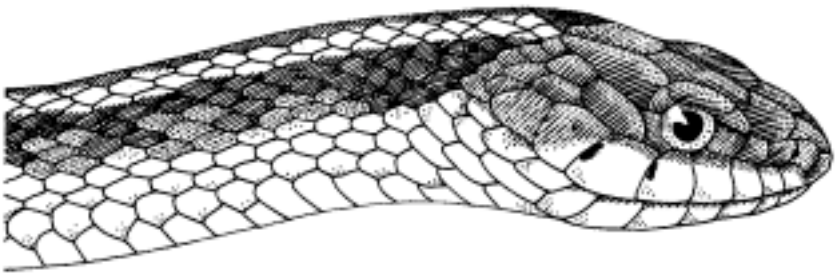
BREEDING: Mates from mid-March to June, with peak activity in April. Young born in summer without nest. Mean number of young born 24 (range 8 to 51).

TERRITORY/HOME RANGE: Territory unknown, may not be territorial. Home range unknown.

FOOD HABITS: Searches in streams and along stream edges for treefrogs, fish, and mice.

OTHER:

REFERENCES: Stebbins 1954a, 1966, 1972; White and Kolb 1974.





Western Terrestrial Garter Snake

R023 (*Thamnophis elegans*)

STATUS: No official status. Common in preferred habitat.

DISTRIBUTION/HABITAT: Found in streams and lakes primarily in the mid- and high-Sierra Nevada. Optimum habitat in riparian deciduous, mountain meadow, and alpine meadow types; may be found in all successional stages of all habitat types from 1000 (at least in northern counties) to 12,000 ft (305 to 3660 m) northward from mid-Tulare County.

SPECIAL HABITAT REQUIREMENTS: Permanent streams, rivers, ponds or lakes for feeding.

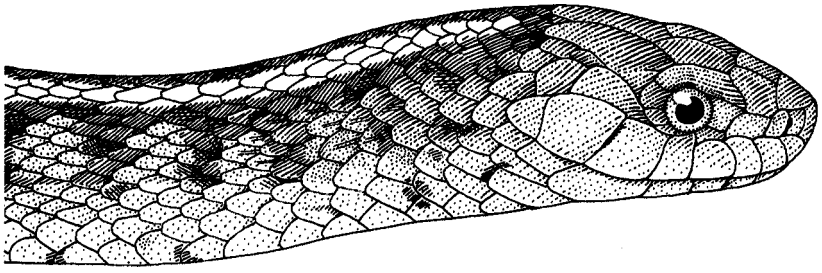
BREEDING: Mates from April to June, with peak activity in May, depending on year and elevation. Young born without nest in summer. Mean number of young born 20 (range 12 to 30).

TERRITORY/HOME RANGE: Territory unknown; may not be territorial. Home range unknown, probably restricted.

FOOD HABITS: Waits and searches for tadpoles, yellow-legged frogs, treefrogs, and fish in lakes, streams, and meadows; also catches mice.

OTHER:

REFERENCES: Stebbins 1954a, White and Kolb 1974.





Western Aquatic Garter Snake

R024 (*Thamnophis couchi*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Usually found in foothill streams and ponds; optimum habitat in blue oak savannah, digger pine-oak, chaparral, mountain meadow, and riparian deciduous types. Also found in forested types up to 6000 ft (1830 m) throughout the Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS: Permanent streams, rivers, ponds, or lakes.

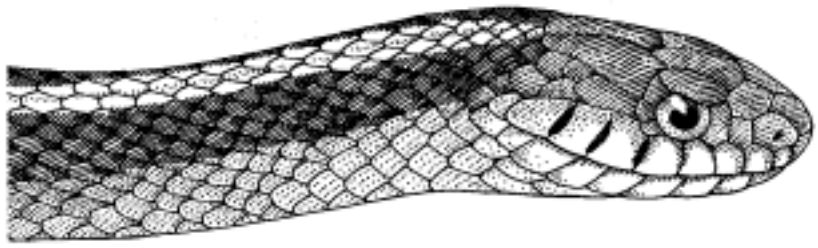
BREEDING: Mates from mid-March to early June, with peak activity in April. Young born without nest in summer. Mean number born 20 (range 10 to 30).

TERRITORY/HOME RANGE: Territory unknown, may not be territorial. Home range unknown.

FOOD HABITS: Searches in streams and along stream edges for fish, frogs, and mice.

OTHER:

REFERENCES: Stebbins 1954a.





Western Black-headed Snake

R025 (*Tantilla planiceps*)

STATUS: No official listed status. May be considered fragile.

DISTRIBUTION/HABITAT: Restricted to Kaweah River drainage, Tulare and Kern Counties, below 2000 ft (610 m). No optimum habitat known in the Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS: Unknown.

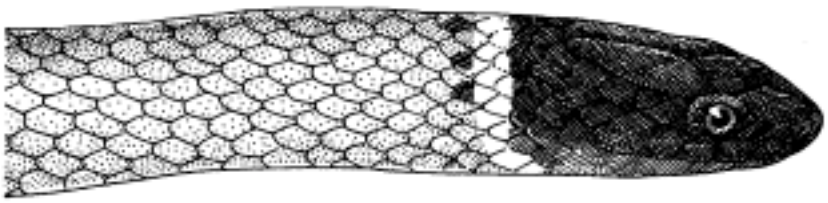
BREEDING: Eggs laid from May to June, with peak activity in June. Mean clutch size 1 or 2 (range unknown in Sierra Nevada). Nest site requirements unknown in Sierra Nevada.

TERRITORY/HOME RANGE: Not thought to be territorial. Home range unknown.

FOOD HABITS: Searches for insects, particularly beetle larvae, under surface objects.

OTHER: Few specimens collected from the Sierra Nevada. Very little known.

REFERENCES: Stebbins 1954a, Tanner 1966, Basey 1976.





Night Snake

R026 (*Hypsiglena torquata*)

STATUS: No official listed status. May be considered fragile.

DISTRIBUTION/HABITAT: Found infrequently in numerous habitats up to 6000 ft (1830 m) throughout the Sierra Nevada. Optimum habitat the chaparral type.

SPECIAL HABITAT REQUIREMENTS: Crevices in rock outcrops.

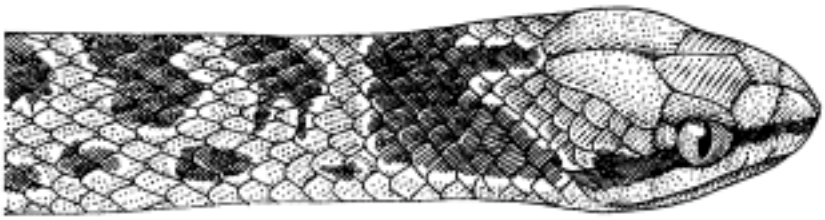
BREEDING: Breeds from April to July, with peak activity in May. Eggs laid in rocky areas where cracks run underground; also found in mines. Mean clutch size 5 (range 4 to 8).

TERRITORY/HOME RANGE: Not thought to be territorial. Home range unknown, may be restricted.

FOOD HABITS: Searches under surface objects and underground for small lizards and slender salamanders.

OTHER: Needs further research on habitat requirements; should be watched for in roadbuilding operations. Little known about requirements for survival.

REFERENCES: Stebbins 1954a.





Western Rattlesnake

R027 (*Crotalus viridis*)

STATUS: No official listed status. Common in preferred habitat.

DISTRIBUTION/HABITAT: Often found in rock outcrops in many habitats. Optimum habitat in annual grassland, blue oak savannah, digger pine-oak, chaparral, and riparian deciduous types. May be found in other habitat types up to 11,000 ft (3350 m). Distributed the length of the Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS: Rock outcrops.

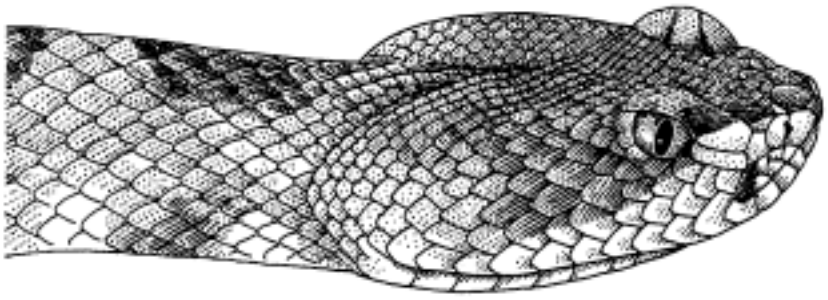
BREEDING: Mates from March to May, with peak activity usually in April, but peak varies from year to year. Young born without nest in fall. Mean number born 11 (range 4 to 21).

TERRITORY/HOME RANGE: Probably not territorial. Home range estimated to be 3 acres (1.2 ha). (Fitch and Glading 1947).

FOOD HABITS: Waits and searches on ground surface and in burrows for rodents (ground squirrels and mice primarily).

OTHER:

REFERENCES: Fitch and Glading 1947, Fitch 1949, Klauber 1972.





Literature Cited

Adams, L.
1942. The natural history and classification of the Mount Lyell Salamander, *Hydromantes platycephalus.* Univ. Calif. Publ. Zool. 46:179-204.

Altig, R., and P. C. Dumas.
1971. *Rana cascadae*. Cat. Amer. Amphib. Reptiles: 105.1-105.2.

Altig, R., and P. C. Dumas.
1972. *Rana aurora*. Cat. Amer. Amphib. Reptiles: 160.1-160.4

Anderson, J.D.
1967. A comparison of the life histories of coastal and montane populations of *Ambystoma macrodactylum in California*. Amer. Midl. Nat. 77:323-355.

Anderson, J. D.
1969. *Dicamptodon* and *D. ensatus*. Cat. Amer. Amphib. Reptiles: 76.1-76.2

Basey, H. E.
1976. Discovering Sierra reptiles and amphibians. Yosemite Nat. Hist. Assoc. Yosemite National Park, Calif. 50 p.

Bishop, S. C.
1947. Handbook of salamanders: the salamanders of the United States, of Canada, and lower California. 555 p. Comstock Publ. Co., Ithaca, N.Y.

Brame, A. H., Jr., and K. F. Murray.
1968. Three new slender salamanders (*Batrachoseps*) with a discussion of relationships and speciation within the genus. Bull. Los Angeles Co. Mus. Nat. Hist., Sci. 4:1-35.

Brown, C. W.
1974. Hybridization among the subspecies of the plethodontid salamander *Ensatina eschscholtzi*. Univ. Calif. Publ. Zool. 98:158.

Bryant, H. C.
1917. The leopard frog in California. Calif. Fish and Game 3:90.

Bury, R. B.
1968. The distribution of *Ascaphus truei* in California. Herpetologica 24(1):39-46.

Bury, R. B.
1970. *Clemmys marmorata*. Cat. Amer. Amphib. Reptiles: 100.1-100.3 .

Bury, R. B.
1972. Habits and home range of the Pacific Pond Turtle, *Clemmys mormorata*, in a stream community. PhD. dissertation, Univ. Calif. Berkeley.

Ferguson, D. E.
1961. The geographic variation of *Ambystoma macrodactylum* Baird, with the description of two new subspecies. Amer. Midl. Nat. 65:311-338.

Ferguson, D. E.
1963. *Ambystoma macrodactylum*. Cat. Amer. Amphib. Reptiles: 4.1-4.2.

Fitch, H. S.
1949. Study of snake populations in central California. Amer. Midl. Nat. 41(3):513-579.

Fitch, H. S., and B. Glading.
1947. A study of a rattlesnake population. Calif. Fish and Game 33(2):103-123.

Gehlbach. F. R.
1967. *Ambystoma tigrinum*. Cat. Amer. Amphib. Reptiles: 52.1-52.4.

Gorman, J.
1964. *Hydromantes brunus, H. platycephalus*, and *H. shastae*. Cat. Amer. Amphib. Reptiles: 11.1-11. 2.

Gorman, J., and C. L. Camp.
1953. A new cave species of salamander of the genus *Hydromantes* from California, with notes on habits and habitat. Copeia 1953:39-43.

Grinnell, J., J. Dixon, and J. M. Linsdale.
1930. Vertebrate natural history of a section of northern California through the Lassen Peak region. Univ. Calif. Publ Zool. 35:1594.

Grinnell, J., and T. I. Storer.
1924. Animal life in the Yosemite. 752 p. Univ. Calif. Press, Berkeley.

Hendrickson, J. R.
1954. Ecology and systematics of salamanders of the genus *Batrachoseps.* Univ. Calif. Publ. Zool. 54:1-46.

Karlstrom, E. L.
1962. The toad genus *Bufo* in the Sierra Nevada of California, ecological and systematic relationships. Univ. Calif. Publ. Zool. 62:1-104.

Karlstrom, E. L.
1973. *Bufo canorus.* Cat. Amer. Amphib. Reptiles: 132.1-132. 2

Klauber, L. M.
1972. Rattlesnakes: their habits, life histories, and influence on mankind. 2nd ed., 1533 p. Univ. Calif. Press, Berkeley.
Lais, P. M.
1976. *Gerrhonotus coeruleus.* Cat. Amer. Amphib. Reptiles: 178.1-178.4.
Leach, H. R., S. J. Nicola, and J. M. Brode.
1976. At the crossroads 1976. A report on California's endangered and rare fish and wildlife. Calif. Dep. Fish and Game. 101 p.
Lynch, J. F.
1974. *Aneides flavipunctatus.* Cat. Amer. Amphib. Reptiles: 158.1-158.2.
Lynch, J. F., and D. B. Wake.
1974. *Aneides lugubris.* Cat. Amer. Amphib. Reptiles: 159.1-159.2.
Medica, P.A.
1975. *Rhinocheilus.* Cat. Amer. Amphib. Reptiles:l75, 1-175.4
Metter, D.E.
1968. *Ascaphus* and *A. truei.* Cat. Amer. Amphib. Reptiles: 69.1-69.2.
Moyle, P. B.
1973. Effects of introduced bullfrogs, *Rana catesbeiana*, on the native frogs of the San Joaquin Valley, California. Copeia 1973(1):18-22.
Newman, T. F., and D. A. Duncan.
1973. Vertebrate fauna of the San Joaquin Experimental Range, Calfornia: a checklist. USDA Forest Serv. Gen. Tech. Rep. PSW-6, 17 p. Pacific Southwest Forest and Range Exp. Stn., Berkeley, Calif.
Papenfuss, T., and L. Carufel.
1977. A survey of the habitat of the Shasta salamander (*Hydromantes shastae*). Interim Rep., Calif. Region, Forest Serv., U.S. Dep. Agric., San Francisco, Calif. 18 p.
Rosenthal, G.M.
1957. The role of moisture and temperature in the local distribution of the plethodontid salamander *Aneides lugubris.* Univ. Calif. Publ. Zool. 54:371-420.
Slater, J. R.
1939. Description and life history of a new *Rana* from Washington. Herpetologica 1(6):145-149.
Smith, H. M.
1946. Handbook of lizards-lizards of the United States and of Canada. 557 p. Comstock Publ. Assoc., Ithaca, N.Y.
Stebbins, R. C.
1944. Field notes on a lizard, the mountain swift, with special reference to territorial behavior. Ecology 25(2):233-245.
Stebbins. R. C.
1951. Amphibians of western North America. 538 p. Univ. Calif. Press, Berkeley.
Stebbins, R. C.
1954a. Amphibians and reptiles of western North America. 536 p. McGraw-Hill, New York, N.Y.
Stebbins, R. C.
1954b. Natural history of the salamanders of the plethodontid genus *Ensatina.* Univ. Calif. Publ. Zool. 54:47-124.
Stebbins, R. C.
1966. A field guide to western reptiles and amphibians. 279 p. Houghton Mifflin, New York, N.Y.
Stebbins, R. C.
1972. Amphibians and reptiles of California. 152 p. Univ. Calif. Press, Berkeley.
Storer, T. I.
1925. A synopsis of the amphibia of California Univ. Calif. Publ. Zool. 27:1-308.
Tanner, W. W.
1966. A re-evaluation of the genus *Tantilla* in the southwestern United States and northwestern Mexico. Herpetologica 22:134-152.
Van Denburgh, J.
1922. The reptiles of western North America. Calif Acad. Sci., San Francisco. 1028 p.
Wake, D. B.
1974. *Aneides.* Cat Amer. Amphib. Reptiles: 157.1-157.2.
White, M., and J. A. Kolb.
1974. A preliminary study of *Thamnophis* near Sagehen Creek, California. Copeia 1974:126-136.
Wilson, L. D.
1973. *Masticophis flagellum.* Cat. Amer. Amphib. Reptiles: 145.1-145.4.
Wright, A. H., and A. A. Wright.
1949. Handbook of frogs and toads of the United States and Canada. 640 p. Comstock Publ. Assoc., Ithaca, N.Y.
Wright, A. H., and A. A. Wright.
1957. Handbook of snakes of the United States and Canada Vol. I and II. 1105 p. Comstock Publ. Assoc., Ithaca, N.Y.

Zweifel, R.G.
1955. Ecology, distribution and systematics of frogs of the *Rana boylei* group. Univ. Calif. Publ. Zool. 54:207-292.
Zweifel, R. G.
1968a. *Rana boylei.* Cat. Amer. Amphib. Reptiles: 71.1-71.2 .
Zweifel, R. G.
1968b. *Rana muscosa*. Cat. Amer. Amphib. Reptiles: 65 .1-65.2.
Zweifel, R. G.
1974. *Lampropeltis zonata.* Cat. Amer. Amphib. Reptiles: 174.1-174.4.

Birds

Jared Verner, Edward C. Beedy, Stephen L. Granholm, Lyman V. Ritter, and *Edward F. Toth*

This chapter offers information on the status, distribution (by habitat type and seral stage), and basic life history for each of 208 species of birds that are found in the western Sierra Nevada. Many of the data came from the literature, although the professional ornithologists involved with this project drew upon extensive personal experience with birds in the Sierra Nevada. Knowledge of the details of bird life in the western Sierra Nevada is scanty at best. Pertinent data on life histories of many species simply were unavailable, while for a majority of those species for which data are presented, the studies cited were done somewhere other than in the western Sierra Nevada. Even assignment of species to habitat types and seral stages was based less on solid information available in the literature, and more on the field experience and judgment of those involved in the project. Therefore, the information reported here is subject to refinement, correction, and revision.

At least 57 additional bird species have been reported five or fewer times in the western Sierra Nevada, and these are simply listed as "accidentals" in the section on Rare Species. The accidental list, of course, will never be complete, as birds are highly mobile animals that not uncommonly turn up well beyond the limits of their normal range. We see no need to manage our lands with such accidentals in mind.

Classification and nomenclature followed here are based on the Checklist of North American Birds (American Ornithologists' Union Checklist Committee 1957) and supplements 32 and 33 (A.O.U. Checklist Committee 1973, 1976). The species are arranged in phylogenetic order and numbered in sequence, with the prefix "B", for purposes of internal cross-referencing and computer access coding.



Species List

B001 Eared Grebe
Podiceps nigricollis

B002 Western Grebe
Aechmophorus occidentalis

B003 Pied-billed Grebe
Podilymbus podiceps

B004 Great Blue Heron
Ardea herodias

B005 Green Heron
Butorides striatus

B006 Black-crowned Night Heron
Nycticorax nycticorax

B007 Whistling Swan
Olor columbianus

B008 Canada Goose
Branta canadensis

B009 Snow Goose
Chen caerulescens

B010 Mallard
Anas platyrhynchos

B011 Pintail
Anas acuta

B012 Green-winged Teal
Anas crecca

B013 Cinnamon Teal
Anas cyanoptera

B014 American Wigeon
Anas americana

B015 Northern Shoveler
Anas clypeata

B016 Wood Duck
Aix sponsa

B017 Redhead
Aythya americana

B018 Ring-necked Duck
Aythya collaris

B019 Canvasback
Aythya valisineria

B020 Lesser Scaup
Aythya affinis

B021 Barrow's Goldeneye
Bucephala islandica

B022 Bufflehead
Bucephala albeola

B023 Harlequin Duck
Histrionicus histrionicus

B024 Ruddy Duck
Oxyura jamaicensis

B025 Hooded Merganser
Lophodytes cucullatus

B026 Common Merganser
Mergus merganser

B027 Turkey Vulture
Cathartes aura

B028 California Condor
Gymnogyps californianus

B029 White-tailed Kite
Elanus leucurus

B030 Goshawk
Accipiter gentilis

B031 Sharp-shinned Hawk
Accipiter striatus

B032 Cooper's Hawk
Accipiter cooperi

B033 Red-tailed Hawk
Buteo jamaicensus

B034 Red-shouldered Hawk
Buteo lineatus

B035 Swainson's Hawk
Buteo swainsoni

B036 Golden Eagle
Aquila chrysaetos

B037 Bald Eagle
Haliaeetus leucocephalus

B038 Marsh Hawk
Circus cyaneus

B039 Osprey
Pandion haliaetus

B040 Prairie Falcon
Falco mexicanus

B041 Peregrine Falcon
Faico peregrinus

B042 Merlin
Falco columbarius

B043 American Kestrel
Falco sparverius

B044 Blue Grouse
Dendragapus obscurus

B045 White-tailed Ptarmigan
Lagopus leucurus

B046 California Quail
Lophortyx californicus

B047 Mountain Quail
Oreortyx pious

B048 Chukar
Alectoris chukar

B049 Turkey
Meleagris gallopavo

B050 Virginia Rail
Rallus limicola

B051 American Coot
Fulica americana

B052 Killdeer
Charadrius vociferus

B053 Common Snipe
Capella gallinago

B054 Spotted Sandpiper
Actitus macularia

B055 American Avocet
Recurvirostra americana

B056 Wilson's Phalarope
Steganopus tricolor

B057 California Gull
Larus californicus

B058 Ring-billed Gull
Larus delawarensis

B059 Band-tailed Pigeon
Columba fasciata

B060 Mourning Dove
Zenaida macroura

B061 Roadrunner
Geococcyx californianus

B062 Barn Owl
T'yto alba

B063 Screech Owl
Otus asio

B064 Flammulated Owl
Otus flammeolus

B065 Great Horned Owl
Bubo virginianus

B066 Pygmy Owl
Glaucidium gnoma

B067 Burrowing Owl
Athene cunicularia

B068 Spotted Owl
Strix occidentalis

B069 Great Gray Owl
Strix nebulosa

B070 Long-eared Owl
Asio otus

B071 Short-eared Owl
Asio flammeus

B072 Saw-whet Owl
Aegolius acadicus

B073 Poor-will
Phalaenoptilus nuttallii

B074 Common Nighthawk
Chordeiles minor

B075 Black Swift
Cypseloides niger

B076 Vaux's Swift
Chaetura vauxi

B077 White-throated Swift
Aeronautes saxatalis

B078 Black-chinned Hummingbird
Archilochus alexandri

B079 Anna's Hummingbird
Calypte anna

B080 Allen's Hummingbird
Selasphorus Basin

B081 Rufous Hummingbird
Selasphorus rufus

B082 Calliope Hummingbird
Stellula calliope

B083 Belted Kingfisher
Megaceryle alcyon

B084 Common Flicker
Colaptes auratus

B085 Pileated Woodpecker
Dryocopus pileatus

B086 Acorn Woodpecker
Melanerpes formicivorous

B087 Lewis' Woodpecker
Melanerpes lewis

B088 Yellow-bellied Sapsucker
Sphyrapicus varius

B089 Williamson's Sapsucker
Sphyrapicus thyroideus

B090 Hairy Woodpecker
Picoides villosus

B091 Downy Woodpecker
Picoides pubescens

B092 Nuttall's Woodpecker
Picoides nuttallii

B093 White-headed Woodpecker
Picoides albolarvatus

B094 Black-backed Three-toed Woodpecker
Picoides arcticus

B095 Western Kingbird
T'yrannus verticalis

B096 Ash-throated Flycatcher
Myiarchus cinerascens

B097 Black Phoebe
Sayornis nigricans

B098 Say's Phoebe
Sayornis Bayer

B099 Willow Flycatcher
Empidonax traillii

B100 Hammond's Flycatcher
Empidonax hammondii

B101 Dusky Flycatcher
Empidonax oberholseri

B102 Western Flycatcher
Empidonax difficilis

B103 Western Wood Pewee
Contopus sordidulus

B104 Olive-sided Flycatcher
Nuttallornis borealis

B105 Horned Lark
Eremophila alpestris

B106 Violet-green Swallow
T'achycineta thalassina

B107 Tree Swallow
Iridoprocne bicolor

B108 Rough-winged Swallow
Stelgidopteryx ruficollis

B109 Barn Swallow
Hirundo rustica

B110 Cliff Swallow
Petrochelidon pyrrhonota

B111 Steller's Jay
Cyanocitta stelleri

B112 Scrub Jay
Aphelocoma coerulescens

B113 Black-billed Magpie
Pica pica

B114 Yellow-billed Magpie
Pica nuttalli

B115 Common Raven
Corvus corax

B116 Common Crow
Corvus brachyrhynchos

B117 Piñon Jay
Gymnorhinus cyanocephalus

B118 Clark's Nutcracker
Nucifraga columbiana

B119 Mountain Chickadee
Parus gambeli

B120 Chestnut-backed Chickadee
Parus rufescens

B121 Plain Titmouse
Parus inornatus

B122 Bushtit
Psaltriparus minimus

B123 White-breasted Nuthatch
Sitta carolinensis

B124 Red-breasted Nuthatch
Sitta canadensis

B125 Pygmy Nuthatch
Sitta pygmaea

B126 Brown *Creeper*
Certhia familiaris

B127 Wrentit
Chamaea fasciata

B128 Dipper
Cinclus mexicanus

B129 Winter Wren
Troglodytes troglodytes

B130 House Wren
Troglodytes aedon

B131 Bewick's Wren
T'hryomanes bewickii

B132 Long-billed Marsh Wren
Cistothorus palustris

B133 Cañon Wren
Catherpes mexicanus

B134 Rock Wren
Salpinctes obsoletus

B135 Mockingbird
Mimus polyglottos

B136 California Thrasher
T'oxostoma redivivum

B137 American Robin
T'urdus migratorius

B138 Varied Thrush
Ixoreus naevius

B139 Hermit Thrush
Catharus guttata

B140 Swainson's Thrush
Catharus ustulata

B141 *Western Bluebird*
Sialia mexicana

B142 Mountain Bluebird
Sialia currucoides

B143 Townsend's Solitaire
Myadestes townsendi

B144 Blue-gray Gnatcatcher
Polioptila caerulea

B145 Golden-crowned Kinglet
Regulus satrapa

B146 Ruby-crowned Kinglet
Regulus calendula

B147 Water Pipit
Anthus spinoletta

B148 Cedar Waxwing
Bombycilla cedrorum

B149 Phainopepla
Phainopepla nitens

B150 Loggerhead Shrike
Lanius ludovicianus

B151 Starling
Sturnus vulgaris

B152 Hutton's Vireo
Vireo huttoni

B153 Bell's Vireo
Vireo bellii

B154 Solitary Vireo
Vireo solitarius

B155 Warbling Vireo
Vireo gilvus

B156 Orange-crowned Warbler
Vermivora celata

B157 Nashville Warbler
Vermivora ruficapilla

B158 Yellow Warbler
Dendroica petechia

B159 Yellow-rumped Warbler
Dendroica coronata

B160 Black-throated Gray Warbler
Dendroica nigrescens

B161 Townsend's Warbler
Dendroica townsendi

B162 Hermit Warbler
Dendroica occidentalis

B163 MacGillivray's Warbler
Oporornis tolmiei

B164 Common Yellowthroat
Geothlypis trichas

B165 Yellow-breasted Chat
Icteria virens

B166 Wilson's Warbler
Wilsonia pusilla

B167 House Sparrow
Passer domesticus

B168 Western Meadowlark
Sturnella neglecter

B169 Yellow-headed Blackbird
Xanthocephalus xanthocephalus

B170 Red-winged Blackbird
Agelaius phoeniceus

B171 Tricolored Blackbird
Agelaius tricolor

B172 Northern Oriole
Icterus galbula

B173 Brewer's Blackbird
Euphagus cyanocephalus

B174 Brown-headed Cowbird
Molothrus ater

B175 Western Tanager
Piranga ludoviciana

B176 Black-headed Grosbeak
Pheucticus melanocephalus

B177 Blue Grosbeak
Guiraca caerulea

B178 Lazuli Bunting
Passerina amoena

B179 Evening Grosbeak
Hesperiphona vespertina

B180 Purple Finch
Carpodacus purpureus

B181 Cassin's Finch
Carpodacus cassinii

B182 House Finch
Carpodacus mexicanus

B183 Pine Grosbeak
Pinicola enucleator

B184 Gray-crowned Rosy Finch
Leucosticte tephrocotis

B185 Pine Siskin
Carduelis pinus

B186 American Goldfinch
Carduelis tristis

B187 Lesser Goldfinch
Carduelis psaltria

B188 Lawrence's Goldfinch
Carduelis lawrencei

B189 Red Crossbill
Loxia curvirostra

B190 Green-tailed Towhee
Pipilo chlorurus

B191 Rufous-sided Towhee
Pipilo erythrophthalmus

B192 Brown Towhee
Pipilo fuscus

B193 Savannah Sparrow
Passerculus sandwichensis

B194 Grasshopper Sparrow
Ammodramus savannarum

B195 Vesper Sparrow
Pooecetes gramineus

B196 Lark Sparrow
Chondestes grammacus

B197 Rufous-crowned Sparrow
Aimophila ruficeps

B198 Black-throated Sparrow
Amphispiza bilineata

B199 Sage Sparrow
Amphispiza belli

B200 Dark-eyed junco
Junco hyemalis

B201 Chipping Sparrow
Spizella passerine

B202 Brewer's Sparrow
Spizella breweri

B203 Black-chinned Sparrow
Spizella atrogularis

B204 White-crowned Sparrow
Zonotrichia leucophrys

B205 Golden-crowned Sparrow
Zonotrichia atricapilla

B206 Fox Sparrow
Passerella iliaca

B207 Lincoln's Sparrow
Melospiza lincolnii

B208 Song Sparrow
Melospiza melodic

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
Summer
Fall
Winter

For key to this matrix, see *figure 2*.

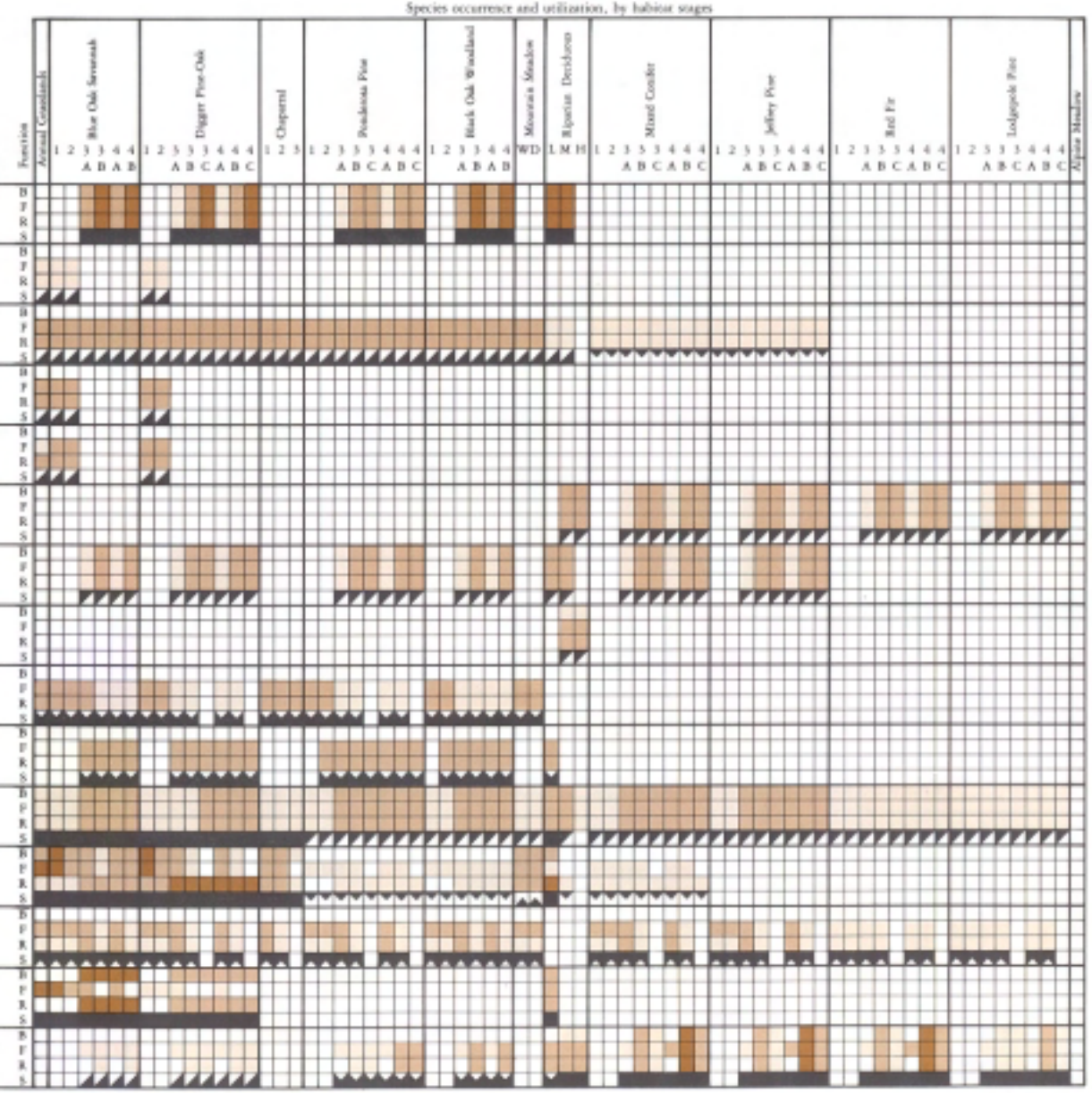
Species occurrence and utilization, by habitat stages

Code	Species	Special Habitat Requirements	Page	Function	Annual Grasslands	Blue Oak Savannah	Digger Pine-Oak	Chaparral	Ponderosa Pine	Black Oak Woodland	Montane Meadow	Riparian Deciduous	Mixed Conifer	Jeffrey Pine	Red Fir	Lodgepole Pine	Alpine Meadow
					1	2 3 A	3 3 4 A	4 4 B	1	2 3 A	3 3 4 B	4 4 C	1	2 3 A	3 3 4 B	4 4 C	1	2 3 A	3 3 4 B	4 4 C

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
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For key to this matrix, see *figure 2*.

Species occurrence and utilization, by habitat stages



Code	Species	Special Habitat Requirements	Page
B016	Wood Duck	Ponds, slow-moving streams or rivers; nest cavities; oaks	108
B017	Redhead	Lakes with deep water	109
B018	Ring-necked Duck	Ponds, lakes	110
B019	Canvasback	Lakes	111
B020	Lesser Scaup	Ponds, lakes	112
B021	Barrow's Goldeneye	Ponds; lakes; nest cavities (see narrative on breeding)	113
B022	Bufflehead	Ponds, lakes, slow-moving streams; nest cavities	114
B023	Harlequin Duck	Swift streams or rivers (see narrative on breeding)	115
B024	Ruddy Duck	Ponds, lakes	116
B025	Hooded Merganser	Ponds, lakes, slow-moving streams or rivers	117
B026	Common Merganser	Ponds, lakes, slow-moving streams or rivers	118
B027	Turkey Vulture	Open terrain for foraging	119
B028	California Condor ENDANGERED	Open terrain for foraging; large trees or cliffs for roosting	120
B029	White-tailed Kite	Dense-canopied trees for nesting	121
B030	Goshawk SENSITIVE	Water probably needed on breeding territory	122

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
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Winter

For key to this matrix, *see figure 2.*

Species occurrence and utilization, by habitat stages

Code	Species	Special Habitat Requirements	Page
B031	Sharp-shinned Hawk	Trees/shrubs	123
B032	Cooper's Hawk	Trees/shrubs or trees/grass-forbs; water probably needed nearby for breeding	124
B033	Red-tailed Hawk	Large trees or cliff for nesting and roosting; large openings for foraging	125
B034	Red-shouldered Hawk	Large tracts of riparian deciduous woodland for breeding	126
B035	Swainson's Hawk		127
B036	Golden Eagle SENSITIVE	Cliffs or scattered large trees	128
B037	Bald Eagle ENDANGERED	Large lake, stream or river; large trees for nesting; low human disturbance	129
B038	Marsh Hawk		130
B039	Osprey SENSITIVE	Lakes, rivers for feeding; snags, large trees, or cliffs for nesting	131
B040	Prairie Falcon SENSITIVE	Open terrain for foraging; cliffs for nesting	132
B041	Peregrine Falcon ENDANGERED	Cliffs for nesting and perching; nearby lake or river	133
B042	Merlin		134
B043	American Kestrel	Nest cavities in trees or earthen bank; elevated perches; open terrain	135
B044	Blue Grouse	Medium to large forest openings; shrubs/grass-forbs	136
B045	White-tailed Ptarmigan	Rock outcrops; probably shrubs/grass-forbs	137

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
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Winter

For key to this matrix, see *figure 2*.

Species occurrence and utilization, by habitat stages

Code	Species	Special Habitat Requirements	Page
B046	California Quail	Shrubs/grass-forbs; water in dry season	138
B047	Mountain Quail	Shrubs/grass-forbs; water in breeding season	139
B048	Chukar	Rock outcrops or talus; water	140
B049	Turkey	Water; trees/grass-forbs	141
B050	Virginia Rail	Marshes; open water	142
B051	American Coot	Ponds, lakes, slow-moving streams or rivers	143
B052	Killdeer	Open terrain; rarely far from ponds, lakes, streams, or rivers	144
B053	Common Snipe	Wet margins of ponds, lakes, streams, rivers, or marshes	145
B054	Spotted Sandpiper	Gravelly or sandy margins of ponds, lakes, streams, or rivers	146
B055	American Avocet	Open terrain; pond or lake margins	147
B056	Wilson's Phalarope	Open terrain; pond, lake, or marsh edges	148
B057	California Gull	Lakes, rivers	149
B058	Ring-billed Gull	Lakes, rivers	150
B059	Band-tailed Pigeon	Large trees; nearby water	151
B060	Mourning Dove	Trees for nesting; nearby water	152

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
Summer
Fall
Winter

For key to this matrix, *see figure 2.*

Species occurrence and utilization, by habitat stages

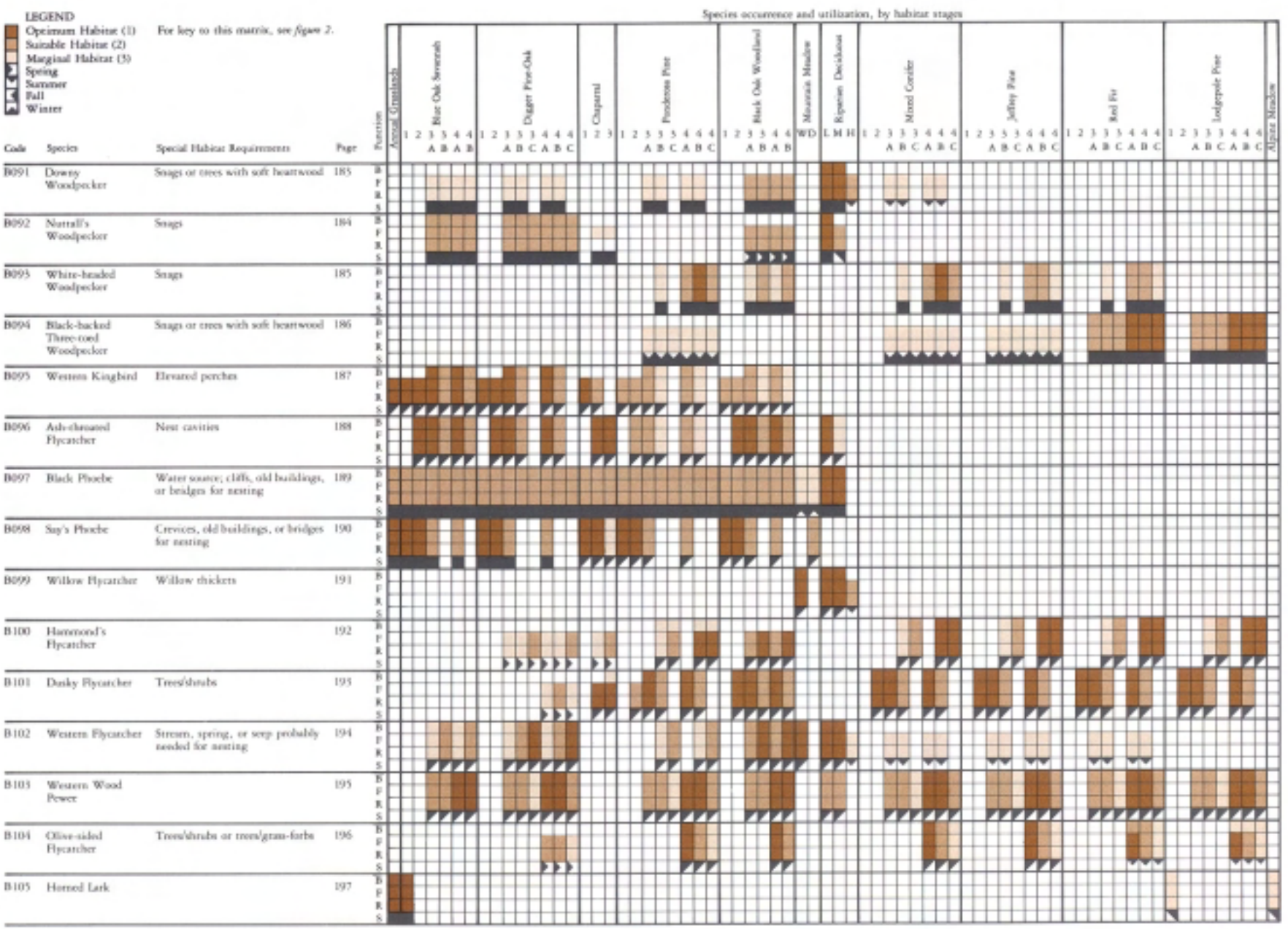
Code	Species	Special Habitat Requirements	Page
B061	Roadrunner	Nearby water	153
B062	Barn Owl	Cliffs, crevices, or old buildings for nesting	154
B063	Screech Owl	Oaks; nest cavities	155
B064	Flammulated Owl	Yellow pines or black oaks in nesting habitat; nest cavities	156
B065	Great Horned Owl	Large openings for foraging	157
B066	Pygmy Owl	Nest cavities	158
B067	Burrowing Owl	Ground burrows	159
B068	Spotted Owl SENSITIVE	Water probably needed; large trees	160
B069	Great Gray Owl	Trees/grass-forbs (see narrative on distribution)	161
B070	Long-eared Owl	Trees/grass-forbs; riparian habitat nearby	162
B071	Short-eared Owl	Annual grassland or marsh	163
B072	Saw-whet Owl	Trees/grass-forbs; nest cavities	164
B073	Poor-will	Trees/shrubs; rock outcrops or logs for nesting cover	165
B074	Common Nighthawk	Open terrain for feeding	166
B075	Black Swift	Cliffs for nesting	167

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
Summer
Fall
Winter

For key to this matrix, see *figure 2*.

Species occurrence and utilization, by habitat stages

Code	Species	Special Habitat Requirements	Page	Function	Annual Grasslands	Blue Oak Savannah 1 2 3 4 4 4 A B A B	Digger Pine-Oak 1 2 3 3 3 4 4 4 A B C A B C	Chaparral 1 2 3	Ponderosa Pine 1 2 3 3 3 4 4 4 A B C A B C	Black Oak Woodland 1 2 3 5 4 4 A B A B	Mountain Meadow WD	Riparian Deciduous L M H	Mixed Conifer 1 2 3 5 3 4 4 4 A B C A B C	Jeffrey Pine 1 2 3 3 3 4 4 4 A B C A B C	Red Fir 1 2 3 5 3 4 4 4 A B C A B C	Lodgepole Pine 1 2 3 3 3 4 4 4 A B C A B C	Alpine Meadow
B076	Vaux's Swift	Hollow stubs or snags for nesting	168	B F R S													
B077	White-throated Swift	Cliffs for nesting	169	B F R S													
B078	Black-chinned Hummingbird	Nectar source; water	170	B F R S													
B079	Anna's Hummingbird	Nectar source; small, medium or large openings; water	171	B F R S													
B080	Allen's Hummingbird	Nectar source (see narrative on identification)	172	B F R S													
B081	Rufous Hummingbird	Nectar source	173	B F R S													
B082	Calliope Hummingbird	Nectar source; water	174	B F R S													
B083	Belted Kingfisher	Earthen banks for nesting; pond, lake, stream, or river for feeding	175	B F R S													
B084	Common Flicker	Snags or trees with soft heartwood	176	B F R S													
B085	Pileated Woodpecker	Large snags; low human disturbance	177	B F R S													
B086	Acorn Woodpecker	Oaks; large trees	178	B F R S													
B087	Lewis' Woodpecker	Oaks in fall and winter	179	B F R S													
B088	Yellow-bellied Sapsucker	Snags or trees with soft heartwood for cavity excavation	180	B F R S													
B089	Williamson's Sapsucker	Snags	181	B F R S													
B090	Hairy Woodpecker	Snags	182	B F R S													


LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
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For key to this matrix, see figure 2.
Species occurence and utilization, by habitat stages
Function
Annual Grasslands
Blue Oak Woodland
Digger Pine-Oak
Chaparral
Ponderosa Pine
Black Oak Woodland
Mountain Meadow
Riparian Deciduous
Mixed Conifer
Jeffrey Pine
Red Fir
Lodgepole Pine
Alpine Meadow
Code
Species
Special Habitat Requirements
Page
B091 Downy Woodpecker Snags or trees with soft heartwood 185
B092 Nuttall's Woodpecker Snags 184
B095 White-headed Woodpecker Snags 185
B094 Black-backed Three-toed Woodpecker Snags or trees with soft heartwood 186
B095 Western Kingbird Elevated perches 187
B096 Ash-throated Flycatcher Nest cavities 188
B097 Black Phoebe Water source; cliffs, old buildings, or bridges for nesting 189
B098 Say's Phoebe Crevices, old buildings, or bridges for nesting 190
B099 Willow Flycatcher Willow thickets 191
B100 Hammond's Flycatcher 192
B101 Dusky Flycatcher Trees/shrubs 193
B102 Western Flycatcher Stream, spring, or seep probably needed for nesting 194
B103 Western Wood Pewee 195
B104 Olive-sided Flycatcher Trees/shrubs or trees/grass-forbs 196
B105 Horned Lark 197

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
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For key to this matrix, see *figure 2.*

Species occurrence and utilization, by habitat stages

Code	Species	Special Habitat Requirements	Page	Function	Annual Grasslands	Blue Oak Savannah	Digger Pine-Oak	Chaparral	Ponderosa Pine	Black Oak Woodland	Mountain Meadow	Riparian Deciduous	Mixed Conifer	Jeffrey Pine	Red Fir	Lodgepole Pine	Alpine Meadow
					1	1 2 3 5 3 4 4 4 A B A B	1 2 3 5 3 4 4 4 A B C A B C	1 2 3	1 2 3 5 3 4 4 4 A B C A B C	1 2 3 3 4 4 4 A B A B	WD	L M H	1 2 3 5 3 4 4 4 A B C A B C	1 2 3 3 4 4 4 A B C A B C	1 2 3 5 3 4 4 4 A B C A B C	1 2 3 5 3 4 4 4 A B C A B C	
B106	Violet-green Swallow	Nest cavities or crevices; medium to large openings, or open terrain	198	B F R S													
B107	Tree Swallow	Nests in cavities by pond, lake, stream, river, marsh, or wet meadow	199	B F R S													
B108	Rough-winged Swallow	Earthen bank	200	B F R S													
B109	Barn Swallow	Cliffs, old buildings, or bridges for nesting; nearby water for mud gathering	201	B F K S													
B110	Cliff Swallow	Cliffs, old buildings, or bridges for nesting; nearby water for mud-gathering	202	B F K S													
B111	Steller's Jay		203	B F K S													
B112	Scrub Jay	Oaks or cultivated nut trees	204	B F R S													
B113	Black-billed Magpie	Water in dry season; openings	205	B F R S													
B114	Yellow-billed Magpie	Open terrain; trees; water in dry season	206	B F R S													
B115	Common Raven	Large openings or open terrain; cliffs or trees for nesting	207	B F K S													
B116	Common Crow	Large openings or open terrain; trees for nesting	208	B F R S													
B117	Piñon Jay	Openings	209	B F R S													
B118	Clark's Nutcracker	Pines	210	B F R S													
B119	Mountain Chickadee	Nest cavities	211	B F R S													
B120	Chestnut-backed Chickadee	Nest cavities	212	B F R S													

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
Summer
Fall
Winter

For key to this matrix, see *figure 2*.

Species occurrence and utilization, by habitat stages

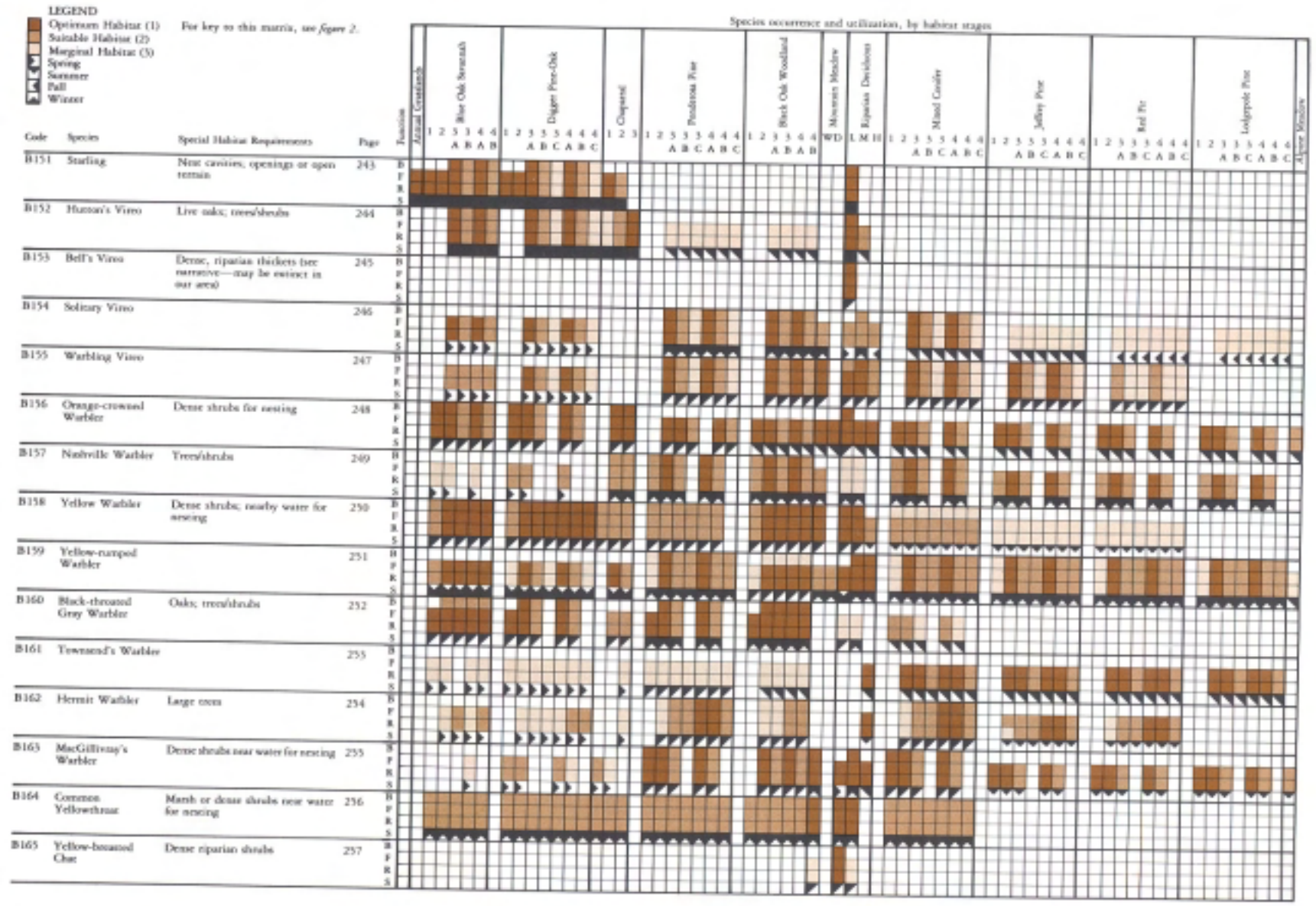
Code	Species	Special Habitat Requirements	Page	Function	Annual Grasslands	Blue Oak Savannah 1 2 3 3 4 4 4 A B A B	Digger Pine-Oak 1 2 3 3 4 4 4 4 A B C A B C	Chaparral 1 2 3	Ponderosa Pine 1 2 3 3 4 4 4 4 A B C A B C	Black Oak Woodland 1 2 3 3 4 4 4 A B A B	Montane Meadow W D	Riparian Deciduous L M H	Mixed Conifer 1 2 3 3 4 4 4 4 A B C A B C	Jeffrey Pine 1 2 3 3 4 4 4 4 A B C A B C	Red Fir 1 2 3 3 4 4 4 4 A B C A B C	Lodgepole Pine 1 2 3 3 4 4 4 4 A B C A B C	Alpine Meadow
B121	Plain Titmouse	Oaks; nest cavities	213	B F R S													
B122	Bushtit	Oaks; trees/shrubs	214	B F R S													
B123	White-breasted Nuthatch	Nest cavities	215	B F R S													
B124	Red-breasted Nuthatch	Snags or nest cavities	216	B F R S													
B125	Pygmy Nuthatch	Pines; snags or nest cavities	217	B F R S													
B126	Brown Creeper		218	B F R S													
B127	Wrentit	Dense shrubs	219	B F R S													
B128	Dipper	Clear, permanent streams or rivers	220	B F R S													
B129	Winter Wren	Litter, logs in dense tangles; nest cavities	221	B F R S													
B130	House Wren	Nest cavities; trees/shrubs	222	B F R S													
B131	Bewick's Wren	Natural tree cavity or rock crevice for nesting; trees/shrubs	223	B F R S													
B132	Long-billed Marsh Wren	Marsh	224	B F R S													
B133	Canon Wren	Small cliffs, talus, or rock outcrops	225	B F R S													
B134	Rock Wren	Talus, rock outcrops	226	B F R S													
B135	Mockingbird	Trees/shrubs	227	B F R S													

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
Summer
Fall
Winter

For key to this matrix, *see figure 2.*

Species occurrence and utilization, by habitat stages

Code	Species	Special Habitat Requirements	Page	Function	Annual Grasslands	Blue Oak Savannah	Blue Oak-Digger Pine-Oak	Chaparral	Ponderosa Pine	Black Oak Woodland	Mountain Meadow	Riparian Deciduous	Mixed Conifer	Jeffrey Pine	Red Fir	Lodgepole Pine	Alpine Meadow
					1	2 3 3 4 4 4 A B A B	1 2 3 3 4 4 4 A B C A B C	1 2 3	1 2 3 3 3 4 4 4 A B C A B C	1 2 3 3 4 4 4 A B A B	WD	L M H	1 2 3 3 3 4 4 4 A B C A B C	1 2 3 3 3 4 4 4 A B C A B C	1 2 3 3 3 4 4 4 A B C A B C	1 2 3 3 3 4 4 4 A B C A B C	
B156	California Thrasher	Dense shrubs	228	B F R S													
B157	American Robin	Water (for mud in nest building); openings	229	B F R S													
B158	Varied Thrush		230	B F R S													
B159	Hermit Thrush		231	B F R S													
B160	Swainson's Thrush	Trees/shrubs near water	232	B F R S													
B161	Western Bluebird	Nest cavities; medium to large openings	233	B F R S													
B162	Mountain Bluebird	Nest cavities; medium to large openings	234	B F R S													
B163	Townsend's Solitaire		235	B F R S													
B164	Blue-gray Gnatcatcher	Oaks in breeding season	236	B F R S													
B165	Golden-crowned Kinglet		237	B F R S													
B166	Ruby-crowned Kinglet		238	B F R S													
B167	Water Pipit	Open terrain	239	B F R S													
B168	Cedar Waxwing	Fruit, berries	240	B F R S													
B169	Phainopepla	Trees/shrubs; berries (especially mistletoe)	241	B F R S													
B170	Loggerhead Shrike	Shrubs/grass-forbs	242	B F R S													

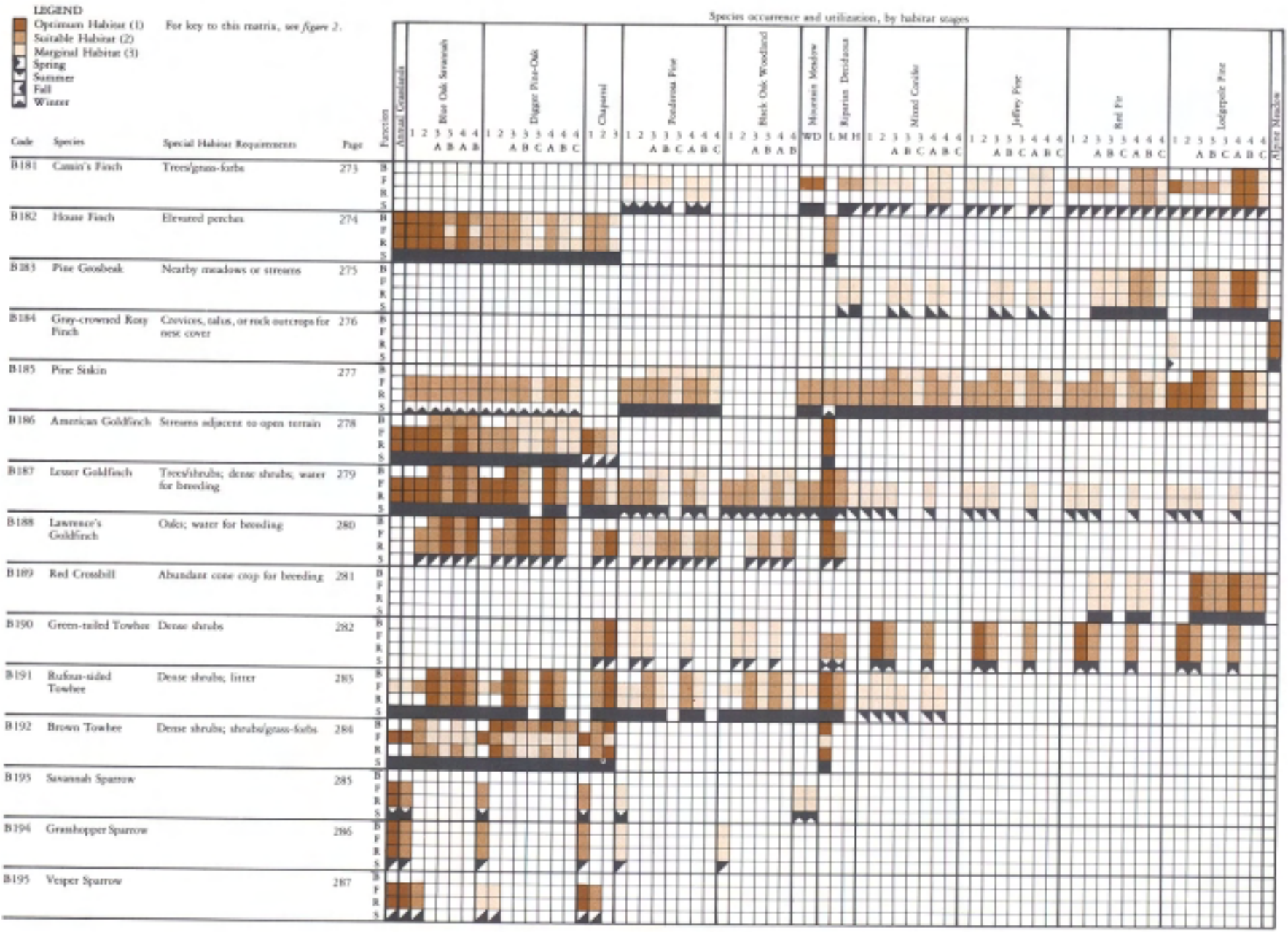

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
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For key to this matrix, see figure 2.
Species occurrence and utilization, by habitat stages
Code
Species
Special Habitat Requirements
Page
Function
Annual Grasslands
Blue Oak Woodland
Digger Pine-Oak
Chaparral
Ponderosa Pine
Black Oak Woodland
Montane Meadow
Riparian Deciduous
Mixed Conifer
Jeffrey Pine
Red Fir
Lodgepole Pine
Alpine Meadow
B151 Starling
Nest cavities; openings or open terrain
243
B152 Hutton's Vireo
Live oaks; trees/shrubs
244
B153 Bell's Vireo
Dense, riparian thickets (see narrative—may be extinct in our area)
245
B154 Solitary Vireo
246
B155 Warbling Vireo
247
B156 Orange-crowned Warbler
Dense shrubs for nesting
248
B157 Nashville Warbler
Trees/shrubs
249
B158 Yellow Warbler
Dense shrubs; nearby water for nesting
250
B159 Yellow-rumped Warbler
251
B160 Black-throated Gray Warbler
Oaks; trees/shrubs
252
B161 Townsend's Warbler
255
B162 Hermit Warbler
Large trees
254
B163 MacGillivray's Warbler
Dense shrubs near water for nesting
255
B164 Common Yellowthroat
Marsh or dense shrubs near water for nesting
256
B165 Yellow-breasted Chat
Dense riparian shrubs
257

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
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For key to this matrix, see *figure 2*.

Species occurrence and utilization, by habitat stages

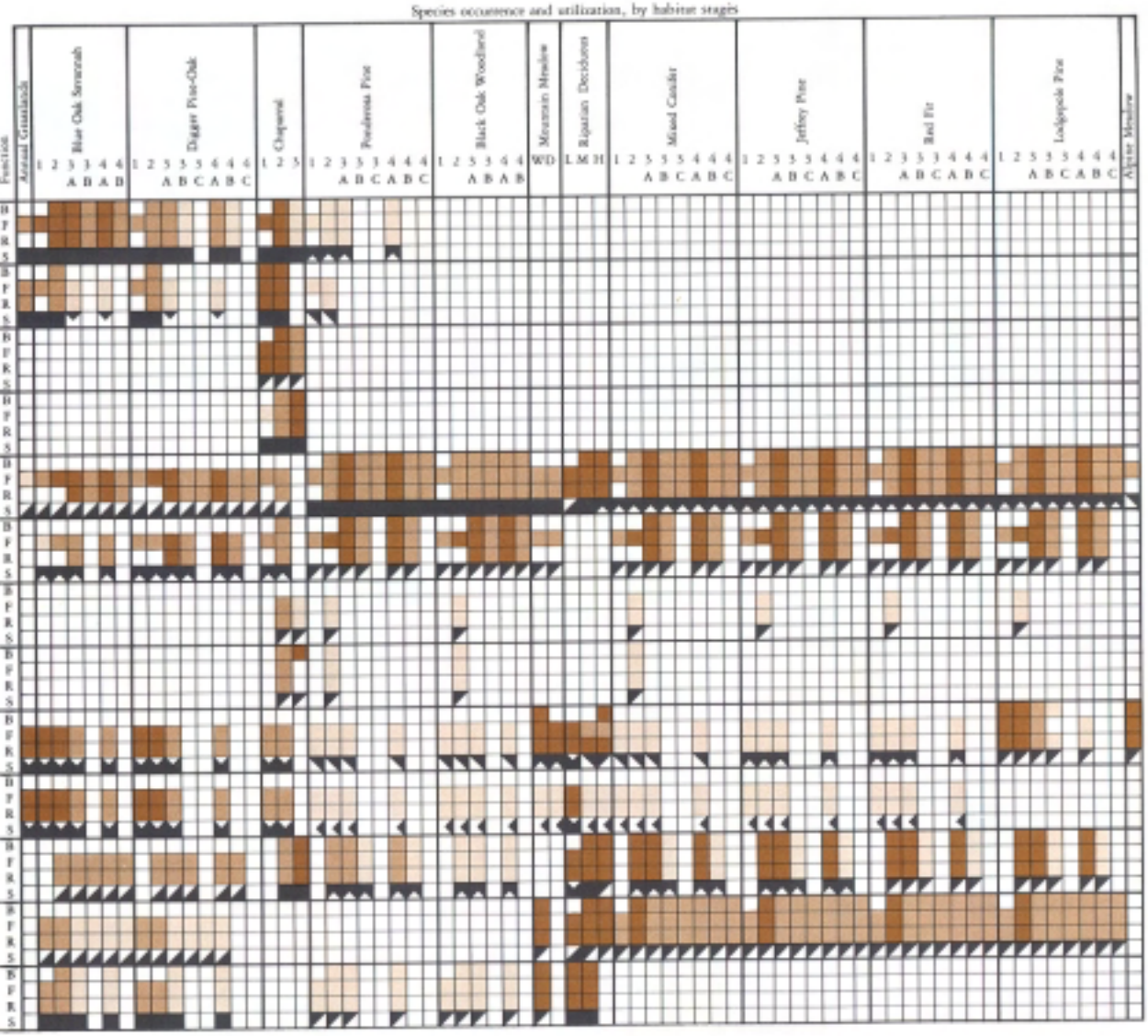
Code	Species	Special Habitat Requirements	Page	Function	Annual Grasslands	Blue Oak Savannah	Digger Pine-Oak	Chaparral	Ponderosa Pine	Black Oak Woodland	Mountain Meadow	Riparian Deciduous	Mixed Conifer	Jeffrey Pine	Red Fir	Lodgepole Pine	Alpine Meadow
					1	1 2 3 5 4 4 4 A B A B	1 2 5 3 3 4 4 4 A B C A B C	1 2 5	1 2 3 3 3 4 4 4 A B C A B C	1 2 3 5 3 4 4 4 A B A B	WD	L M H	1 2 3 3 3 4 4 4 A B C A B C	1 2 3 5 3 4 4 4 A B C A B C	1 2 3 5 3 4 4 4 A B C A B C	1 2 3 3 3 4 4 4 A B C A B C	
B166	Wilson's Warbler	Dense shrubs near water for breeding	258	B F R S													
B167	House Sparrow	Human habitations	259	B F R S													
B168	Western Meadowlark	Open terrain	260	B F R S													
B169	Yellow-headed Blackbird	Marshes for nesting; open terrain	261	B F R S													
B170	Red-winged Blackbird	Marshes or shrubs near water for nesting; open terrain	262	B F R S													
B171	Tricolored Blackbird	Typically marshes for nesting; open terrain	263	B F R S													
B172	Northern Oriole		264	B F R S													
B173	Brewer's Blackbird		265	B F R S													
B174	Brown-headed Cowbird	Openings for feeding; trees for roosting	266	B F R S													
B175	Western Tanager		267	B F R S													
B176	Black-headed Grosbeak		268	B F R S													
B177	Blue Grosbeak	Dense shrubs near water	269	B F R S													
B178	Lazuli Bunting	Shrubs/grass-forbs	270	B F R S													
B179	Evening Grosbeak		271	B F R S													
B180	Purple Finch		272	B F R S													


LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
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Winter
For key to this matrix, see figure 2.
Species occurrence and utilization, by habitat stages
Function
Annual Grasslands
Blue Oak Savannah
Digger Pine-Oak
Chaparral
Ponderosa Pine
Black Oak Woodland
Montane Meadow
Riparian Deciduous
Mixed Conifer
Jeffrey Pine
Red Fir
Lodgepole Pine
Alpine Meadow
Code
Species
Special Habitat Requirements
Page
B181 Cassin's Finch Trees/grass-forbs 273
B182 House Finch Elevated perches 274
B183 Pine Grosbeak Nearby meadows or streams 275
B184 Gray-crowned Rosy Finch Crevices, talus, or rock outcrops for nest cover 276
B185 Pine Siskin 277
B186 American Goldfinch Streams adjacent to open terrain 278
B187 Lesser Goldfinch Trees/shrubs; dense shrubs; water for breeding 279
B188 Lawrence's Goldfinch Oaks; water for breeding 280
B189 Red Crossbill Abundant cone crop for breeding 281
B190 Green-tailed Towhee Dense shrubs 282
B191 Rufous-sided Towhee Dense shrubs; litter 283
B192 Brown Towhee Dense shrubs; shrubs/grass-forbs 284
B193 Savannah Sparrow 285
B194 Grasshopper Sparrow 286
B195 Vesper Sparrow 287

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
Summer
Fall
Winter

For key to this matrix, see *figure 2*.

Species occurrence and utilization, by habitat stages



Code	Species	Special Habitat Requirements	Page
B196	Lark Sparrow	Shrubs/grass-forbs	288
B197	Rufous-crowned Sparrow	Shrubs/grass-forbs	289
B198	Black-throated Sparrow		290
B199	Sage Sparrow	Shrubs/grass-forbs	291
B200	Dark-eyed Junco	Shrubs/grass-forbs	292
B201	Chipping Sparrow		293
B202	Brewer's Sparrow		294
B203	Black-chinned Sparrow	Shrubs/grass-forbs	295
B204	White-crowned Sparrow	Shrubs/grass-forbs; water for breeding	296
B205	Golden-crowned Sparrow		297
B206	Fox Sparrow	Dense shrubs	298
B207	Lincoln's Sparrow	Dense shrubs; ponds, lakes, streams, rivers, or wet meadows	299
B208	Song Sparrow	Dense shrubs; ponds, lakes, streams, rivers, or wet meadows	300

Eared Grebe

B001 (*Podiceps nigricollis*)

STATUS: No official listed status. Uncommon migrant in late summer and fall; rare winter and spring visitor.

DISTRIBUTION/HABITAT: Found in all successional stages from annual grasslands through alpine meadows.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, or large pools in streams or rivers.

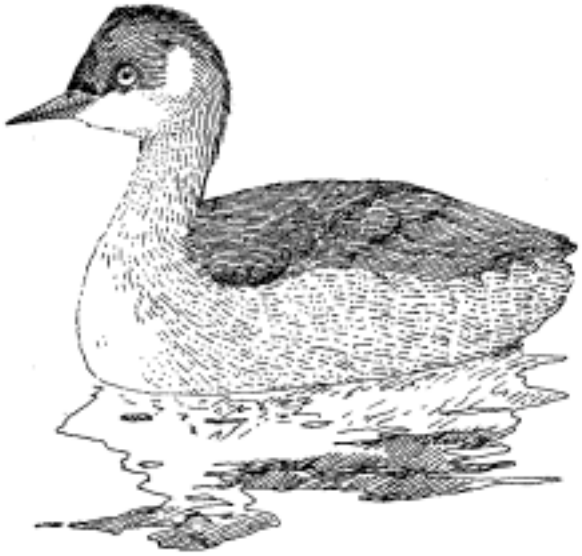
BREEDING: Does not breed on west slope of the Sierra Nevada.

TERRITORY/HOME RANGE: No data available on home range; not territorial during nonbreeding season.

FOOD HABITS: Major food items: aquatic insects, small crustaceans, small fishes, leech eggs, mollusks, and amphibians. Forages underwater by diving. Grasps prey in bill (does not pierce); gleans land insects from surface water.

OTHER: Susceptible to biological concentration of hard pesticides in watersheds draining into its aquatic habitats.

REFERENCES: McAllister 1958, Palmer 1962.





Western Grebe

B002 (*Aechmophorus occidentalis*)

STATUS: No official listed status. On Audubon Society Blue List for 1978. Rare migrant during late spring and summer.

DISTRIBUTION/HABITAT: Found in all successional stages from annual grasslands through red fir.

SPECIAL HABITAT REQUIREMENTS: Lakes.

BREEDING: Does not breed on west slope of the Sierra Nevada.

TERRITORY/HOME RANGE: No data on home range. Territorial only during breeding season. When feeding, "territoriality" operates to space individuals about 200 ft (61 m) apart during breeding season (Lawrence 1950).

FOOD HABITS: Feeds mainly on small fish, also on insects underwater. Dives for prey and pierces fish with bill; some prey grasped rather than pierced.

OTHER: Susceptible to biological concentration of hard pesticides in watersheds draining into its aquatic habitats.

REFERENCES: Lawrence 1950, Palmer 1962.





Pied-billed Grebe

B003 (*Podilymbus podiceps*)

STATUS: No official listed status. Rare resident.

DISTRIBUTION/HABITAT: Found in all successional stages from annual grasslands through Jeffrey pine.

SPECIAL HABITAT REQUIREMENTS: Marsh and open water.

BREEDING: Breeds from mid-March to late September, with peak from early June to late July. Nest usually floating, but sometimes built up from bottom of a pond in aquatic vegetation near open water. Clutch size from 2 to 10 eggs, with 6 most common. Few nesting records from Shasta County; breeds along length of west slope (Grinnell and Miller 1944).

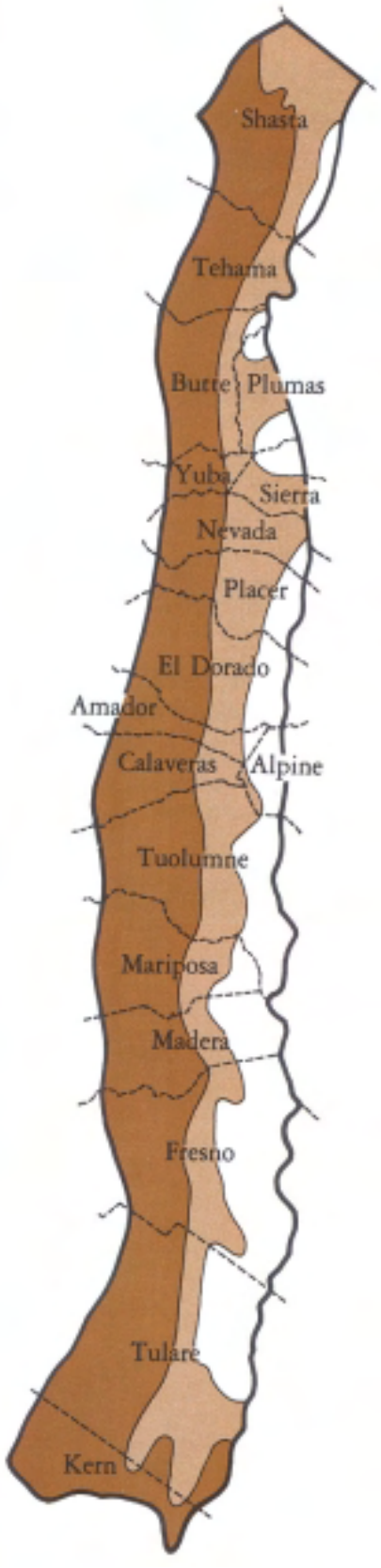
TERRITORY/HOME RANGE: In Iowa, for 44 breeding territories, the "arc" around nests averaged 150 ft (46 m). Home range was twice this size (Glover 1953a).

FOOD HABITS: Dives for insects, crustaceans, and small fish.

OTHER: Susceptible to biological concentration of hard pesticides on watersheds draining into its aquatic habitats.

REFERENCES: Grinnell and Miller 1944, Glover 1953a, Palmer 1962, Chabreck 1963.





Great Blue Heron

B004 (*Ardea herodias*)

STATUS: No official listed status. Uncommon resident.

DISTRIBUTION/HABITAT: Found in all successional stages from annual grasslands through lodgepole pine. Regualrly moves upslope after breeding, rarely up to treeline. Some nonbreeding individuals present year-round up to 4000 ft (1220 m).

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, streams, rivers, marshes, or wet meadows.

BREEDING: Breeds from mid-February to early September, with peak from early April to early July. Nests in live or dead trees, on cliffsides, or sequestered spots in marshes. Will nest on ground; prefers tops of tall trees often above 50 ft (15.2 m). Only one active rookery known on west slope, in a riparian deciduous woodland along Kern River, Kern County, at 3000 ft (915 m) elevation. Clutch size from 1 to 8 eggs, with 3 or 4 most common.

TERRITORY/HOME RANGE: Breeding territory limited to nest and immediate surroundings. Feeding territories may be defended in nonbreeding season (Palmer 1962), particularly in linear habitats-along ditches, streams, and fence rows (Krebs 1974). May travel as far as 10 mi (16 km) from nest sites to foraging areas (Krebs 1974).

FOOD HABITS: Feeds on fish, crustaceans, insects, aquatic plants, and rodents. Forages in shallow water, along banks of a body of water, and in open fields. Stands and waits or walks slowly, standing upright.

OTHER: Susceptible to biological concentration of hard pesticides on watersheds draining into its aquatic habitats.

REFERENCES: Palmer 1962, Pratt 1970, Wilburn 1971, Jackman and Scott 1975.





Green Heron

B005 (*Butorides striatus*)

STATUS: No official listed status. A rare summer visitor and migrant; may breed in scattered locations.

DISTRIBUTION/HABITAT: Found mainly in riparian deciduous zones, more common in the foothills below 1000 ft (305 m), but may be found regularly above that elevation.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, or slow-moving streams or rivers with tree border.

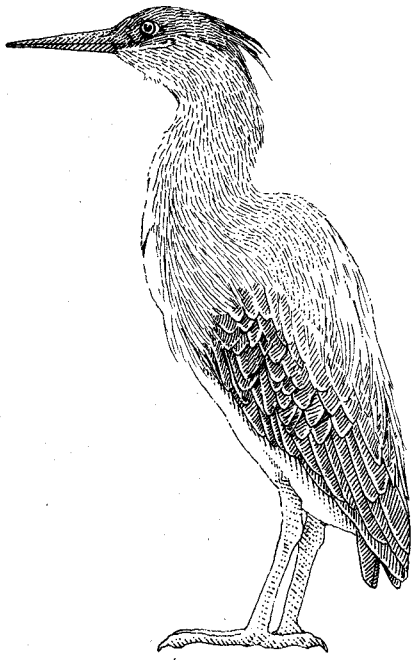
BREEDING: Breeds from late March to mid-August, with peak from early June to late July. Nests in trees, often willows, usually near water and often in dense tangles in crowns of middle-aged trees from near ground to more than 30 ft (9 m). Clutch size from 3 to 6, with 3 or 4 most usual.

TERRITORY/HOME RANGE: No data available on home range. Breeding territory on Long Island, New York, averaged 60 ft (18.3 m) in radius. Territory shrinks from 60 ft (18.3 m) to 3 ft (0.9 m) radius after pair formation. Some also defend a feeding territory of unknown size (Meyerriecks 1960).

FOOD HABITS: Eats primarily small fish, crustaceans, and insects, obtained by standing and waiting, or walking slowly, typically in crouched position. Feeds in shallow water.

OTHER: Susceptible to biological concentration of hard pesticides on watersheds draining into its aquatic habitats.

REFERENCES: Meyerriecks 1960, Palmer 1962.





Black-crowned Night Heron

B006 (*Nycticorax nycticorax*)

STATUS: No official listed status. On the 1978 Audubon Society Blue List. Rare summer visitor and migrant; may winter below 40° latitude.

DISTRIBUTION/HABITAT: Found in annual grasslands through chaparral and riparian deciduous types. Primarily found under various canopy closures of pole, medium, and large tree stages. More common in foothills below 1000 ft (305 m); a few recorded above this elevation, and may be found there regularly; breed in a few localities.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, marshes, slow streams with pools, or rivers.

BREEDING: Breeds from early April to mid-September, with peak from early June to early August. Nests in small to very large colonies in trees or sometimes in rules or cattails 0 to 160 ft (0 to 49 m) above the ground. Clutch size from 1 to 6, with 3 to 5 most usual.

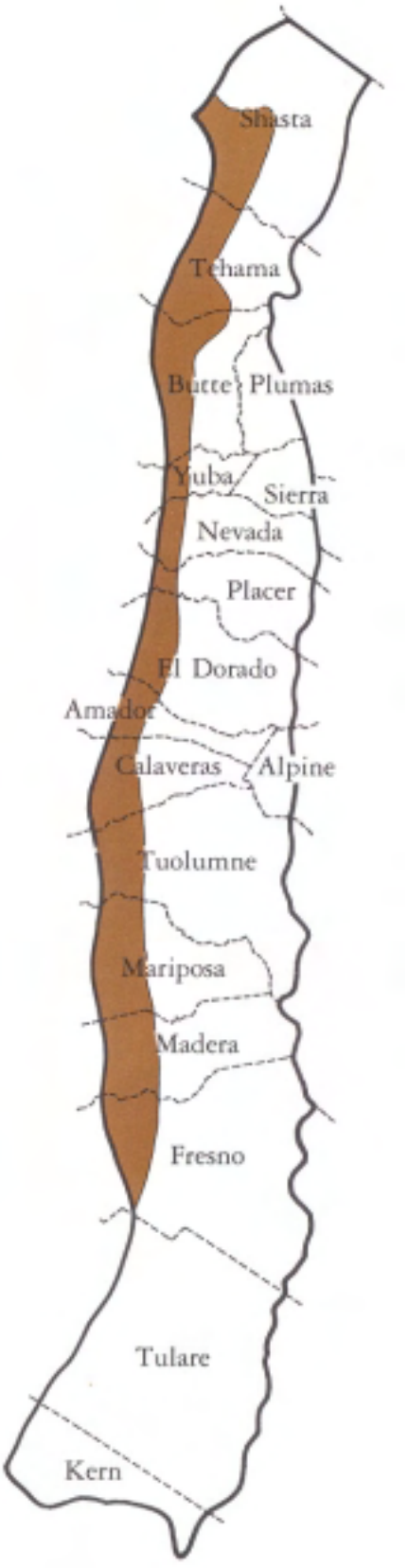
TERRITORY/HOME RANGE: No data available on home range. On Long Island, New York, breeding territory was less than 3 ft (1 m) around the nest (Allen and Mangels 1940). Some have winter roost territory, or feeding territory, or both, but size unknown.

FOOD HABITS: Feeds at night, mainly on small fish, crustaceans, aquatic insects, and frogs. Forages in shallow water by standing and waiting or walking slowly.

OTHER: Susceptible to biological concentration of hard pesticides on watersheds draining into its aquatic habitats.

REFERENCES: Allen and Mangels 1940, Palmer 1962, Ives 1972.





Whistling Swan
B007 (*0lor columbianus*)

STATUS: No official listed status. Rare winter visitor to large, freshwater lakes at low elevations.

DISTRIBUTION/HABITAT: Reported in winter on suitable lakes from annual grassland region to as high as ponderosa pine and black oak regions in northern portion of the Sierra Nevada. Apparently habitat adjacent to water is unimportant; have been recorded in both open and forested sites.

SPECIAL HABITAT REQUIREMENTS: Shallow and productive lakes.

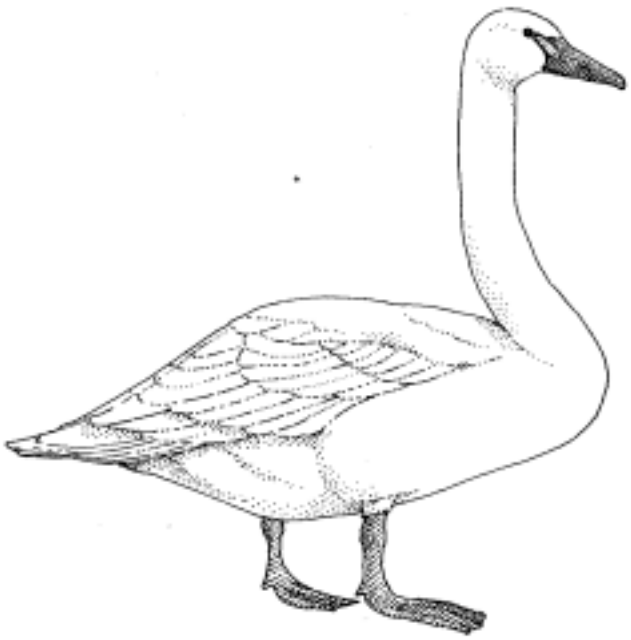
BREEDING: Does not breed on west slope of the Sierra Nevada.

TERRITORY/HOME RANGE: Not territorial in winter. Flies 10 to 15 mi (16 to 24 km) from aquatic roosts in Maryland to feed in fields (Bellrose 1976). A radio-tagged bird in Maryland regularly flew 7 to 8 mi (11 to 13 km) between two areas over an 18-day period (Sladen and Cochran 1969).

FOOD HABITS: Aquatic vegetation, grasses, and cultivated crops make up the diet. Gathers food from bottoms of shallow, eutrophic lakes and agricultural fields. Uproots aquatic vegetation, grazes, and tips up, with head underwater.

OTHER:

REFERENCES: Grinnell *et al.* 1918, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Canada Goose

B008 (*Branta canadensis*)

STATUS: No official listed status. Game species., Uncommon spring and fall migrant and winter visitor; rare and localized nester in the northern Sierra Nevada.

DISTRIBUTION/HABITAT: Known to breed at lakes as high as 6000 ft (1830 m) in Lassen region (starred on range map). Migrating flocks traveling between nesting areas in Great Basin and wintering grounds in Central Valley recorded. Flocks infrequently stop briefly to feed and rest in large meadows or lakes throughout the Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS: Lakes.

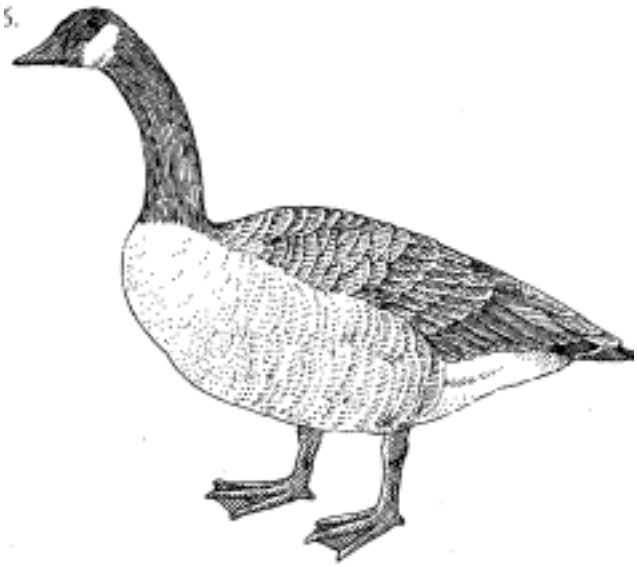
BREEDING: Breeds from mid-March to late July, with peak from mid-May to mid-July. Typically nests on islands on the ground or uses a dry nest foundation, such as stump, platform, or tree. Nest height varies, depending on type of foundation structure available. Clutch size from 4 to 10, with 5 to 7 most frequent.

TERRITORY/HOME RANGE: Breeding territories include nest site and suitable loafing area; size varies with characteristics of vegetation and aggressiveness of gander. In Alberta, a map of territories suggests a size range from about 800 ft^2 to at least 2.3 acres (70 m^2 to 0.9 ha) with nest densities of 8.0, 10.7, and 9.2 nests/acre (19.8, 26.4, and 22.7 nests/ha) for a 3-year period (Ewaschuk and Boag 1972). A high nesting density of about 62/acre (153/ha) on an island at Honey Lake Refuge, Lassen County, reported (Naylor 1953). Breeding home range depends on distance from nest to suitable feeding areas. In Utah (Williams and Sooter 1940) and North Dakota (Hammond and Mann 1956), foraged up to 5 mi (8 km) from nest. Broods in Montana moved 2 to 10 mi (3.2 to 16 km) from nest to feeding areas and remained until they could fly (Geis 1956). In winter, foraged at least 30 mi (48 km) from roosting lakes in Texas (Glazener 1946).

FOOD HABITS: Cereal crops, clovers, grasses, aquatic vegetation, snails, tadpoles, and insects are major foods. Obtains food from water by probing in mud, and tipping up, with head underwater, and on ground, by grazing.

OTHER:

REFERENCES: Grinnell *et al.* 1918, Dimmick 1968, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Snow Goose

B009 (*Chen caerulescens*)

STATUS: No official listed status. Game species. Extremely rare fall migrant and winter visitor.

DISTRIBUTION/HABITAT: Most records are of flocks in flight; have been documented as landing on lakes away from timbered areas, from annual grasslands up to chaparral zone.

SPECIAL HABITAT REQUIREMENTS: Lakes.

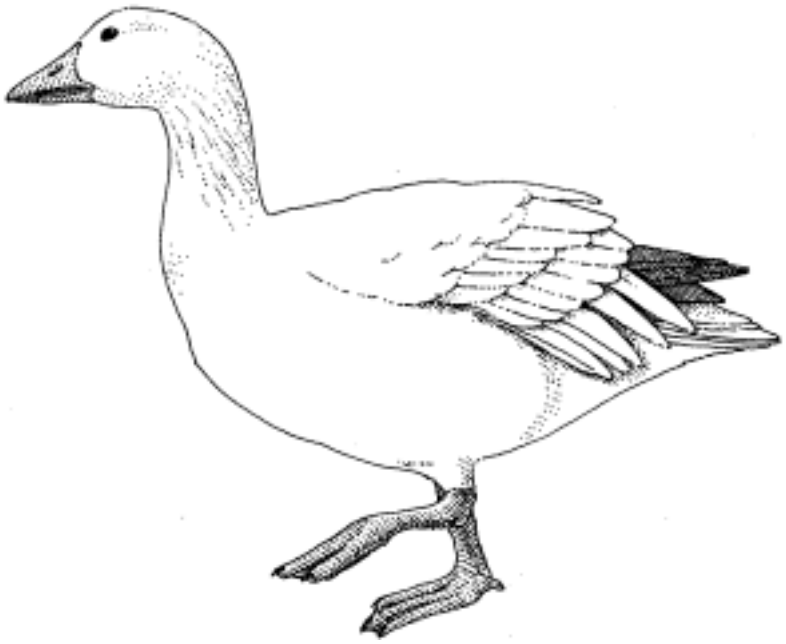
BREEDING: Does not breed on west slope of the Sierra Nevada.

TERRITORY/HOME RANGE: Little information on winter home range. In Texas, flew up to 30 mi (48 km) to feeding areas (Glazener 1946). Not territorial in winter.

FOOD HABITS: Feeds on bulrushes, marsh grasses, pasture grasses, and cultivated grains. Food gathered from muddy bottoms of shallow ponds and cultivated fields. Uproots aquatic vegetation and grazes in pastureland.

OTHER: One of the most social of all species of waterfowl.

REFERENCES: Grinnell *et al.* 1918, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Mallard

B010 (*Anal platyrhynchos*)

STATUS: No official listed status. Game species. Uncommon breeder; fairly common winter visitor at low elevations.

DISTRIBUTION/HABITAT: Recorded breeding in Yosemite National Park, west side of the Sierra Nevada, to elevations of 9600 ft (2930 m) (Beedy, unpubl.). Numerous lower elevation nesting records, usually associated with lakes and smooth-flowing rivers, irrespective of surrounding vegetation. Most winter records below 4000 ft (1220 m).

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, slow-moving streams or rivers.

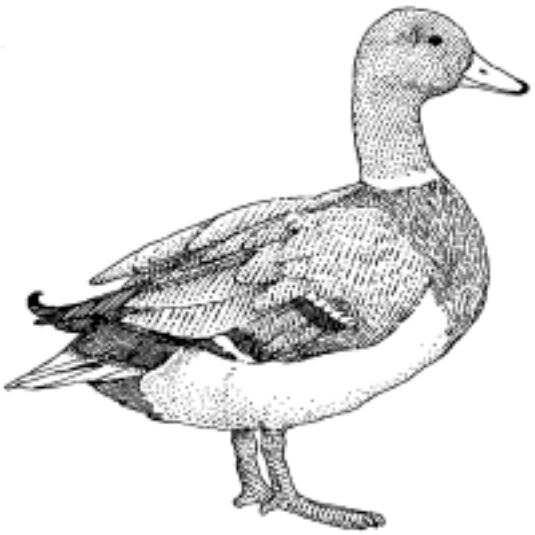
BREEDING: Breeds from mid-March to mid-July, with peak from late April to late June. Nests on the ground, usually in tall, herbaceous vegetation, usually within 328 ft (100 m) of water. Has been noted nesting in dense woods. Clutch size from 1 to 18 (mostly 6 to 12), with mean of 9.

TERRITORY/HOME RANGE: In prairie potholes country of Manitoba, nesting home range size averaged 700 acres (283 ha) (Dzubin 1955). Average breeding home ranges of radio-tagged birds in timbered areas of Minnesota were 519 acres (210 ha) (12 females) and 593 acres (240 ha) (12 males); the range was 163 acres (66 ha) (a female) to 1878 acres (760 ha) (a pair) (Gilmer *et al.* 1975). In winter, may fly up to 30 to 40 mi (48 to 64 km) to forage from roost sites. Does not defend rigid territories, but area immediately surrounding the female usually defended by the male. Nesting density in South Dakota prairie potholes reported as 6.7 pairs/mi^2 (2.6 pairs/km^2) (Drewien and Springer 1969).

FOOD HABITS: Feeds on cultivated grains, pondweeds, grasses, insects, crustaceans, and small fish. Food taken from shallow water ponds and from the ground. Dabbles on water surface, tips up in shallow water, and grazes in fields.

OTHER: Most abundant waterfowl species in the Sierra Nevada.

REFERENCES: Anderson *et al.* 1974, Pospahala *et al.* 1974, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Pintail

B011 (*Anas acuta*)

STATUS: No official listed status. Game species. Very rare spring and fall migrant and winter visitor; accidental in summer.

DISTRIBUTION/HABITAT: No confirmed nesting records in the Sierra Nevada, though pair seen at 8600 ft (2620 m) in Tuolomne meadows, June 4, 1977 (Beedy, unpubl.). Prefers areas of shallow water surrounded by open terrain; generally found only at lower elevations in the Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes.

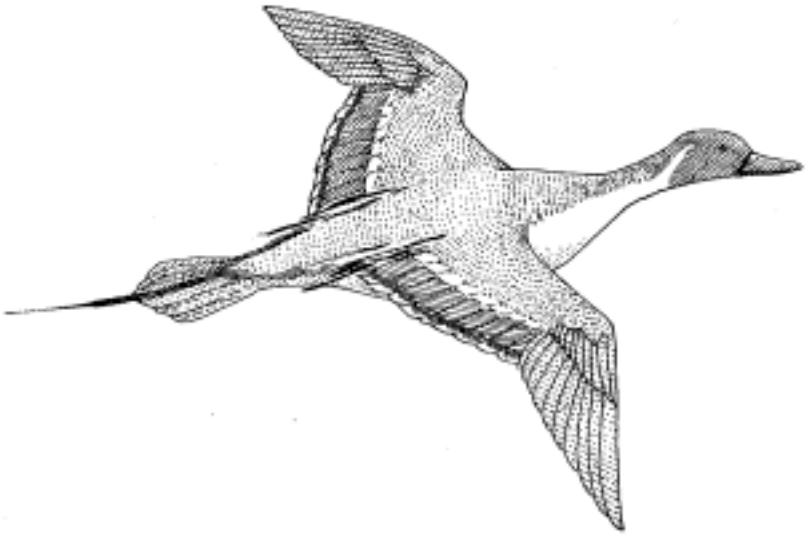
BREEDING: Not known to breed on west slope of the Sierra Nevada.

TERRITORY/HOME RANGE: No information on winter home range; not territorial in winter.

FOOD HABITS: Feeds on cultivated grain, seeds of bulrushes, pondweeds, aquatic and terrestrial insects. Food obtained from bottoms of shallow ponds and dry ground. Dabbles at water surface, tips up for bottom feeding, and grazes.

OTHER:

REFERENCES: Fuller 1953, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Green-winged Teal

B012 (*Anas crecca*)

STATUS: No official listed status. Game species. Rare fall and spring migrant and winter visitor.
DISTRIBUTION/HABITAT: Most records of birds in freshwater ponds and marshes at low elevations up to ponderosa pine and black oak woodland zones.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, or marshes.

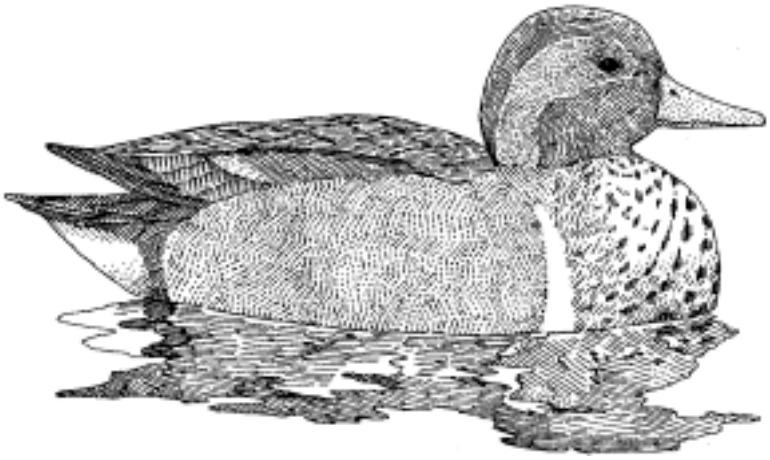
BREEDING: Does not breed on west slope of the Sierra Nevada.

TERRITORY/HOME RANGE: No data on winter home range; not territorial in migration or winter.

FOOD HABITS: Feeds on seeds of aquatic plants, grain, weed seed, and mast; also insects, crustaceans, snails, and tadpoles. Food taken from muddy shores of ponds, bottoms of shallow ponds and, occasionally, fields. Probes in the mud, tips up for bottom feeding, grazes in fields.

OTHER:

REFERENCES: Moisan *et al.* 1967, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Cinnamon Teal

B013 (*Anas cyanoptera*)

STATUS: No official listed status. Game species. Rare spring and summer visitor.

DISTRIBUTION/HABITAT: Found in low-elevation ponds and marshes from annual grasslands up to ponderosa pine and black oak woodland zones.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, slow-moving streams, or rivers.

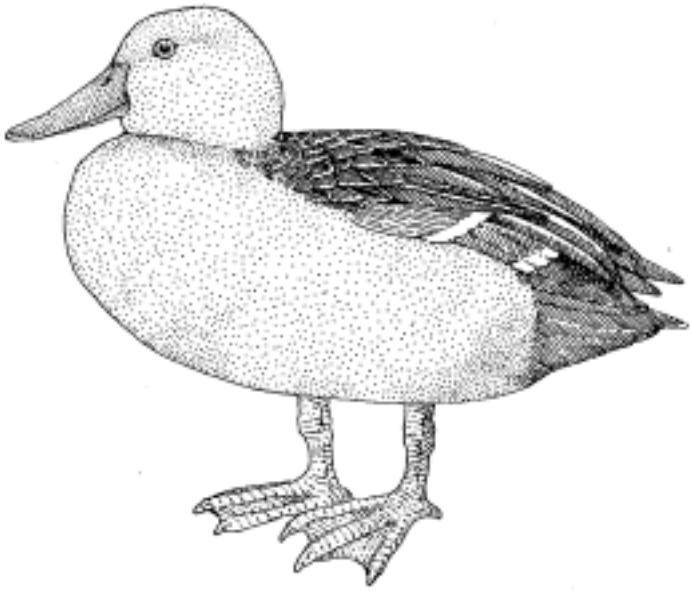
BREEDING: Not known to breed on west slope of the Sierra Nevada; observed nesting in adjacent areas to west and northeast.

TERRITORY/HOME RANGE: No data on home range; territorial only when nesting.

FOOD HABITS: Feeds on seeds and vegetative portions of pondweeds, bulrushes, and sedges; also takes mollusks and insects. Food taken from pond edges, bottoms of shallow ponds, and dry fields. Probes in mud, tips up for bottom feeding, grazes in fields.

OTHER:

REFERENCES: Spencer 1953, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





American Wigeon

B014 (*Anas americana*)

STATUS: No official listed status. Game species. Extremely rare fall and spring migrant and winter visitor.

DISTRIBUTION/HABITAT: More than other members of genus, prefers deeper lakes or wide, slow-moving sections of rivers. Recorded generally at low elevations, up to ponderosa pine and black oak zone, typically in ponds and lakes surrounded by grass/forb or shrub-covered land.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, or slow-moving streams or rivers.

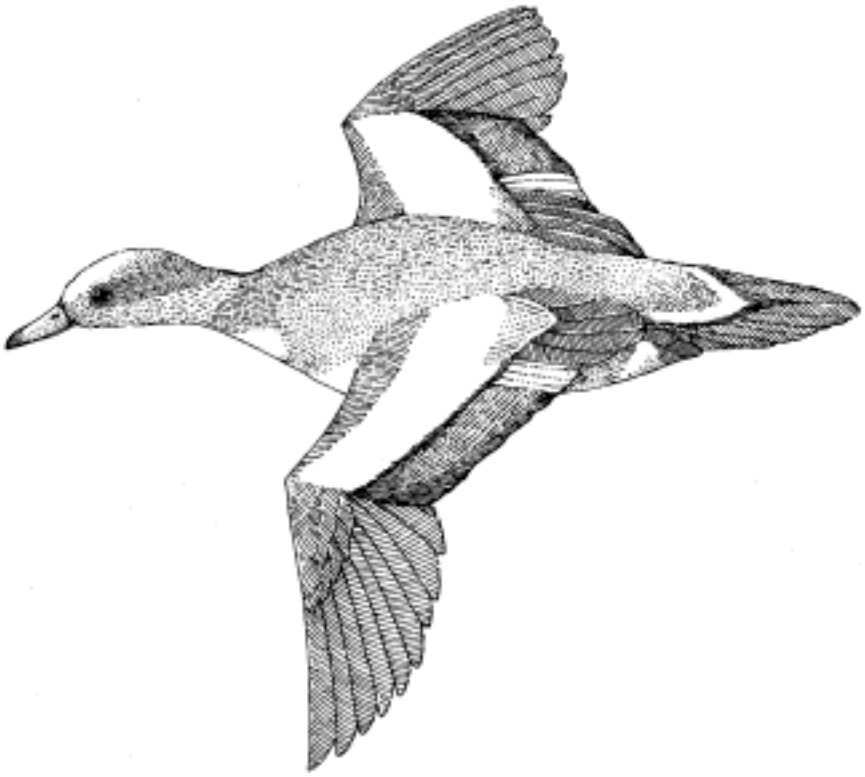
BREEDING: Does not breed in the western Sierra Nevada.

TERRITORY/HOME RANGE: No data on home range; not territorial in winter.

FOOD HABITS: Eats wigeon grass, pondweed, aquatic and terrestrial insects. Feeds in pastureland and fields, often wet, and from the edges and bottoms of ponds. Grazes in fields, probes around pond edges, tips up for bottom feeding, and dives. Recorded stealing aquatic vegetation from diving ducks, such as canvasbacks and redheads (Grinnell *et al.* 1918).

OTHER:

REFERENCES: Grinnell *et al.* 1918, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Northern Shoveler

B015 (*Anas clypeata*)

STATUS: No official listed status. Game species. Extremely rare spring and fall migrant, and winter visitor. Only one nesting record (starred on range map).

DISTRIBUTION/HABITAT: Generally distributed at low elevations, up to ponderosa pine and black oak woodland zone, where found in shallow ponds adjacent to open country. One nesting record reported at Ostrander Lake, at 8600 ft (2620 m), in Yosemite National Park (Gaines 1977).

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, or slow-moving streams or rivers.

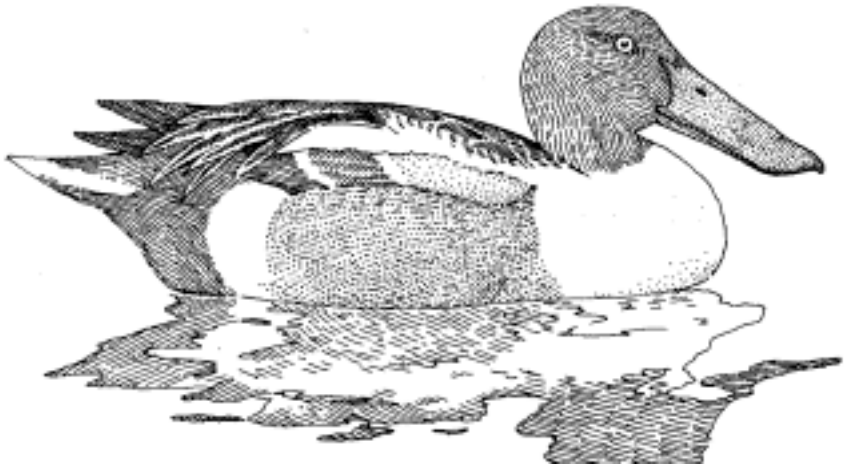
BREEDING: Breeds from mid-May to early August, with peak from mid-June to mid-July. Nest typically placed among short grass within 50 yds (46 m) of water. Clutch size from 5 to 14, with mean of 10 or 11.

TERRITORY/HOME RANGE: Some observers indicate does not defend territories; males defend only small areas around mates (Hori 1963). A defended core area (territory) noted within each pair's breeding home range (Poston 1969, 1974). Territories before egg laying averaged 7.2 acres (2.9 ha) (n= 10), with range from 3.2 to 12.4 acres (1.3 to 5.0 ha) (Seymour 1974). During egg laying and incubation, core area decreased to a mean of 2.2 acres (0.9 ha) and a range of 0.25 to 3.7 acres (0.1 to 1.5 ha). Breeding home ranges from 15 to 90 acres (6 to 36 ha), with a mean of 49.7 acres (18.7 ha) reported in the Midwest (Poston 1969). Breeding home ranges from 20 to 128 acres (8.1 to 52 ha), with an average of 76 acres (31 ha) reported in Alberta (Poston 1974).

FOOD HABITS: Feeds on freshwater clams, aquatic insects, copepods, pondweeds, and bulrushes. Food taken from shallow water and muddy bottoms of ponds. Feeds on water surface, and dabbles in muddy shallows.

OTHER:

REFERENCES: Poston 1969, 1974; Johnsgard 1975b; Bellrose 1976; Palmer 1976.





Wood Duck

B016 (*Aix sponsa*)

STATUS: No official listed status. Game species. Uncommon to fairly common resident in suitable habitat.

DISTRIBUTION/HABITAT: Breeds along streams or ponds near oaks, for food and suitable nest cavities, from blue oak savannahs up to ponderosa pine and black oak woodland zones. More abundant in northern California, particularly along the Cosumnes, Mokelumne, Tuolumne, Merced, San Joaquin, and Kings Rivers. High abundances also reported in Shasta and Plumas Counties (Naylor 1960).

SPECIAL HABITAT REQUIREMENTS: Ponds, slow-moving streams; nest cavities; oaks.

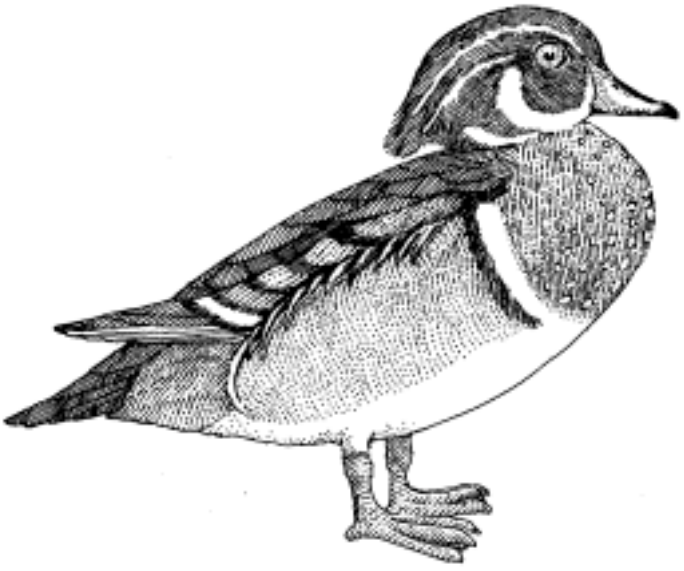
BREEDING: Breeds from mid-April to mid-July, with peak from mid-May to mid-June. Nests in cavity. Optimum natural cavities 20 to 50 ft (6 to 15 m) up, with entrance of 4 in (10 cm) in diameter (McGilvery 1968), situated in stands of willows, cottonwoods, or oaks. Clutch size from 3 to 15, with mean of 12.2.

TERRITORY/HOME RANGE: Does not defend nest; males defend small space around mate (Grice and Rogers 1965). Home range of breeding males averaged 500 acres (200 ha) and of unpaired males 1300 acres (526 ha) in Minnesota (Gilmer 1971). Flightless broods ranged from 0 to 3.5 mi (0 to 5.6 km) along an Ohio river; a brood of fledged young ranged from 0 to 8 mi (0 to 12.8 km) (Stewart 1958).

FOOD HABITS: Eats primarily acorns, insects, aquatic plants, and cultivated grains. Takes acorns from forest floor; in water tips up to feed underwater; sometimes females dive.

OTHER: Numbers markedly reduced in past as result of reduction in suitable wooded riparian habitat by logging. Placement of artificial nest boxes in habitats where natural cavities are limiting resulted in substantial increase in numbers. Such boxes should be "predator proof' (Bellrose 1976), within 400 yds (375 m) of stream (Ball *et al.* 1975), and spaced widely (Jones and Leopold 1967).

REFERENCES: Naylor 1960, Trefethen 1966, Bellrose 1976, Palmer 1976.





Redhead

B017 (*Aythya americana*)

STATUS: No official listed status. Game species. Extremely rare winter visitor.

DISTRIBUTION/HABITAT: Found in fall and winter on deep lakes at low elevations, from annual grassland zone up through the digger pine-oak type; prefers ponds in nontimbered areas.

SPECIAL HABITAT REQUIREMENTS: Lakes with deep water.

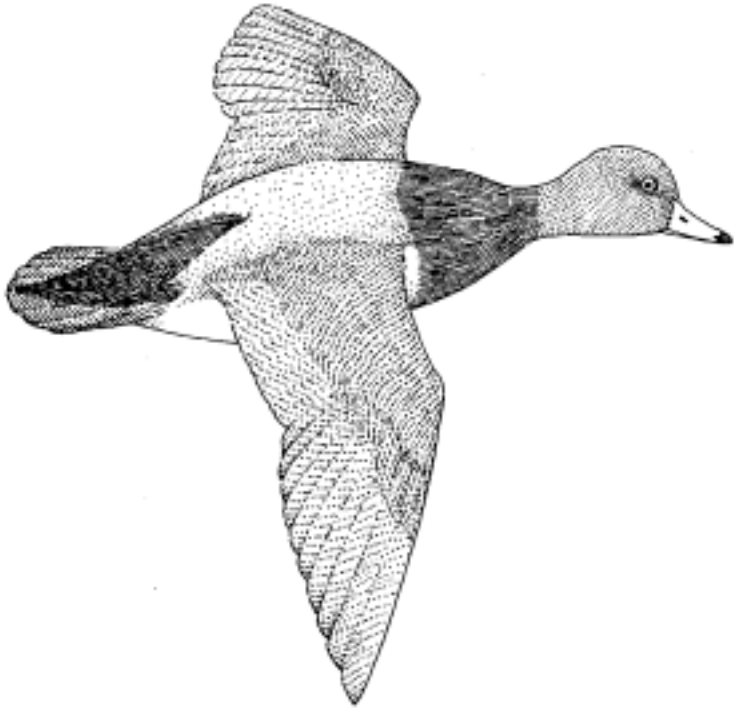
BREEDING: Does not breed in the western Sierra Nevada.

TERRITORY/HOME RANGE: No data available on winter home range; not territorial in the western Sierra Nevada.

FOOD HABITS: Eats seeds and vegetative parts of pondweeds and bulrushes; also algae, insects, fish, frogs, and mollusks. Dives, often to considerable depths, to obtain food.

OTHER:

REFERENCES: Grinnell *et al.* 1918, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Ring-necked Duck

B018 (*Aythya collaris*)

STATUS: No official listed status. Game species. Rare spring and fall migrant and winter visitor; a few nesting records at Buck's Lake (starred on range map) in the northern Sierra Nevada (T. Manolis, pers. commun.).

DISTRIBUTION/HABITAT: Breeds infrequently around ponds with marsh vegetation in mixed-conifer and Jeffrey pine types. In fall and winter, found on shallow ponds of varying size and surrounding vegetation types, from annual grassland areas up to ponderosa pine and black oak woodland types.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes.

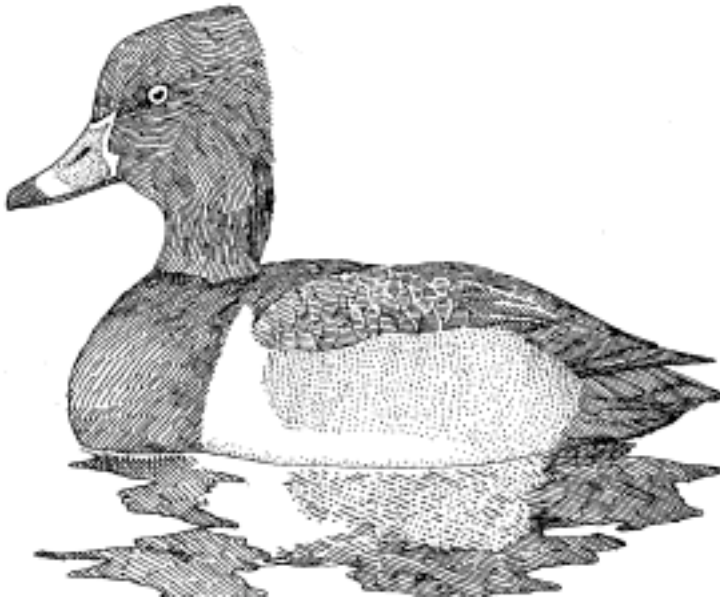
BREEDING: Breeds from early May to early August, with peak from mid-June to mid-July. Nests on reasonably dry spots with suitable cover, usually sedge, on hummocks or clumps of open marsh. Range from 0 to 400 ft (0 to 122 m) from open water, averaging 81 ft (25 m). Clutch size from 5 to 14, with mean of 7.9.

TERRITORY/HOME RANGE: No data on home range. Male defends small space around mate (Mendall 1958). Nesting density in Maine varied from one pair per 1.6 acres (0.6 ha) to one pair per 23 acres (9 ha) (Mendall 1958).

FOOD HABITS: Eats primarily pondweeds, bulrushes, sedges, snails, clams, and aquatic insect larvae. Dives for food, usually to depths of 6 ft (1.8 m) or less. Captures food in water or takes it from the muddy bottom.

OTHER: Nesting reports infrequent enough that could be considered nonbreeder in the western Sierra Nevada. Nearly all sightings between November 21 and March 23.

REFERENCES: Mendall 1958, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Canvasback

B019 (*Aythya valisineria*)

STATUS: No official listed status; on the 1978 Audubon Society Blue List. Game species. Rare winter visitor; less common in southern than northern Sierra Nevada.

DISTRIBUTION/HABITAT: A fairly common species in winter in many inland areas of California, but rarely seen in the Sierra Nevada. Frequents large, open lakes with large quantities of submerged aquatic vegetation, in annual grassland, blue oak, and digger pine-oak zones. Usually avoids lakes in timbered sections.

SPECIAL HABITAT REQUIREMENTS: Lakes.

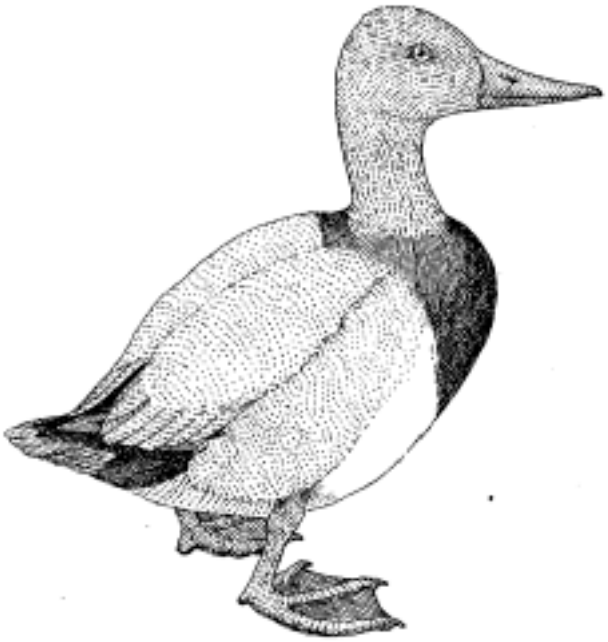
BREEDING: Does not breed in the western Sierra Nevada.

TERRITORY/HOME RANGE: No data on winter home range; not territorial in winter.

FOOD HABITS: Major food items are pondweeds, bulrushes, wigeon grass, mollusks, insects, and fishes. Dives, often to great depths; some food taken from muddy bottom; feeds on water surface as well.

OTHER:

REFERENCES: Erickson 1948, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Lesser Scaup

B020 (*Aythya affinis*)

STATUS: No official listed status. Game species. Rare but regular fall migrant and winter visitor.

DISTRIBUTION/HABITAT: Generally found only on large lakes with much submerged aquatic vegetation, in annual grasslands and in grass/forb and shrub stages of blue oak savannahs and digger pine-oak woodlands. Observed in Yosemite Valley at 4000 ft (1220 m) (Gaines 1977); most sightings below 2000 ft (610 m).

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes.

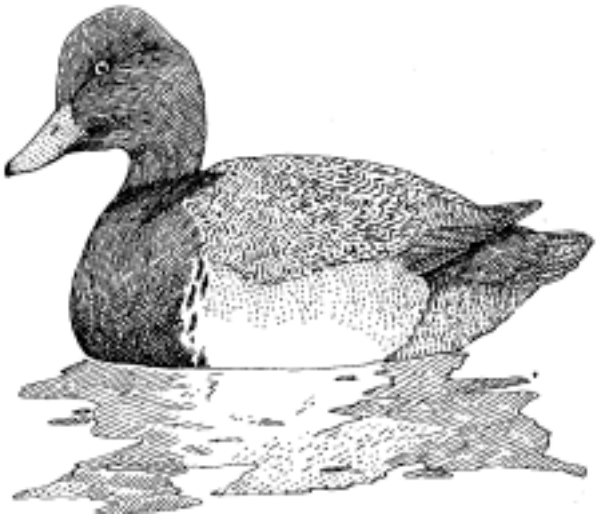
BREEDING: Does not breed in the western Sierra Nevada.

TERRITORY/HOME RANGE: Extensive use of large bodies of water, with ill-defined home range (Bellrose 1976); not territorial in winter.

FOOD HABITS: Eats mollusks, insects, fishes, wild celery, pondweeds, and wigeon grass. Dives, often to depths of greater than 25 ft (7.6 m), to obtain food in the water and on the bottom. Does some surface feeding.

OTHER:

REFERENCES: Gehrman 1951, Trauger 1971, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Barrow's Goldeneye

B021 (*Bucephala islandica*)

STATUS: No official listed status. Game species. Rare spring migrant and breeder (at least formerly-see Small 1974).

DISTRIBUTION/HABITAT: Breeds rarely around lakes and along streams from mixed-conifer forests upslope to lodgepole pine type, from Yosemite National Park northward. Reported nesting at a high elevation: 9200 ft (2800 m). Surrounding habitat must have some timber.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes; nest cavities.

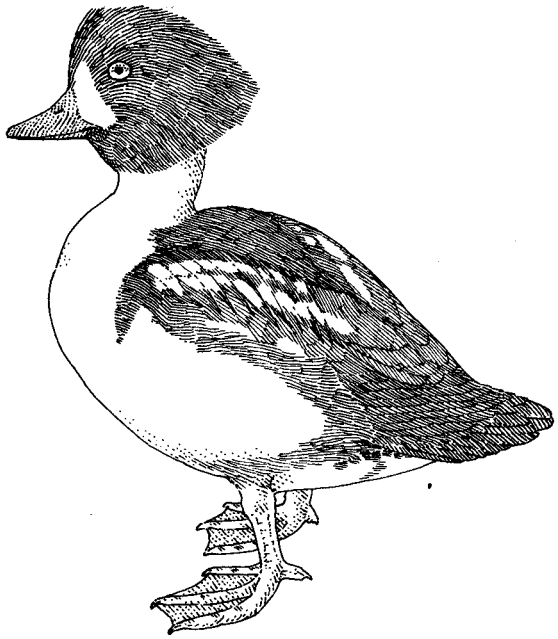
BREEDING: Breeds from mid-April to mid-August, with peak from mid-June to mid-July. Nests in tree cavity; prefers flicker or pileated woodpecker holes. Most often uses pines, aspens, or cottonwoods in the Sierra Nevada. Nests usually within 100 yds (91 m) of water. In absence of nest cavities, uses nest boxes and also rocky crevices along smooth-flowing streams or high-elevation lakes. Clutch size from 4 to 15, with mean of 9.

TERRITORY/HOME RANGE: No data available. Two pairs reported on a 3-acre (1.2-ha) pond in the Cariboo District of British Columbia; territories consisted of 40 to 60 yds (37 to 55 m) of shoreline (Bellrose 1976).

FOOD HABITS: Eats primarily mollusks, isopods, amphipods, aquatic insects, grasses, and various water plants. Dives, usually less than 4 ft (1.2 m), turns over rocks, and probes in mud for food.

OTHER: Has never been common in the Sierra Nevada; main portion of nesting range is northward-in Oregon, Washington, British Columbia, Alaska, and the Rockies.

REFERENCES: Grinnell *et al.* 1918, Johnsgard 19756, Bellrose 1976, Palmer 1976.





Bufflehead

B022 (*Bucephala albeola*)

STATUS: No official listed status. Game species. Rare but regular nester and spring migrant.

DISTRIBUTION/HABITAT: Breeds around small, timber-lined ponds or streams from blue oak savannah zone up to Jeffrey pine forests.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, slow-moving streams; nest cavities.

BREEDING: Breeds from late April to early August, with peak from mid-June to mid-July. Nest placed in cavity in tree (commonly aspen), with preference for flicker holes, within 660 ft (200 m) of a lake or pond, and from 2 to 10 ft (0.6 to 3 m) above ground. Clutch size from 5 to 16, with mean of 8.6.

TERRITORY/HOME RANGE: In British Columbia, territories included a pond, or section of lake shoreline, and loafing sites; smallest pond suitable for isolated territory was about 2.5 acres (1 ha) (Erskine 1972). Two nests in some trees, but most nests about 330 yds (100 m) apart. Males seldom exhibited conflict unless females present, though pairs spaced out along the shore. Newly hatched broods moved from nest to feeding areas up to distances greater than 1 mi (1.6 km). Brood home ranges after young were 3 weeks old averaged 9.4 to 13.1 acres (3.8 to 5.3 ha), with range of 2.0 to 59 acres (0.8 to 24 ha).

FOOD HABITS: Eats larvae of aquatic insects, mollusks, crustaceans, and some aquatic vegetation. Obtains food from water and muddy bottom by diving; sometimes feeds on surface.

OTHER: Uncertain how common a nesting species in the Sierra Nevada during early 1900's. Presumably limited today by lack of suitable tree-lined ponds in undisturbed condition. Flickers and starlings significant competitors for nest cavities (Bellrose 1976).

REFERENCES: Erskine 1972, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Harlequin Duck

B023 (*Histrionicus histrionicus*)

STATUS: No official listed status. Game species. Historically a rare but regular nester along several rivers; now almost extinct in the Sierra Nevada.

DISTRIBUTION/HABITAT: Breeds along fast-flowing streams and rivers at high elevations, from 4000 to 9000 ft (1220 to 2740 m) in the central Sierra Nevada. Reported nesting along upper parts of the Merced, Cherry, Stanislaus, Tuolumne, and San Joaquin Rivers (Grinnell *et al.* 1918) but only three breeding records reported since 1927.

SPECIAL HABITAT REQUIREMENTS: Swift streams or rivers.

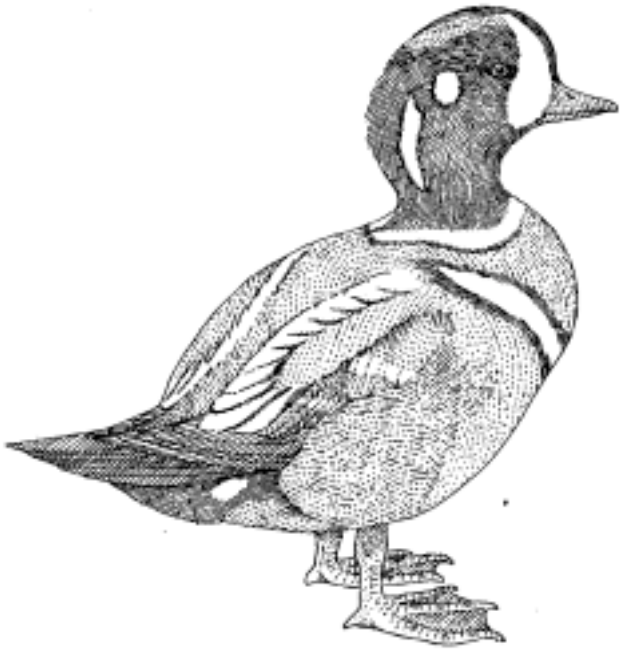
BREEDING: Breeds from mid-May to early August, with peak from mid-June to mid-July. Nests always next to turbulent, cold rivers, typically on the ground, under logs, driftwood, or rocks. Clutch size from 3 to 7, with mean of 5.6.

TERRITORY/HOME RANGE: In Iceland, defended only small area around female; average density 2.1 pairs/mi of stream (1 .3 pairs/km) (Bengston 1966b).

FOOD HABITS: Eats insects, mollusks, crustaceans, fishes, and some water plants. Food taken from rocky bottoms of swift streams by diving; sometimes tips up to feed under water surface.

OTHER: Reasons for declining population in the Sierra Nevada unknown. Disturbance of wintering habitat along the coast suggested; also dramatic increase in numbers of fishermen and other human visitors to high mountain streams.

REFERENCES: Bengston 1966a, 1966b; Bellrose 1976; Palmer 1976.





Ruddy Duck

B024 (*Oxyura jamaicensis*)

STATUS: No official listed status. Game species. Rare spring and fall migrant and winter visitor.

DISTRIBUTION/HABITAT: Found on shallow ponds or lakes from annual grasslands up to ponderosa pine and black oak woodland types. Prefers ponds with an abundance of submerged aquatic vegetation; avoids ponds surrounded by dense stands of timber.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes.

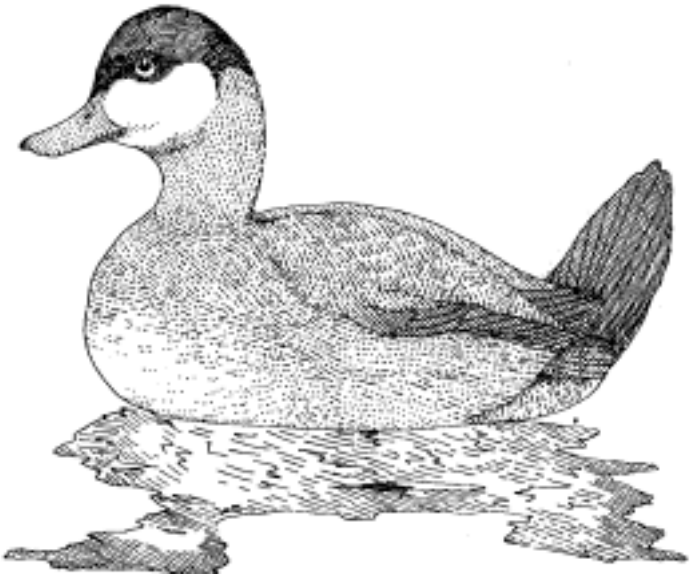
BREEDING: Does not breed in the western Sierra Nevada.

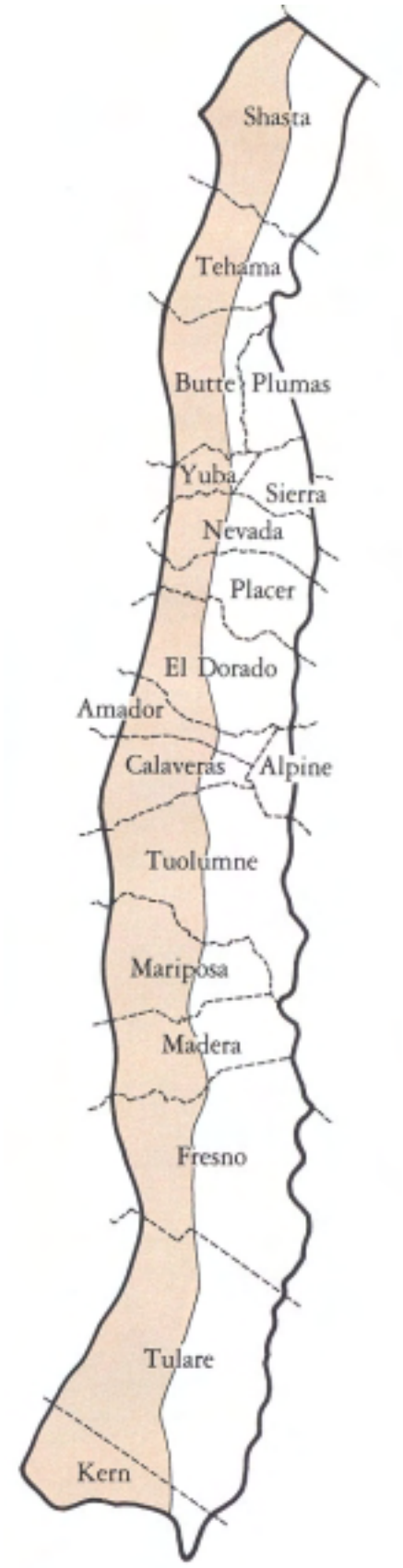
TERRITORY/HOME RANGE: No data on winter home range; not territorial in winter.

FOOD HABITS: Eats pondweeds, sedges, bulrushes, mollusks, and crustaceans. Dives, often to depths of 10 to 20 ft (3.0 to 6.1 m), to feed in the water and on the muddy bottom; sometimes feeds on water surface.

OTHER: Only one spring record located for the western Sierra Nevada: Wilson Lake, Lassen National Park, on March 24, 1927 (Grinnell *et al*. 1930).

REFERENCES: Joyner 1969, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Hooded Merganser

B025 (*Lophodytes cucullatus*)

STATUS: No official listed status. Game species. Rare fall and spring migrant and winter visitor.

DISTRIBUTION/HABITAT: Frequents ponds and slow-moving streams in timbered sections from blue oak savannah up to ponderosa pine and black oak woodland types. Cited as a possible breeder in the Sierra Nevada (Bellrose 1976), but corroborating evidence not at hand. Latest spring record found April 18 (Gaines 1977).

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, slow-moving streams, or rivers.

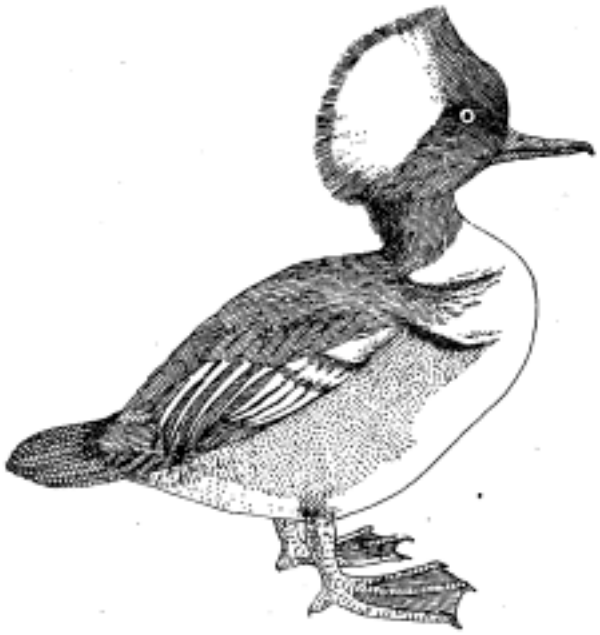
BREEDING: Does not breed in the western Sierra Nevada.

TERRITORY/HOME RANGE: No data on home range; not territorial in winter.

FOOD HABITS: Major food items are fishes, crustaceans, aquatic insects, and frogs. Feeds almost exclusively by diving. Captures food in water or takes from muddy or rocky bottoms of ponds and streams.

OTHER: Susceptible to biological concentration of hard pesticides used in watersheds draining into aquatic habitats.

REFERENCES: Grinnell *et al.* 1918, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Common Merganser

B026 (*Mergus merganser*)

STATUS: No official listed status. Game species. Fairly common winter visitor and uncommon breeder.

DISTRIBUTION/HABITAT: Breeds along edges of forested lakes and streams from blue oak savannah up to lodgepole pine forests, and from McCloud River in the north to Kern River in the south. Remains through winter on fresh, clear rivers as long as rivers are ice-free.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, or slow-moving streams or rivers.

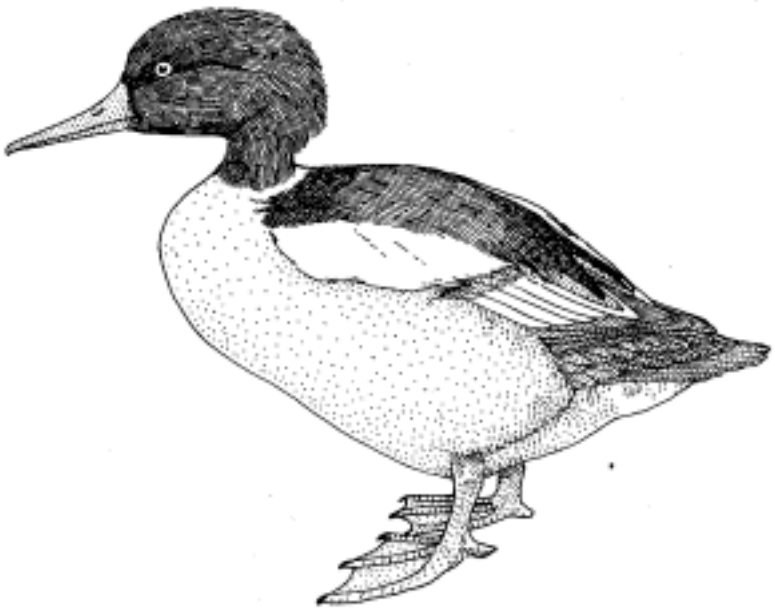
BREEDING: Breeds from early May to early August, with peak from mid-June to mid-July. Usually nests in tree cavity near clear river or stream with many fish. Some nests placed on ground under bushes or boulders; islands preferred for ground nesting. Clutch size from 6 to 12, with mean of 9.4.

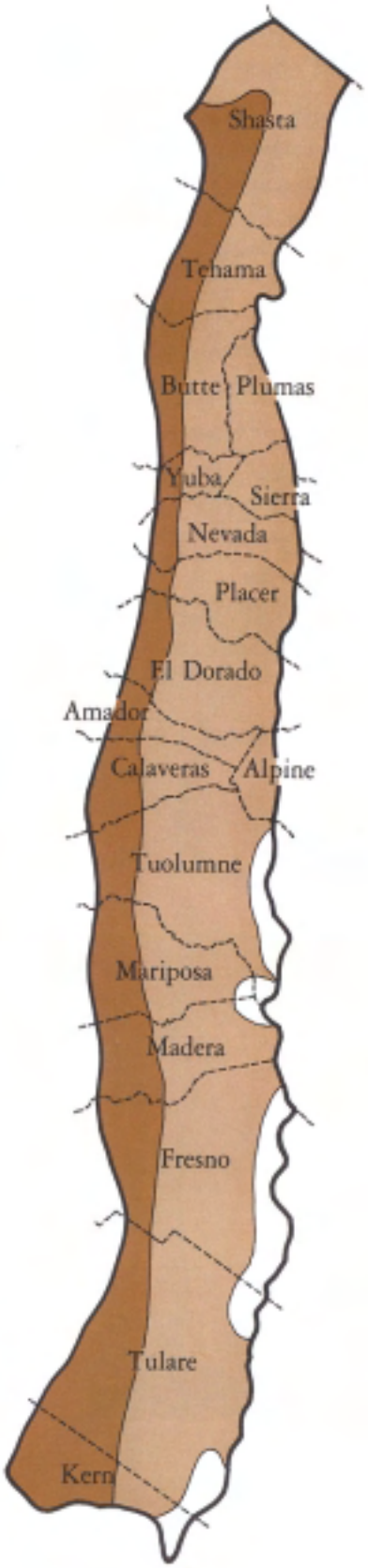
TERRITORY/HOME RANGE: No data on territory size. Home ranges generally included 2 to 3 mi (3.2 to 4.8 km) of river (Palmer 1976). Spacing of common mergansers averaged 3-.5 mi (5.6 km) apart on coastal streams of northwestern California (Forman 1976).

FOOD HABITS: Feeds on fish, including perch, carp, trout, and salmon. Dives for fish in clear, shallow water.

OTHER: Has been implicated in destruction of fisheries. Conclusions from studies indicate opportunistic foraging on species common and easily captured. Eats primarily nongame fish species, but captures some trout or salmon in areas specifically managed for those species.

REFERENCES: Grinnell *et al.* 1918, Johnsgard 1975b, Bellrose 1976, Palmer 1976.





Turkey Vulture

B027 (*Cathartes aura*)

STATUS: No official listed status. Fairly common breeding bird, less common in winter.

DISTRIBUTION/HABITAT: Breeds mainly in zone of. blue oak savannah, digger pine-oak, and chaparral. Ranges to higher altitudes in late summer. In winter, less common and found only at lower altitudes, where requires a roost--either single large tree with open branch-work or section of grove.

SPECIAL HABITAT REQUIREMENTS: Open terrain for foraging.

BREEDING: Breeds from early March to late September, with peak from late May to mid-August. Clutch size usually 2 or 3. Nests in well-hidden cavity in cliff face, in rocks or brush on steep hillsides, or in hollow log or stump.

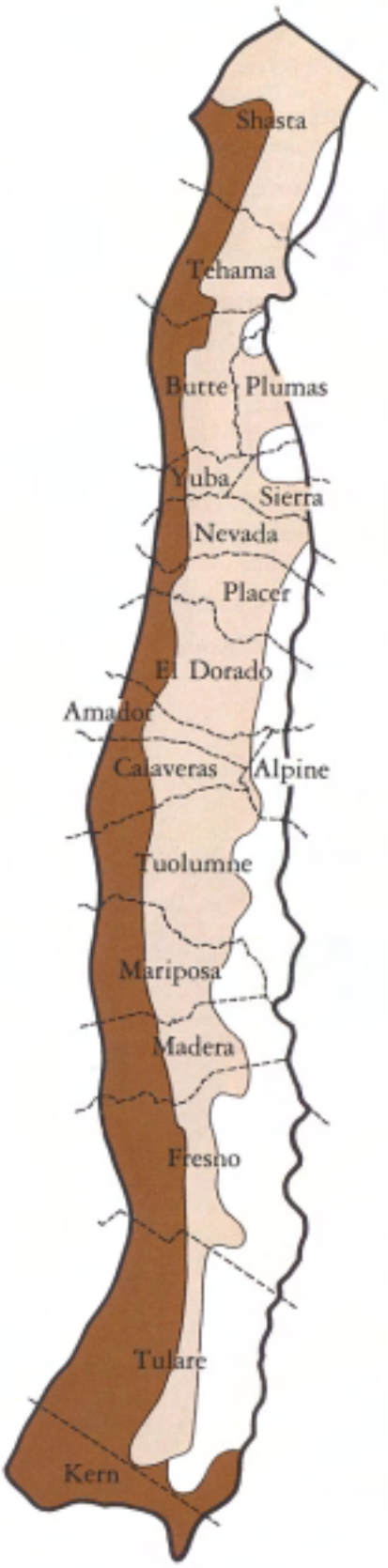
TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Feeds mainly on carrion; rotting fruits and vegetables, live young birds, and eggs taken rarely. Food taken from ground, but located while soaring and gliding.

OTHER:

REFERENCES: Coles 1944, Brown and Amadon 1968.





California Condor

B028 (*Gymogyps californianus*)

STATUS: On Federal and California Endangered Species Lists. Some non-breeders move north into the western Sierra Nevada in May and remain until late fall.

DISTRIBUTION/HABITAT: Roosts or feeds in any habitat type.

SPECIAL HABITAT REQUIREMENTS: Open terrain for foraging; large trees or cliffs for roosting.

BREEDING: Does not breed in the western Sierra Nevada at present.

TERRITORY/HOME RANGE: Condors fly distance of at least 35 mi (56 km) between roosting and feeding sites (Koford 1953). Not known to be territorial during nonbreeding periods; nesting territoriality not confirmed. Simultaneous use of nests 0.5 mi (0.8 km) apart, where nest defense between adult condors not observed (Koford 1953).

FOOD HABITS: Feeds exclusively on carrion, dead range cattle mainly; also sheep, deer, horses, and ground squirrels. Prefers deer and young calves. Searches for carrion while soaring and gliding; always eats on ground.

OTHER: See Miller *et al*. (1965, p. 49) for management recommendations.

REFERENCES: Koford 1953; Miller *et al*. 1965; Wilbur 1976, 1978; Verner 1978.





White-tailed Kite

B029 (*Elanus leucurus*)

STATUS: No official listed status. Formerly endangered, now fairly common. Range expanded in recent decades. Probably uncommon above 1000 ft (305 m), though literature unclear.

DISTRIBUTION/HABITAT: Restricted to lower elevations; breeds in sites with trees in blue oak savannah, digger pine-oak, and riparian deciduous types. Nests only where voles (*Microtus* spp.) abundant; concentrates in areas with dense populations of small rodents in winter.

SPECIAL HABITAT REQUIREMENTS: Trees with dense canopies for nesting.

BREEDING: Breeds from early February to late October, with peak from early May to early August. Sometimes rears two broods per season. Nest placed at top of a dense-topped tree of moderate height; nests range in height from 18 to 59 ft (5 to 18 m). Clutch size from 3 to 6, with mean of 4.1.

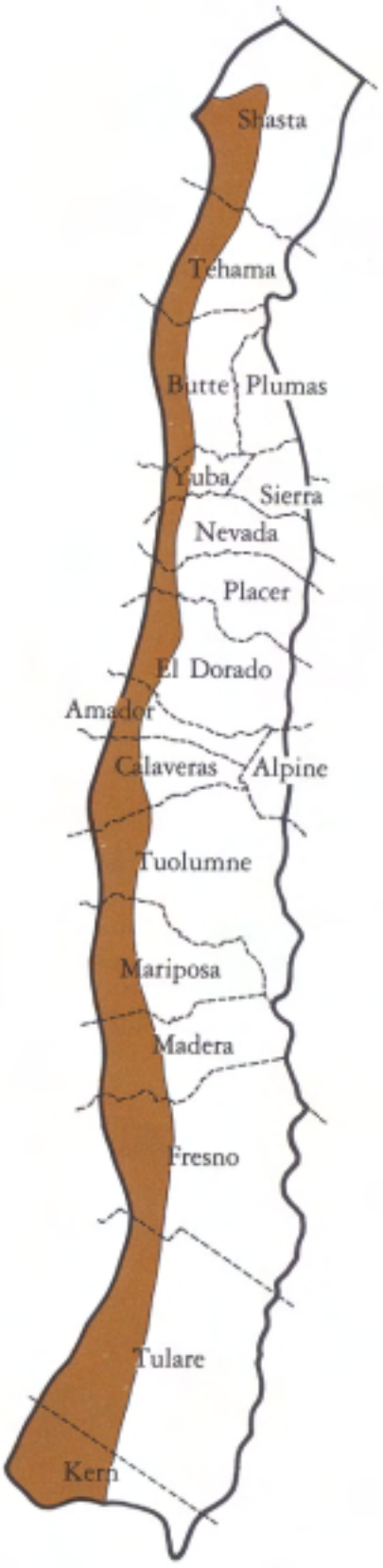
TERRITORY/HOME RANGE: Nonterritorial in San Diego and Solano Counties (Dixon *et al.* 1957, Stendell 1972). Minimum requirement for breeding pair is 20 acres (8 ha) during a good vole year.

FOOD HABITS: Feeds almost exclusively on diurnal mice captured and eaten on ground. Searches by flying and hovering at less than 100 ft (30 m) above ground; attacks by slow vertical descent.

OTHER: Habitat increased in recent decades by year-round irrigation of agricultural land.

REFERENCES: Dixon *et al.* 1957, Waian and Stendell 1970, Eisenmann 1971.





Goshawk

B030 (*Accipiter gentilis*)

STATUS: No official listed status. Uncommon resident and winter visitor; precise status requires further study.

DISTRIBUTION/HABITAT: Typically breeds in mature stands of conifer forest. Nests sometimes in thicket of medium-aged conifers, with or without aspen interspersed, from mixed-conifer zone up to lodgepole pine type. Prefers stands of intermediate canopy coverage. Remains year-round in breeding areas; during nonbreeding season, some move downslope as far as blue oak savannah.

SPECIAL HABITAT REQUIREMENTS: Water probably needed on breeding territory.

BREEDING: Breeds from mid-March to early September, with peak from early May to mid-July. Nest usually built on a large, horizontal limb within 12 ft (3.7 m) of trunk and from 20 to 80 ft (6.1 to 24 m) above ground, in conifer, and in densest part of stand, usually near meadow or other opening. Clutch size from 1 to 5 , with mode of 3.

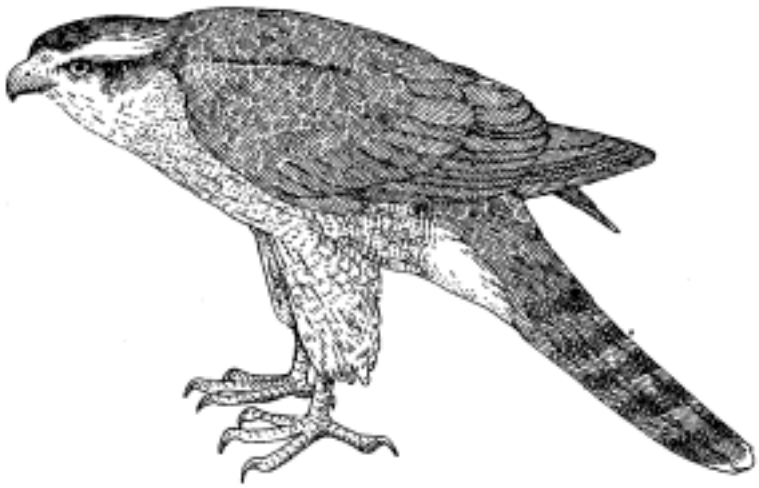
TERRITORY/HOME RANGE: Territory and home range apparently the same. In Wyoming, a single territory studied covered 525 acres (212 ha) (Craighead and Craighead 1956); may range over areas as large as 6 to 15 mi^2 (16 to 39 km^2) (Brown and Amadon 1968). A home range of about 5 mi^2 (13 km^2) estimated in Minnesota (Eng and Gullion 1962). In Oregon, four nests located on 45 mi^2 (117 km^2); mean distance between nests 2.7 mi. (4.3 km) (Reynolds 1978).

FOOD HABITS: Mammals in size range from chickarees to hares comprise 55 percent of diet; birds in size range from robins to grouse, 45 percent of diet. Prey captured on ground, in vegetation, or in air, by using fast searching flight or rapid dash from a perch.

OTHER: Recommended management policies that should be read: Jackman and Scott 1975, p. 28. Most important recommendation suggests leaving 30 acres (12 ha) of undisturbed timber around all known nests. Acreage should include substantial amount of north-facing slope, all prey-plucking sites, and much water course. Wear hard hat in vicinity of nest.

REFERENCES: Schnell 1958, Brown and Amadon 1968, Jackman and Scott 1975, Jones 1979.





Sharp-shinned Hawk

B031 (*Accipiter striatus*)

STATUS: No official listed status; on the Audubon Society Blue List for 1978. Uncommon permanent resident in mid-elevation habitats; seasonal resident in lower and higher areas.

DISTRIBUTION/HABITAT: Breeds in pole to mature tree stages of ponderosa pine, black oak, riparian deciduous, mixed-conifer, and Jeffrey pine types; prefers stands with intermediate to high percent canopy coverage. Moves upslope in summer and fall. Also moves downslope for fall, winter, and spring periods as far as blue oak savannah, occasionally even into annual grasslands for feeding. May be absent from the southern Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS: Trees or shrubs.

BREEDING: Breeds from early April to late August, with peak from early June to early August. Nests within dense forest canopy, against tree trunk or in crotch of trunk, usually from 6 to 60 ft (2 to 18 m) up; prefers conifers. Clutch size from 3 to 8, usually 4 or 5.

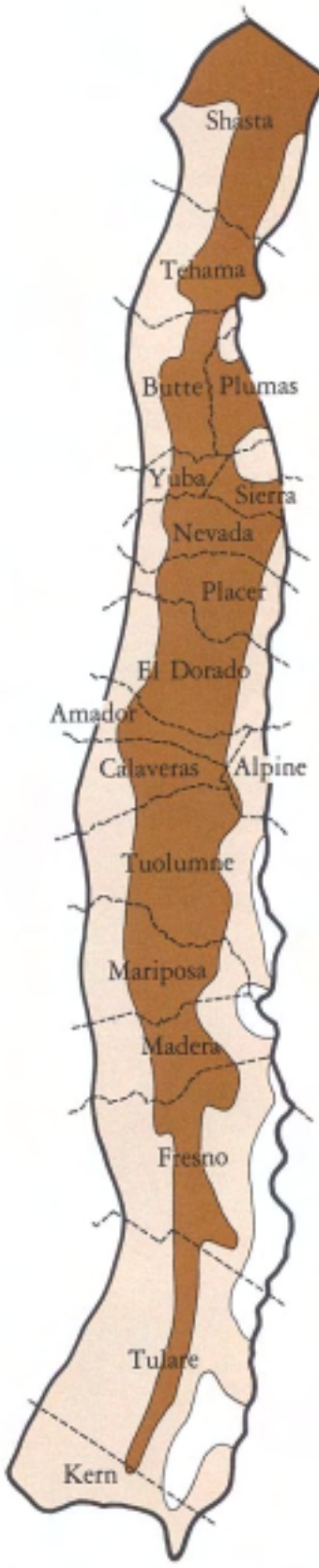
TERRITORY/HOME RANGE: Two home ranges studied in Jackson Hole, Wyoming, covered 160 and 320 acres (65 and 130 ha) (Craighead and Craighead 1956). Apparently, territory and home range the same. In Oregon, four nests located on 45 mi^2 (117 km^2); mean distance between nests 2.7 mi. (4.3 km) (Reynolds 1978).

FOOD HABITS: Small birds make up 97 percent of total diet, small mammals 3 percent. Prey captured on ground, in vegetation, and from air. Hunting involves fast searching flight or rapid dash from concealed perch. Often forages at edges of forest and woodland.

OTHER: Recommended management practices that should be read: Jackman and Scott 1975, p. 45. Most important "A minimum of 10 acres should be preserved around all known nesting trees. . . " North-facing slopes, plucking sites, and water sources should be included.

REFERENCES: Brown and Amadon 1968, Wattel 1973, Jackman and Scott 1975, Jones 1979.





Cooper's Hawk

B032 (*Accipiter cooperi*)

STATUS: No official listed status; on the 1978 Audubon Society Blue List. Rare and apparently declining in the Sierra Nevada, possibly as a result of pesticides used. Status requires further study.

DISTRIBUTION/HABITAT: Breeds from digger pine-oak up to ponderosa pine and black oak woodland zone; prefers dense stands of live oaks or riparian sites. Apparently frequents edge situations. In winter, found in variety of wooded habitats.

SPECIAL HABITAT REQUIREMENTS: Trees with dense canopies for nesting; trees/shrubs or trees/grass-forbs.

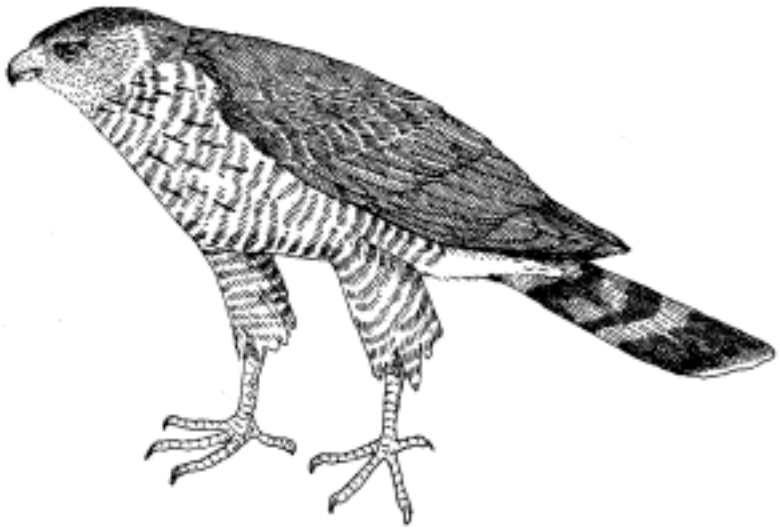
BREEDING: Breeds from early April to late August, with peak from early June to early August. Nests on horizontal branch near trunk, or in an upright crotch 25 to 40 ft (7.6 to 12.2 m) up. Clutch size from 2 to 6, usually 4 or 5.

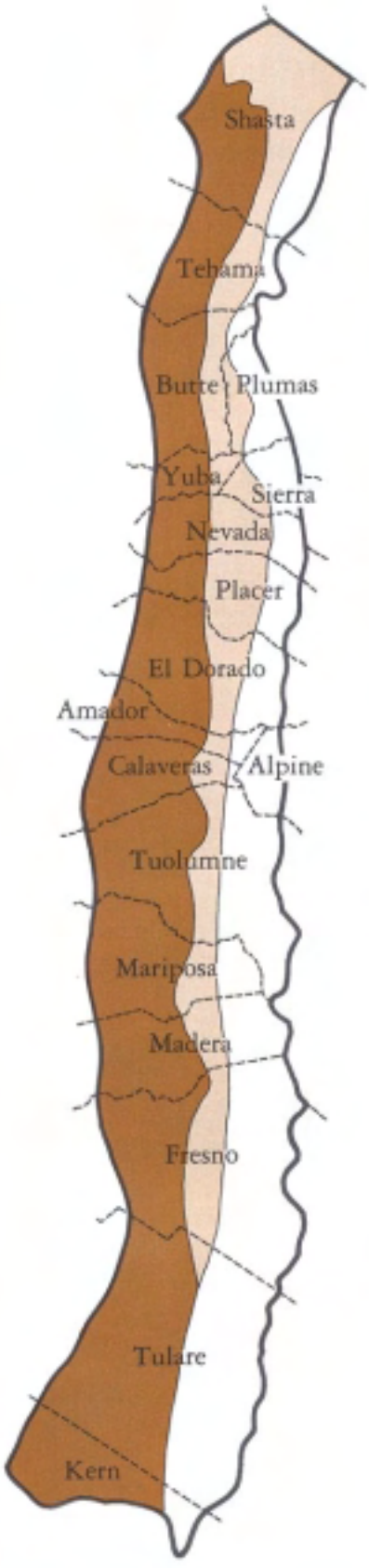
TERRITORY/HOME RANGE: In Michigan, three breeding home ranges varied from 260 to 1000 acres (105 to 404 ha), with mean of 720 acres (291 ha). Territory size appears to be the same (Craighead and Craighead 1956). In 77 territories in California valley and live oak stands, mean distance between nests 1.6 mi (2.6 km) (C. Asay, pers. commun.).

FOOD HABITS: Small- to medium-sized birds make up 82 percent of diet, and small mammals 18 percent. Forages in air, on ground, and in vegetation. Usually chases prey from inconspicuous perch, or searches while in flight.

OTHER: See Jackman and Scott (1975) for management recommendations.

REFERENCES: Craighead and Craighead 1956, Brown and Amadon 1968, Henny and Wight 1972, Jackman and Scott 1975, Jones 1979.





Red-tailed Hawk

B033 (*Buteo jamaicensis*)

STATUS: No official listed status. Common winter resident; breeds in foothills. Some move up to open areas at high elevations in summer and fall.

DISTRIBUTION/HABITAT: Found in most successional stages from blue oak savannah to lodgepole pine and alpine meadows. Activity primarily associated with open canopy areas of blue oak savannah and digger pine-oak types. Prefers habitat where rodents can be seen from air.

SPECIAL HABITAT REQUIREMENTS: Large trees or cliff for nesting and roosting; large openings for foraging.

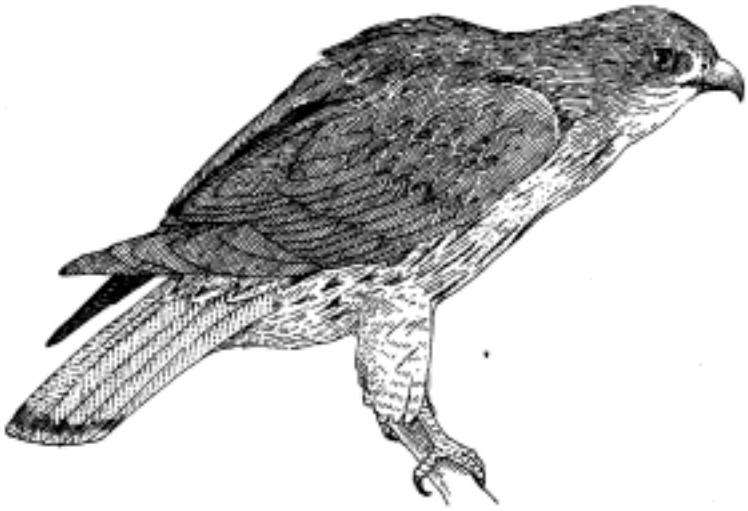
BREEDING: Breeds from late January to early September, with peak from early May to early August. Nests in crotch or fork of tree, usually within 30 to 70 ft (9.1 to 21 m) of ground. Less frequently nests on cliffs. Clutch size from 1 to 4, with 3 most common.

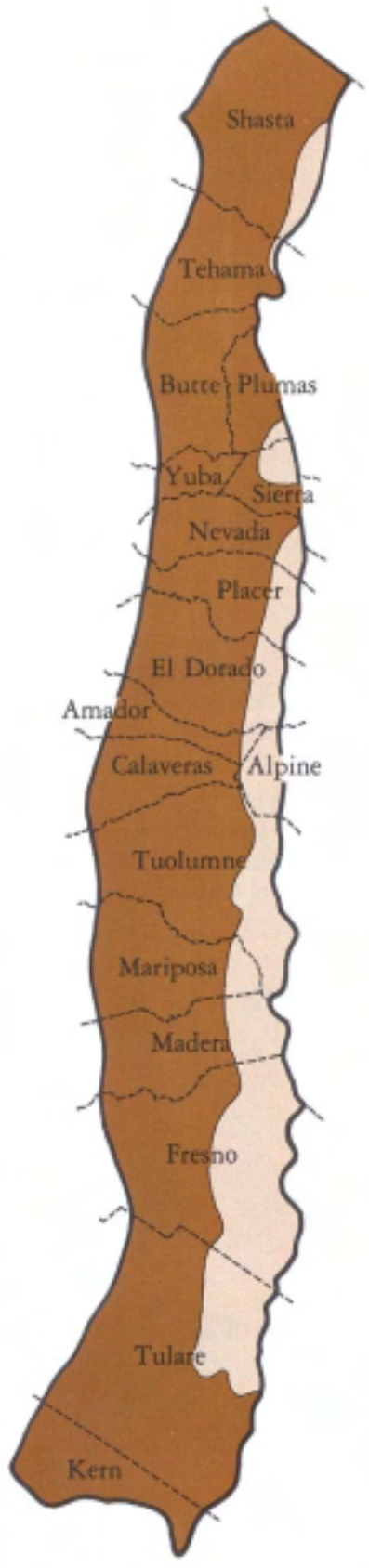
TERRITORY/HOME RANGE: Year-round territory sizes from utilized perch sites in the Sierra foothills, Madera County, roughly estimated (Fitch *et al.* 1946). Estimates ranged from 160 to 400 acres (65 to 162 ha).

FOOD HABITS: Eats mainly small mammals, especially ground squirrels; medium-sized birds and reptiles also taken. Usually swoops to ground from perch or quartering flight.

OTHER:

REFERENCES: Fitch *et al.* 1946, Craighead and Craighead 1956, Luttich *et al.* 1971, Jackman and Scott 1975.





Red-shouldered Hawk

B034 (*Buteo lineatus*)

STATUS: No official listed status; on the Audubon Society Blue List for 1978, though apparently no significant decline in California populations (Wilbur 1973). Uncommon even in suitable habitat in the western Sierra Nevada.

DISTRIBUTION/HABITAT: Resident along Kern River at about 2000 to 3000 ft (610 to 914 m); may be found as vagrant at low elevations throughout the western Sierra Nevada. Breeds only in extensive tracts of riparian deciduous woodland; feeds in grasslands and early successional stages of blue oak savannah and digger pine-oak types.

SPECIAL HABITAT REQUIREMENTS: Large tracts of riparian deciduous woodland for breeding.

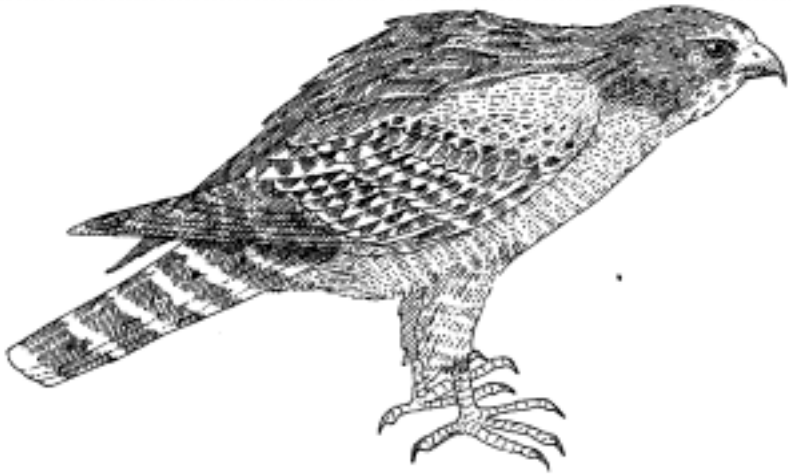
BREEDING: Breeds from early February to mid-July, with peak from mid-April to late June. Nests usually near stream, in branches or crotch of main trunk of large tree, frequently riparian hardwood or eucalyptus. Nest height ranges from 28 to 77 ft (8.5 to 23 m), with average of 50 ft (15 m). Clutch size 1 to 4, with mean of about 3.

TERRITORY/HOME RANGE: Breeding territory and home range the same. Fifty-one breeding territories studied in a Maryland coastal plain, riparian woodland averaged 480 acres (194 ha) in size (Stewart 1949). Average breeding home range size in Michigan observed as 156 acres (63 ha), with a range of 19 to 384 acres (7.7 to 155 ha) (n = 42) (Craighead and Craighead 1956). Winter home ranges reported from 313 to 1242 acres (127 to 503 ha), with mean of 838 acres (339 ha) (Craighead and Craighead 1956).

FOOD HABITS: Highly varied diet includes rabbits, smaller mammals, small birds, amphibians, reptiles, and some insects. Usually captures prey on the ground. Searches for food from perch on snag, stub, or post.

OTHER: Continued presence in the western Sierra Nevada depends on maintenance of extensive tracts of riparian deciduous vegetation.

REFERENCES: Stewart 1949, Brown and Amadon 1968, Wiley 1975.





Swainson's Hawk

B035 (*Buteo swainsoni*)

STATUS: No official listed status; on the 1978 Audubon Society Blue List, as serious declines noted in all western regions. Uncommon migrant and summer resident; present breeding status in the Sierra Nevada questionable.

DISTRIBUTION/HABITAT: Breeds (currently?) in blue oak savannahs and digger pine-oak woodlands; prefers stands with few trees. Occurrence in high elevation meadows uncommon, probably representing local movements of birds from east side of the Sierra Nevada crest.

SPECIAL HABITAT REQUIREMENTS:

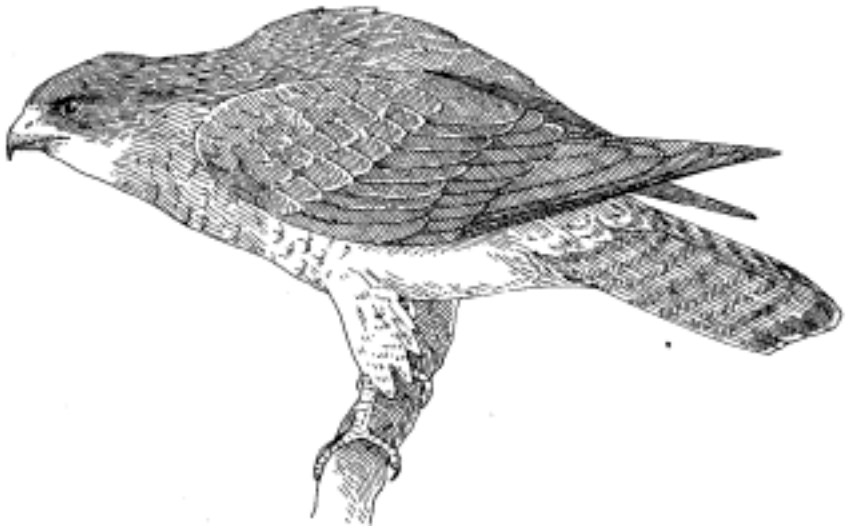
BREEDING: Breeds from late March to mid-August, with peak from late May to late July. Usually nests in a live or dead tree, within 25 ft (7.6 m) of the ground; occasionally on cut banks or low cliffs. Clutch size from 2 to 4, with mode of 2.

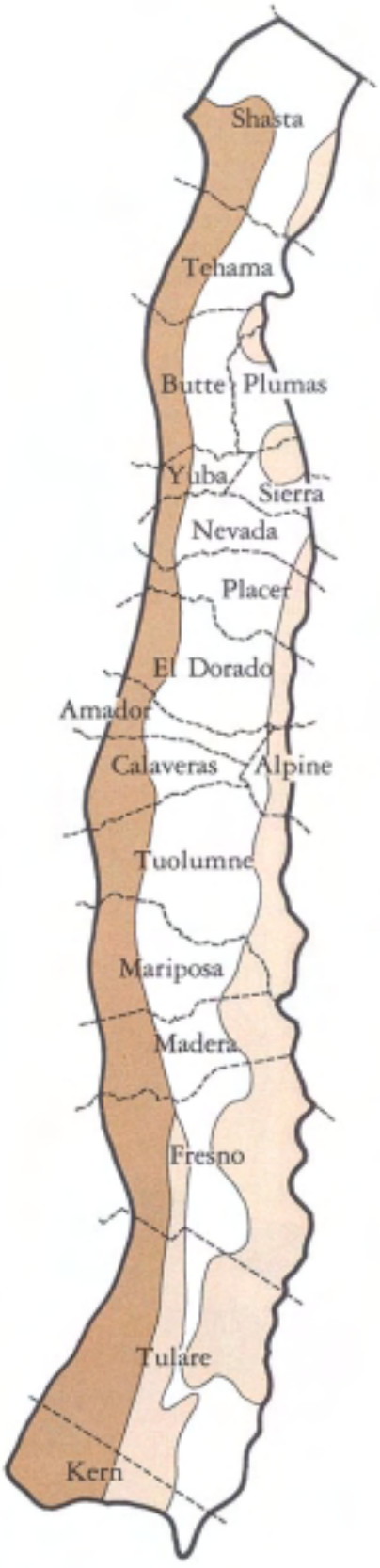
TERRITORY/HOME RANGE: Three home ranges in Utah ranged from 1.2 to 2.1 mi^2 (3.1 to 5.4 km^2), with a mean of 1.6 mi^2 (4.1 km^2) (Smith and Murphy 1973). Average home range of 1.0 mi^2 (2.6 km^2) reported in Wyoming (Craighead and Craighead 1956). Territory and home range considered to be about the same.

FOOD HABITS: Eats mostly small mammals; birds, reptiles, and large insects also eaten. Pounces on prey on ground from a low, searching flight.

OTHER:

RERERENCES: Bowles and Decker 1934, Brown and Amadon 1968, Smith and Murphy 1973, Dunkle 1977.





Golden Eagle

B036 (*Aquila chrysaetos*)

STATUS: No official listed status. Uncommon resident; ranges widely over various terrains.

DISTRIBUTION/HABITAT: Found in annual grassland to above timberline in all successional stages. Favors grass/forb, shrub/sapling, and open-canopied young woodlands of blue oak. In late summer, often seen above timberline. Main requirements a good nest site, open country, and dependable food supply.

SPECIAL HABITAT REQUIREMENTS: Cliffs or scattered large trees.

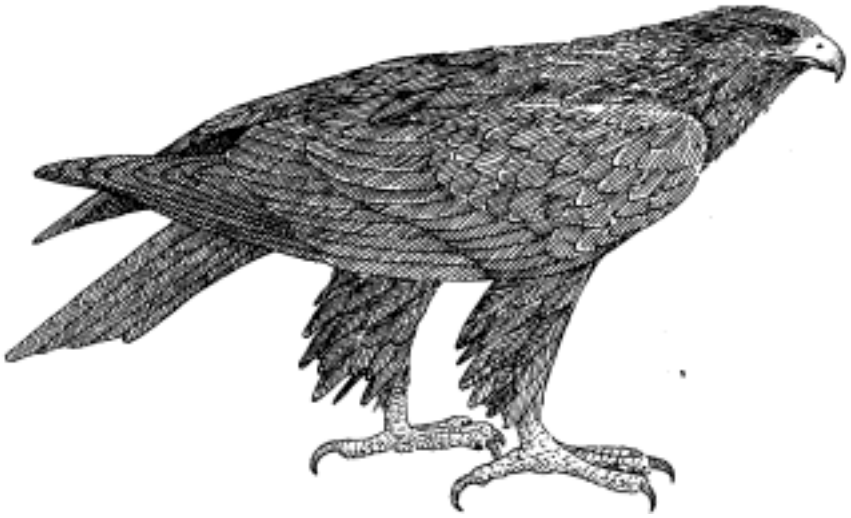
BREEDING: Breeds from mid-January to late September, with peak between late April and August. Nests usually on cliff ledge with commanding view; also in large trees, both living and dead, from 10 to 100 ft (3 to 30 m) above ground. Clutch size from 1 to 3, with 2 most common.

TERRITORY/HOME RANGE: In San Diego County, 27 year-round home ranges varied from 19 to 59 mi^2 (49 to 153 km^2) and averaged 36 mi^2 (93 km^2) (Dixon 1937). Territory size found to be the same. In Utah, six breeding home ranges varied from 6.6 to 11.8 mi^2 (17 to 31 km^2) and averaged 9 mi^2 (23 km^2) (Smith and Murphy 1973). Territory size the same.

FOOD HABITS: Eats mainly lagomorphs and rodents; also eats other mammals, birds, and carrion. Forages usually on ground. Searches by soaring at 100 to 300 ft (30 to 91 m) or by quartering at about 25 ft (7.6 m). Dives on prey.

OTHER: No data on roost requirements.

REFERENCES: Dixon 1937, Smith and Murphy 1973, Thelander 1974, Beecham and Kochert 1975, Jackman and Scott 1975.





Bald Eagle

B037 (*Haliaeetus leucocephalus*)

STATUS: Listed as Endangered on both Federal and State lists.

DISTRIBUTION/HABITAT: Nests in Shasta, Plumas, and Butte Counties on west slope of the Sierra Nevada. Occassionally observed from October to April in all types of habitat throughout the Sierra Nevada. Primarily associated with young or mature forests of varying canopy closure of ponderosa through mixed-conifer types, but can be found in all successional stages from blue oak savannah to lodgepole pine types. Presence at higher elevations in winter depends on open water and fish available for feeding.

SPECIAL HABITAT REQUIREMENTS: Large lake, stream, or river; large trees for nesting; low human disturbance.

BREEDING: Breeds from early February to early Setpember, with peak from mid-March to late June. Nests usually in overstory ponderosa or sugar pine with foliage shading nest, within 0.5 mi (0.8 km) of large body of water, and with low human disturbance. Nest height above ground ranges from 60 to 200 ft (18 to 61 m), usually 75 to 125 ft (23 to 38 m). Total canopy closure in timber stand usually less than 40 percent (R. Lehman, pers. commun.). Clutch size from 1 to 3, with 1 or 2 most common.

TERRITORY/HOME RANGE: No data available on home range. Territory size for 14 breeding territories in Alaska varied from 28 to 111 acres (11 to 45 ha), and averaged 57 acres (23 ha) (Hensel and Troyer 1964).

FOOD HABITS: Eats mainly fish (live and dead); also carrion, water birds, and mammals. Forages on water surface and ground by swooping from perch or air.

OTHER: Only eight active nests on west slope found in 1972-73, all in Shasta and Butte Counties (Thelander 1973). In 1979, 18 active nests found, 16 in Shasta and one each in Plumas and Butte Counties (R. Lehman, pers. commun.). California breeding population probably stable (R. Lehman, pers. commun.).

REFERENCES: Hensel and Troyer 1964, Snow 1973, Thelander 1973.





Marsh Hawk

B038 (*Circus cyaneus*)

STATUS: No official listed status; on the 1978 Audubon Society Blue List, though apparently not declining in the western Sierra Nevada. Uncommon breeding resident of the Central Valley; found at much higher elevations in late summer and fall.

DISTRIBUTION/HABITAT: Found in grass/forb stages from annual grasslands to lodgepole pine and alpine meadows. Breeds in Central Valley with no evidence of regular breeding above 1000 ft (305 m). Both residents and migrants from north found up to 10,000 ft (3050 m) in the Sierra Nevada in late summer and fall. Present at lower elevations at least until April.

SPECIAL HABITAT REQUIREMENTS:

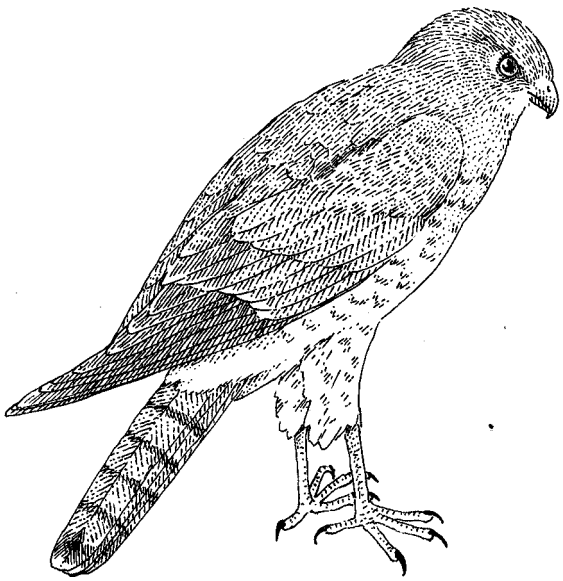
BREEDING: Does not breed regularly on west slope of the Sierra Nevada.

TERRITORY/HOME RANGE: Winter home range in Michigan varied from 30 to 640 acres (12 to 260 ha). Hunting range may extend 5.5 mi (8.8 km) from roost (Craighead and Craighead 1956).

FOOD HABITS: Eats mainly small mammals and birds. Forages on ground, with pouncing from systematic quartering flight at 10 to 30 ft (3 to 9 m) above ground.

OTHER:

REFERENCES: Hammond and Henry 1949, Craighead and Craighead 1956, Brown and Amadon 1968, Hamerstrom 1969.





Osprey

B039 (*Pandion haliaetus*)

STATUS: No official listed status; on the 1978 Audubon Society Blue List. Declined in recent years, probably because of pesticides used and human disturbance.

DISTRIBUTION/HABITAT: Found from annual grasslands through lodgepole pine in association with riparian habitat or lakesides, but primarily in ponderosa pine through mixed-conifer types. Migrates through west slope in spring and fall; in the western Sierra Nevada, apparently breeds only in Shasta County. Not regularly present in winter.

SPECIAL HABITAT REQUIREMENTS: Lakes, rivers for feeding; large trees or cliffs for nesting.

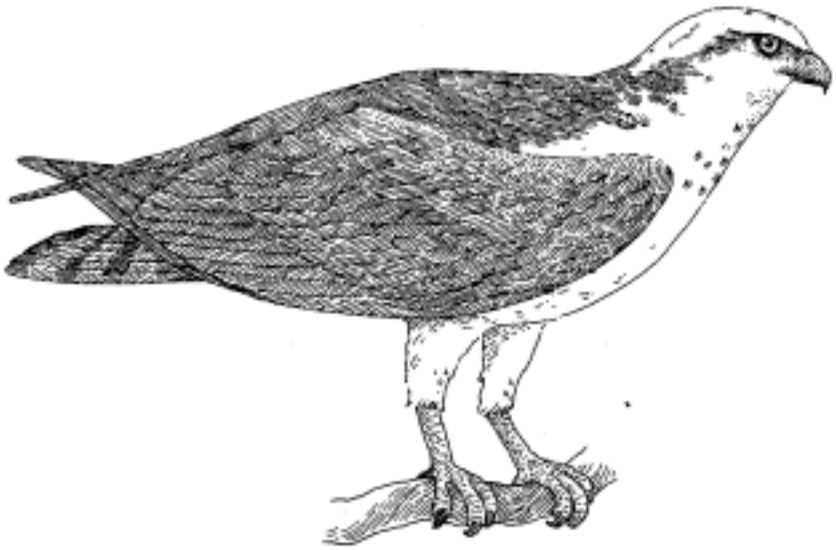
BREEDING: Breeds from early April to early September, with peak from early June to late August. Nests in top of tree, live or dead, 8 to 160 ft (2.4 to 49 m) tall, usually with broad, flat top, within 6 mi (9.6 km) of large lake or river with adequate supply of fish. Clutch size from 1 to 4, with 3 most common.

TERRITORY/HOME RANGE: Range up to 6 mi (9.6 km) from nest to hunting areas (a lake) (Garber 1972). No data available on territory size, but nests in colonies with high density.

FOOL) HABITS: Hunts in lake or large river. Eats fish that swim at or near water surface. Searches from high perch or from flight, and dives at fish.

OTHER:

REFERENCES: Koplin 1971, Garber 1972, Jackman and Scott 1975.





Prairie Falcon

B040 (*Falco mexicanus*)

STATUS: No official listed status; on the 1978 Audubon Society Blue List. Rare on west slopes; being reduced in numbers probably because of nest robbing by humans, vertebrate control programs killing its prey, and possibly use of pesticides.

DISTRIBUTION/HABITAT: Ranges from annual grasslands through alpine meadows. Primarily associated with perennial grasslands, lodgepole pine of varying canopy closures, and alpine meadows. Ranges above treeline in late summer, winters at lower elevations.

SPECIAL HABITAT REQUIREMENTS: Open terrain for foraging; cliffs for nesting.

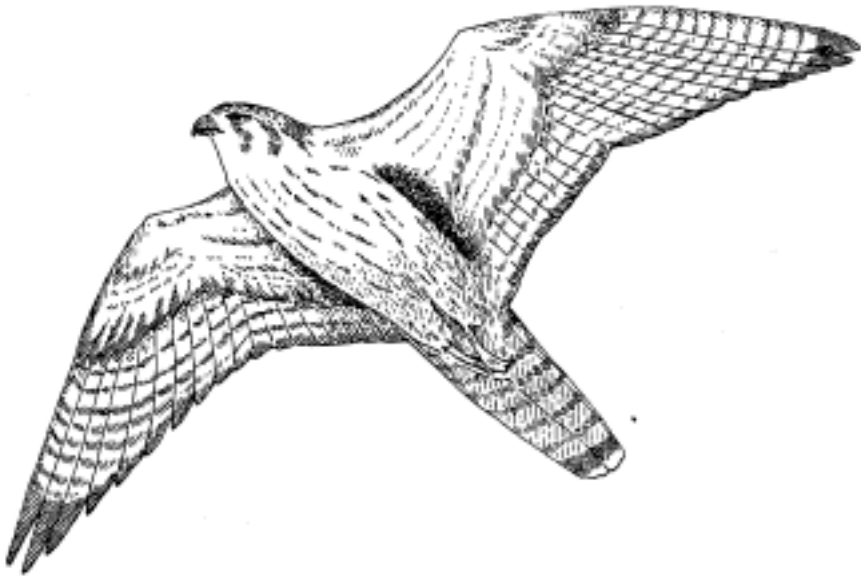
BREEDING: Breeds from mid-February to mid-September, with peak from early May to early August. Formerly would breed mostly below coniferous forests; now most remaining pairs breed at higher altitudes. Nests always on cliff 20 to 400 ft (6.1 to 122 m) high with shelter ledge overlooking large open area. Clutch size from 3 to 6, with 5 most common. A 1971-72 survey of nesting sites within 48 mi (30 km) of the Central Valley found 32 of 33 traditional sites unoccupied (Garrett and Mitchell 1973).

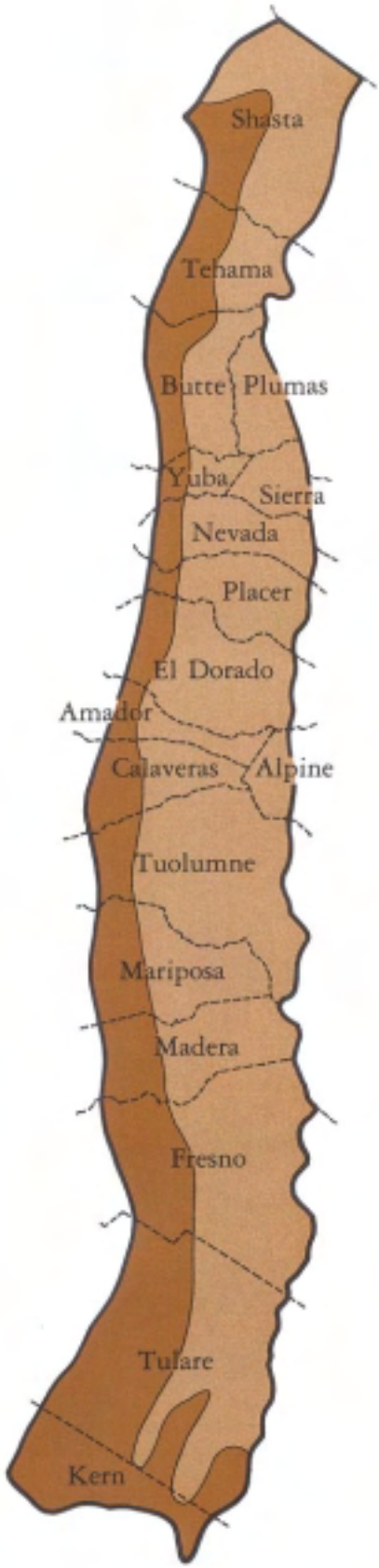
TERRITORY/HOME RANGE: In Wyoming, home range of one breeding pair was 10 mi^2 (26 km^2) (Craighead and Craighead 1956). In Utah, two breeding territories were 2.2 and 2.5 mi^2 (5.7 and 6.5 km^2) in size (Smith and Murphy 1973). In northern Colorado, winter ranges (maximum distance between observation points of marked birds) averaged 3.8 mi (6.1 km) for males and 7.2 mi (11.5 km) for females; maximum range was 12.1 mi (19.4 km) for one female (Enderson 1964).

FOOD HABITS: Eats small mammals and small and medium-sized birds. Forages on ground and in air, involving either a shallow dive from a perch, with rapid pursuit, or a dive from searching flight 50 to 300 ft (15 to 91 m) high.

OTHER:

REFERENCES: Craighead and Craighead 1956, Enderson 1964, Garrett and Mitchell 1973, Smith and Murphy 1973, Snow 1974.





Peregrine Falcon

B041 (*Falco peregrinus*)

STATUS: An Endangered species on both Federal and State lists. Populations declining in recent years because of habitat loss, pesticides, and human disturbance, including nest robbing. Transients in the western Sierra Nevada in spring and fall; not present in winter.

DISTRIBUTION/HABITAT: Found from annual grassland through lodgepole pine, in all successional stages. Nests from digger pine-oak upwards, but prefers low to middle elevations.

SPECIAL HABITAT REQUIREMENTS: Cliffs for nesting and perching; nearby lake or river.

BREEDING: Breeds from early March through late August, with peak from early May to late June. Only one probable breeding site found in the Sierra Nevada, but believed several yet undiscovered (Thelander 1975, 1976). Nests in pothole or ledge on cliff, usually with commanding view. Clutch size in southern California has mean of 3.58, with standard error of 0.72.

TERRITORY/HOME RANGE: In inland habitats in California, breeding sites range from about 3 to 7.5 mi (5 to 12 km) apart (D. Harlow, pers. commun.). In Alaska, breeding territories had minimum radius around nest of about 300 ft (91 m); some birds attacked others up to 1 mi (1.6 km) from the nest (Cade 1960). No nests closer together than 0.25 mi (0.4 km). In Great Britain, home range varied from 17 to 25 mi^2 (44 to 65 km^2) averaging 20.1 mi^2 (52 km^2) (Brown and Amadon 1968). In Utah, species foraged in areas from 0.2 to 18.6 mi (0.32 to 29.8 km) from their nest, with average of 7.6 mi (12.2 km) (n = 19) (Porter and White 1973). In Alaska, breeding male followed by helicopter covered foraging range of 120 mi^2 (290 km^2) (C. White, pers. commun.).

FOOD HABITS: Inland birds in California eat primarily band-tailed pigeons, woodpeckers, and jays, usually taken in air (D. Harlow, pers. commun.). Search from high, exposed perch, with a chase and dive from above.

OTHER:

REFERENCES: Cade 1960; Brown and Amadon 1968; Hickey and Anderson 1969; Snow 1972; Thelander 1975, 1976.





Merlin

B042 (*Falco columbarius*)

STATUS: No official listed status; on the 1978 Audubon Society Blue List. Rare migrant and winter visitor from late September to May.

DISTRIBUTION/HABITAT: Found in fall, winter, and spring from annual grasslands up to ponderosa pine and black oak woodland zone. Prefers open country, sometimes found in early successional stages. Often nomadic in winter, remaining in areas with abundant prey.

SPECIAL HABITAT REQUIREMENTS:

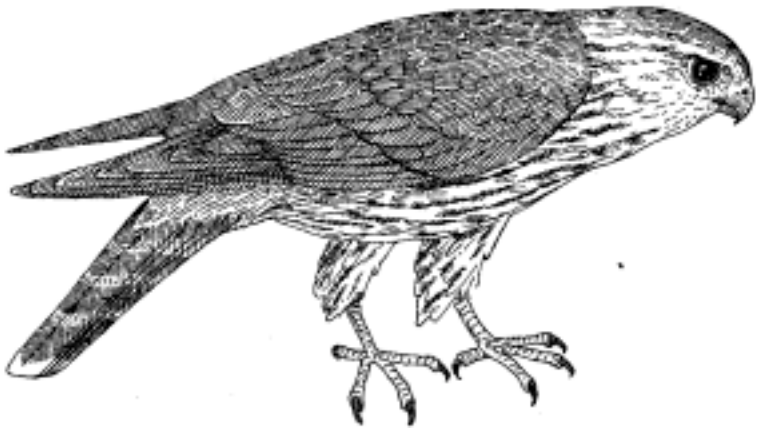
BREEDING: Nonbreeder in the western Sierra Nevada.

TERRITORY/HOME RANGE: No data on home range; nonterritorial in the western Sierra Nevada.

FOOD HABITS: Eats primarily small birds; also eats small mammals and insects. Captures food on ground, also takes some in air. Searches while flying rapidly at low altitude, attacking with short dash or dive from above.

OTHER:

REFERENCES: Craighead and Craighead 1940, Brown and Amadon 1968, Trimble 1975.





American Kestrel

B043 (*Falco sparverius*)

STATUS: No official listed status. Common resident.

DISTRIBUTION/HABITAT: Ranges up to alpine zone, in mountain meadows, and other open areas in late summer and fall, but winters at lower elevations. Prefers large tree stage with 40 to 70 percent crown closure of blue oak savannah and digger pine-oak types for breeding. Pole to medium tree stages of same closure range also attractive, but will use all other successional stages.

SPECIAL HABITAT REQUIREMENTS: Nest cavities in trees or earthen bank; elevated perches; open terrain.

BREEDING: Breeds from early April to early September, with peak between early June and late August. Nests in large woodpecker hole, natural tree cavity, cavity in cliff or earth bank, or magpie nest, from 7 to 81 ft (2.1 to 25 m) above ground. Clutch size from 3 to 7 nationwide, with 4 most common in the Sierra Nevada.

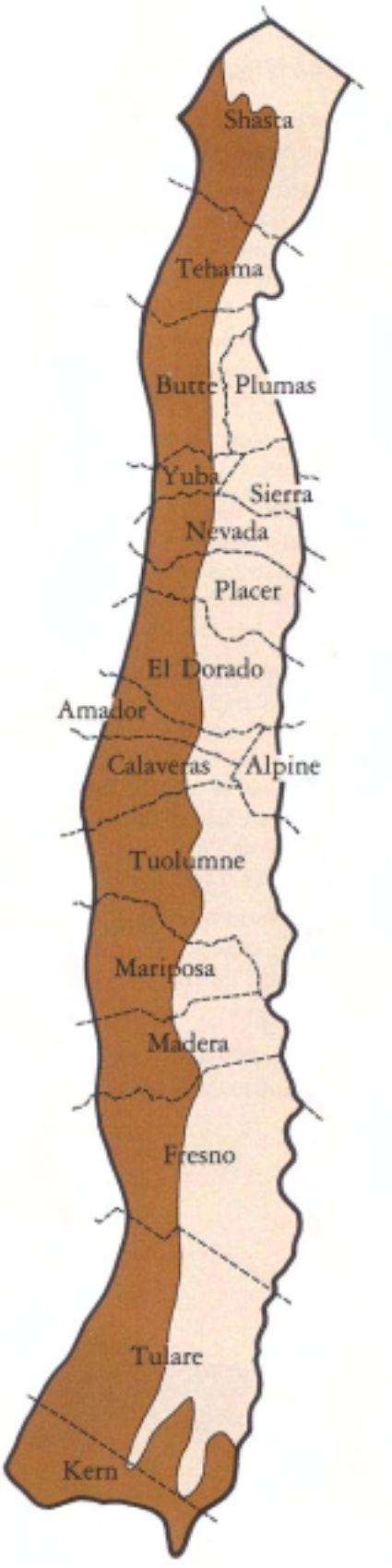
TERRITORY/HOME RANGE: On east slope of the Sierra Nevada, prebreeding home ranges were about double the size of defended breeding territories, which averaged 275 acres (111 ha) for 32 sites (Balgooyen 1976). In southern California, defended only the immediate nest site (Cade 1955). In Ohio, winter territories averaged 375 acres (152 ha), with maximum of 1125 acres (455 ha) (Mills 1975).

FOOD HABITS: Feeds on insects, reptiles, small mammals, and small birds usually on or just aboveground. Dives from a perch; sometimes will hover or hawk insects.

OTHER:

REFERENCES: Grinnell and Miller 1944, Cade 1955, Enderson 1960, Brown and Amadon 1968, Balgooyen 1976.





Blue Grouse

B044 (*Dendragapus obscurus*)

STATUS: No official listed status. Game species. Locally common resident in the Sierra Nevada.

DISTRIBUTION/HABITAT: Ranges from ponderosa pine through lodgepole pine and alpine meadows. Primarily found breeding in open-canopied, large tree and medium tree stages of mixed-conifer through red fir types. Complex habitat requirements. Breeds on open or partly brushy slopes with adjacent stands of dense-foliaged conifers, usually true firs, used for roosting and hooting. After breeding, disperses up- and downslope, foraging in open habitats. Most move to high elevation, dense-foliaged conifers for winter but evidence inconclusive for the Sierra Nevada. A few populations do not move up.

SPECIAL HABITAT REQUIREMENTS: Medium to large forest openings; shrubs/grass-forbs.

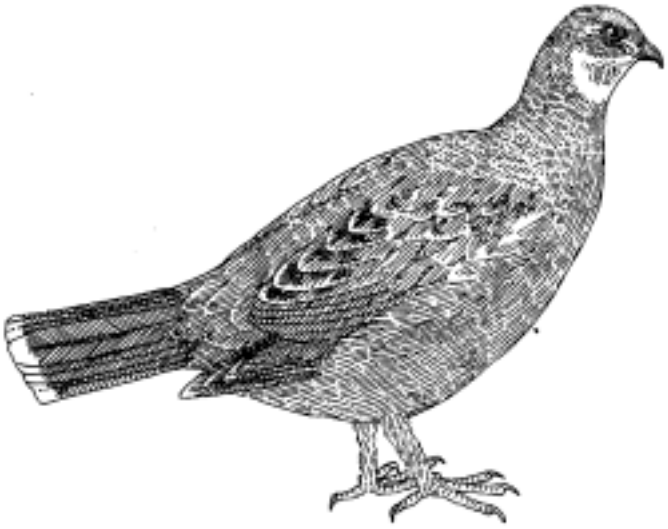
BREEDING: Breeds from early April to September, with peak from mid-May to mid-July. Nests on well-drained ground, often partly concealed by brush, low tree branches, or low cover. Clutch size from 6 to 10, with 7 to 8 most common. Young remain with mother through fall migration; brooding of young rarely continues past mid-July; not known when young gain independence.

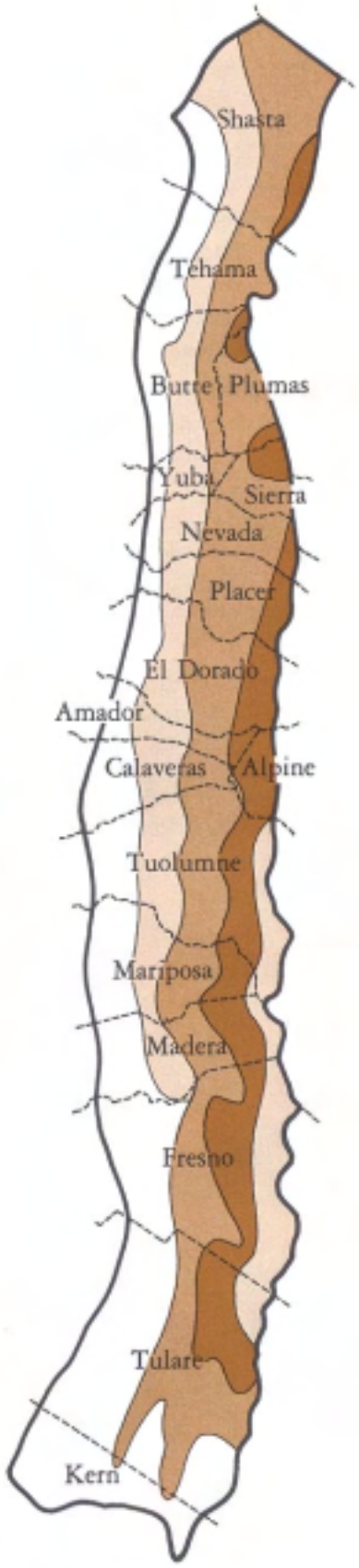
TERRITORY/HOME RANGE: In Montana, summer home ranges of broods varied from 1320 to 3960 ft (400 to 1210 m) in diameter (Mussehl 1960). In British Columbia, territory size for a low-density population ranged from 3 to 11 acres (1.2 to 4. 5 ha), but varied in a high-density population from 1 to 2 acres (0.4 to 0.8 ha), with a mean of 1.5 acres (0.6 ha) (Bendell and Elliott 1967). In Alberta, mean territory size was 1.5 acres (0.6 ha), with a range from 0.55 to 2.25 acres (0.22 to 0.9 ha) (Boag 1966); breeding season home ranges of 15 marked females averaged 43 acres (17.4 ha).

FOOD HABITS: Feeds mainly on needles, buds, and pollen cones of conifers taken by gleaning, grazing, and browsing on conifers. In winter eats mainly seeds, berries, foliage, and insects.

OTHER:

REFERENCES: Hoffman 1956; Mussehl 1960; Bendell and Elliott 1966, 1967; Johnsgard 1973; Jackman and Scott 1975.





White-tailed Ptarmigan

B045 (*Lagopus leucurus*)

STATUS: No official listed status. Introduced at Mono Pass in 1971-72 by California Department of Fish and Game; apparently breeding successfully and expanding their range.

DISTRIBUTION/HABITAT: Breeds in alpine meadows strewn with rocks and boulders; in winter, some may move downslope into early successional stages of lodgepole pine forest.

SPECIAL HABITAT REQUIREMENTS: Rock outcrops; probably shrubs/grass-forbs.

BREEDING: Breeds from late May to September, with peak from early June to late July in parts of range outside of California; no California data available. Nests on the ground in variety of sites; must be near meadows and accessible brooding grounds having short vegetation, and at least 50 percent rock cover. Lays from 3 to 9 eggs per set, usually 5 or 6.

TERRITORY/HOME RANGE: No data on home range. Breeding territories of 16 to 47 acres (6.4 to 18.8 ha), with mean of 36 acres (14.4 ha) reported in the Colorado Rockies (Schmidt 1969).

FOOD HABITS: Feeds on new shoots, leaves, flowers, seeds, and fruits, especially of willows in spring and summer. Eats buds and twigs of willows and some alder catkins in winter. Chicks eat mainly invertebrates. Gleans and grazes food from ground and low plants.

OTHER:

REFERENCES: Choate 1963, Johnsgard 1975a, Gaines 1977.





California Quail

B046 (*Lophortyx californicus*)

STATUS: No official listed status. Game species. Common resident on west slope.

DISTRIBUTION/HABITAT: Primarily found in brush/seedling/sapling stage of blue oak savannah through chaparral. Ranges from annual grasslands through black oak woodlands in open-canopied situations.

SPECIAL HABITAT REQUIREMENTS: Shrubs/grass-forbs; water in dry season.

BREEDING: Breeds from early April to mid-September, with peak from early June to late July. Nests on ground usually under cover of brush, logs, rocks, or herbaceous vegetation. Clutch size from 12 to 16, with 14 most common. Young remain with parents through winter; not known when young become independent.

TERRITORY/HOME RANGE: Breeding home range varied from 12 to 25 acres (5 to 10 ha), with winter range from 17 to 45 acres (7 to 18 ha) (Emlen 1939). Only territory known used for crowing by unmated males; size not known. Mated males defended area immediately surrounding mate (Sumner 1935, Genelly 1955).

FOOD HABITS: Feeds on green vegetation and seeds, particularly legumes; also on grains, fruits, and insects by foraging on ground or low vegetation. Scratches, grazes, and jumps for blossoms, seeds, and fruits. In Madera County, a detailed study of 260 young of the year, from June through October, 1973 and 1974, showed food by volume to be 93.3 percent seeds (mostly legumes and other forbs), 5.5 percent insect fragments, 0.8 percent leafage, and 0.4 percent plant galls (Newman 1978).

OTHER:

REFERENCES: Sumner 1935, Raitt 1960, Johnsgard 1973, Leopold 1977.





Mountain Quail

B047 (*Oreortyx pictus*)

STATUS: No official listed status. Game species. Common on west slopes of the Sierra Nevada, with conspicuous altitudinal migration.

DISTRIBUTION/HABITAT: Breeds from chaparral zone up to lodgepole pine forests; prefers stands with much shrubbery and low percent canopy cover. Migrates out of high country; found in winter from ponderosa pine and black oak woodland zones down to digger pine-oak type.

SPECIAL HABITAT REQUIREMENTS: Shrubs/grass-forbs; water in breeding season.

BREEDING: Breeds from mid-April to September, with peak from late June to early August. Nests on ground, under cover of large rock, log, bush, or clump of grass. Clutch size from 6 to 15, with mean of 9. Young usually remain with parents through winter, forming small coveys averaging 7 individuals. Not known when young become independent.

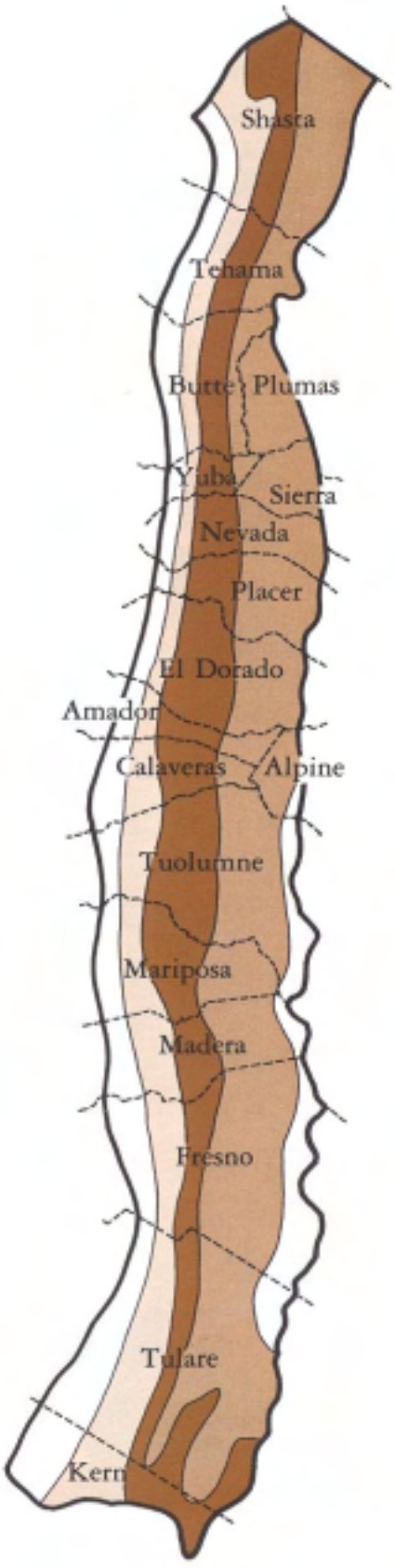
TERRITORY/HOME RANGE: In Idaho, breeding home range size a maximum of 1.0 mi^2 (2.6 km^2) (Ormiston 1966). Breeding territory in same study ranged from 5 to 50 acres (2 to 20 ha).

FOOD HABITS: Eats mainly fruit, acorns, seeds, and green vegetation. Forages on ground and in low shrubs, by scratching, gleaning, grazing, and jumping for leaves and other items.

OTHER:

REFERENCES: Grinnell *et al.* 1918, Ormiston 1966, Johnsgard 1973, Gutierrez 1975.





Chukar

B048 (*Alectoris chukar*)

STATUS: No official listed status. Game species. Uncommon, introduced resident now well established in the southern Sierra Nevada. First released in California in 1932 with several later releases.

DISTRIBUTION/HABITAT: Found in grass/forb stages from annual grasslands through alpine meadows. Prefers open, rocky slopes with 5 to 10 in (6 to 25 cm) of annual precipitation in remote unsettled areas. Moves below level of heavy snows in late fall and winter in coveys of 5 to 40 individuals.

SPECIAL HABITAT REQUIREMENTS: Rock outcrops or talus; water.

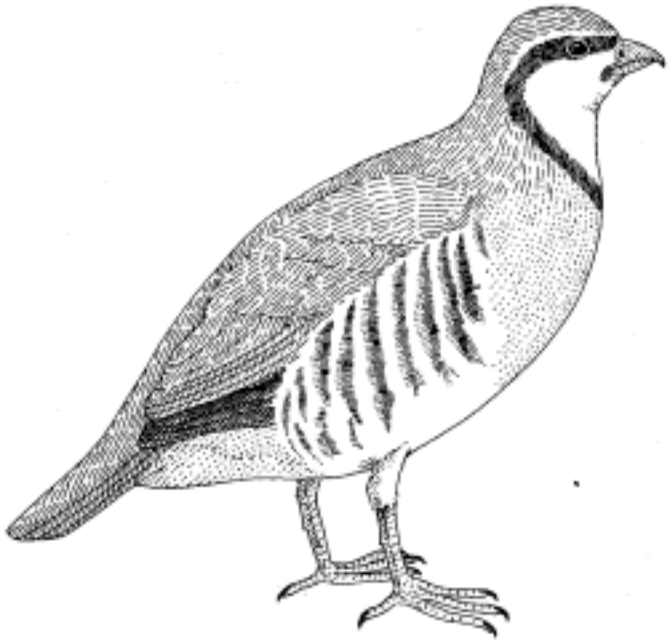
BREEDING: Breeds from early April to early September, with peak from mid-May to early July. Nests in scratched depression in ground, or on rocky slope, usually hidden on three sides by rocks, brush, forbs, or grass, within about 0.5 mi (0.8 km) of water. Clutch size from 10 to 20, with mean of 15. Young likely independent about 3 weeks after leaving nest; leaves nest almost immediately upon hatching.

TERRITORY/HOME RANGE: In Utah, birds cruised daily over an area of about 1 mi^2 (2.6 km^2) (Phelps 1955). May also travel 2 to 3 mi (3.2 to 4.8 km) daily to get water during dry periods (Bump 1951, in Johnsgard 1973). Probably nonterritorial (Johnsgard 1973); may defend area around their mate (Mackie and Buechner 1963).

FOOD HABITS: Feeds on grass, forbs, seeds, and some insects, by grazing and gleaning.

OTHER:

REFERENCES: Harper *et al*. 1958, Christensen 1970, Johnsgard 1973.





Turkey

B049 (*Meleagris gallopavo*)

STATUS: No official listed status. Game species. An introduced species, first released in 1908. By 1969, four populations locally well-established on west slope.

DISTRIBUTION/HABITAT: Ranges from digger pine-oak through lodgepole pine. Primarily found in grass/forb and shrub/seedling/sapling stages of ponderosa pine and black oak woodland types. Found in flocks year-round, wanders widely through many habitats, 3 mi (4.8 km) or more per day. In the Sierra Nevada, prefers wooded areas with scattered grassy openings, usually in rugged, hilly terrain. Moves downslope 25 to 50 mi (40 to 80 km) to winter range, determined by food availability and lack of deep snow. Roosts at night in tree near water.

SPECIAL HABITAT REQUIREMENTS: Water; trees/grass-forbs.

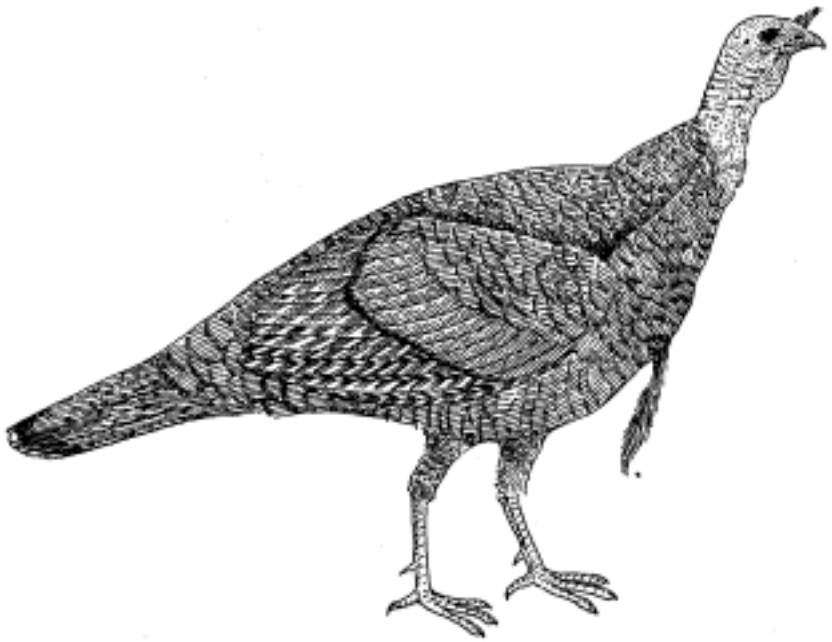
BREEDING: Breeds from late April to mid-August, with peak from early June to late July. Nests in scooped-out depression on dry ground with or without cover and near water. Clutch size from 8 to 15, with 10 most common.

TERRITORY/HOME RANGE: Males apparently defend space on strutting grounds. In Oklahoma, Thomas (1954) reported range from 4 to 8 acres (1.6 to 3.2 ha); in Missouri, Dalke *et al.* (1946) reported range from 100 to 300 acres (40 to 121 ha). Numerous reports of home ranges indicate sizes in winter from about 230 to 1200 acres (93 to 486 ha) and during breeding season from about 160 to 900 acres (65 to 364 ha) (Lewis 1963, Barwick and Speake 1973, and Speake *et al.* 1975).

FOOD HABITS: Eats mainly seeds, acorns, greens, insects, and fruit. Forages on ground, in low vegetation, and sometimes on shrubs and trees by scratching, gleaning or grazing.

OTHER:

REFERENCES: Burger 1954, Schorger 1966, Sanderson and Schultz 1973, Graves 1975, Jackman and Scott 1975 .





Virginia Rail

B050 (*Rallus limicola*)

STATUS: No official listed status. Rare visitor in spring, summer, and fall; winter status uncertain. Status generally uncertain because of species' secretive behavior and no systematic distributional study on west slope. Habitat matrix indicates broadest potential occurrence.

DISTRIBUTION/HABITAT: Found in all successional stages from annual grasslands through Jeffrey pine.

SPECIAL HABITAT REQUIREMENTS: Marshes; open water.

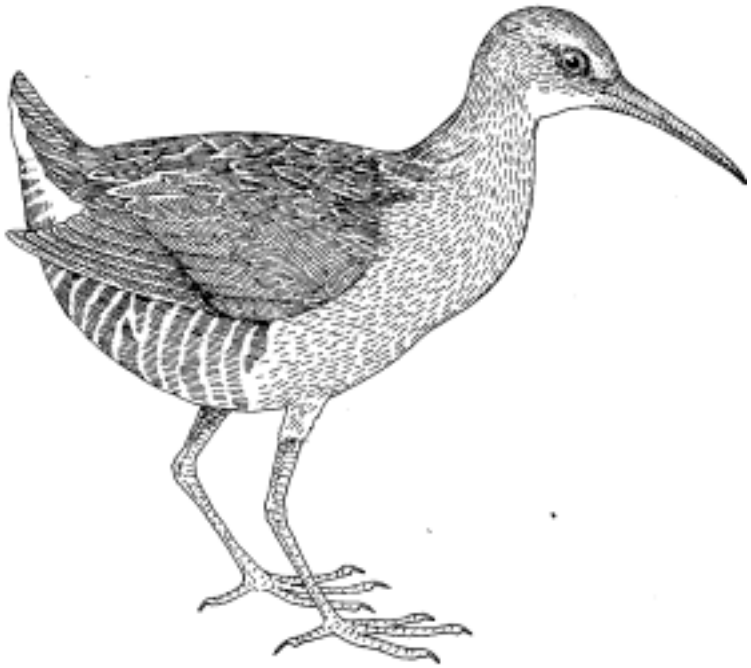
BREEDING: Breeds from early April to early August, with peak from early June to mid-July. Nests built near open water in clumps of dense, emergent vegetation with base of nest touching water. Clutch size from 4 to 13, with 8 or 9 most common. Only two instances of breeding known for west slope.

TERRITORY/HOME RANGE: No data available on size of home range. Territories maintained, no report on sizes (Walkinshaw 1937, Kaufman 1971). Sketch maps in Glahn (1974) suggest territories in Colorado on the order of 5600 to 33,150 ft^2 (520 to 3080 m^2), with mean of about 14,750 ft^2 (1370 m^2) (n = 18).

FOOD HABITS: Eats mainly insects, other invertebrates, seeds, and green vegetation. Forages on ground or floating plant debris amidst dense, emergent vegetation at edge of water, by gleaning.

OTHER:

REFERENCES: Pospichal and Marshall 1954, Horak 1970, Johnsgard 1975a.





American Coot

B051 (*Fulica americana*)

STATUS: No official listed status. Game species. Fairly common spring and fall migrant. Resident breeding species in some localities.

DISTRIBUTION/HABITAT: Found in all successional stages from annual grasslands through Jeffrey pine.

SPECIAL HABITAT REQUIREMENTS: Ponds, lakes, slow-moving streams, or rivers.

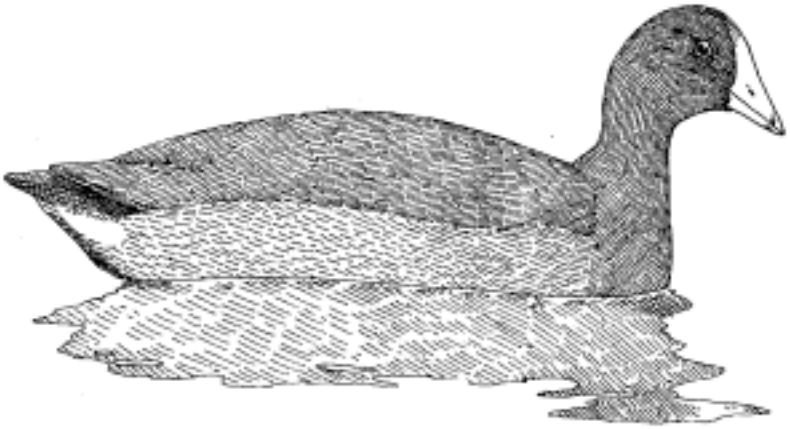
BREEDING: Breeds from early March to late September, with peak from early June to mid-August. Builds several nest-like structures for courtship, display platforms, nests for eggs, and nests for brooding young. Also builds floating nest in emergent vegetation near open water. Clutch size from 4 to 13, with 9 or 10 most common. Few breeding records for west slopes, all from Sequoia-Kings Canyon National Parks.

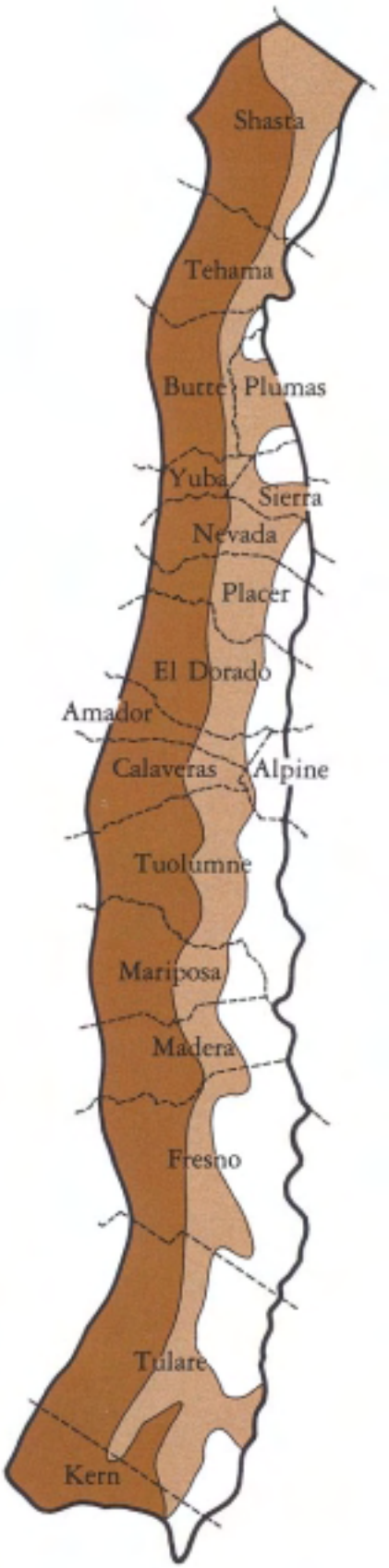
TERRITORY/HOME RANGE: No data available on home range. In Alameda County, size of nine breeding territories ranged from 0.5 to 1.4 acres (0.2 to 0.6 ha), and averaged 1 acre (0.4 ha) (Gullion 1953). Winter territories, held only by resident individuals, ranged from 0.1 to 0. 5 acre (0.04 to 0.2 ha) and averaged 0.3 acre (0.1 ha) (n = 10).

FOOD HABITS: Feeds mainly on submerged vegetation, also shoreline vegetation, insects, and aquatic invertebrates. Forages under water or on shoreline by diving and gleaning.

OTHER:

REFERENCES: Gullion 1954; Frederickson 1970, 1977; Johnsgard 1975a.





Killdeer

B052 (*Charadrius vociferus*)

STATUS: No official listed status. Common resident in foothills; uncommon summer visitor to higher elevations. Most widespread and numerous shorebird in the Sierra Nevada.

DISTRIBUTION/HABITAT: Breeds from annual grasslands up to lodgepole pine zone, in open habitats afforded by grasslands, meadows, or early successional stages. Found year-round as high as ponderosa pine and black oak woodland types.

SPECIAL HABITAT REQUIREMENTS: Open terrain; rarely far from ponds, lakes, streams, or rivers.

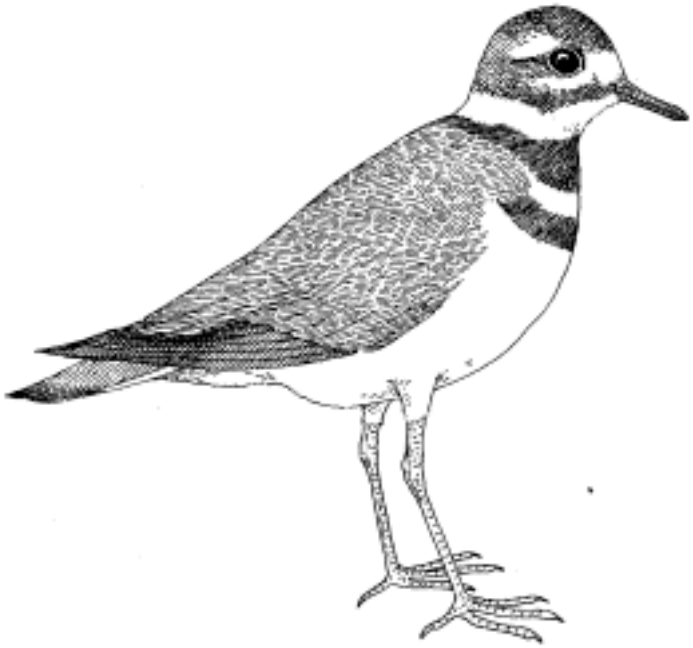
BREEDING: Breeds from early April to early July, with peak from early May to mid-June. Nests on open ground, either gravelly or turfy, near water if possible; found nesting in deserts to alpine meadows. Clutch size from 2 to 4, with 4 most frequent.

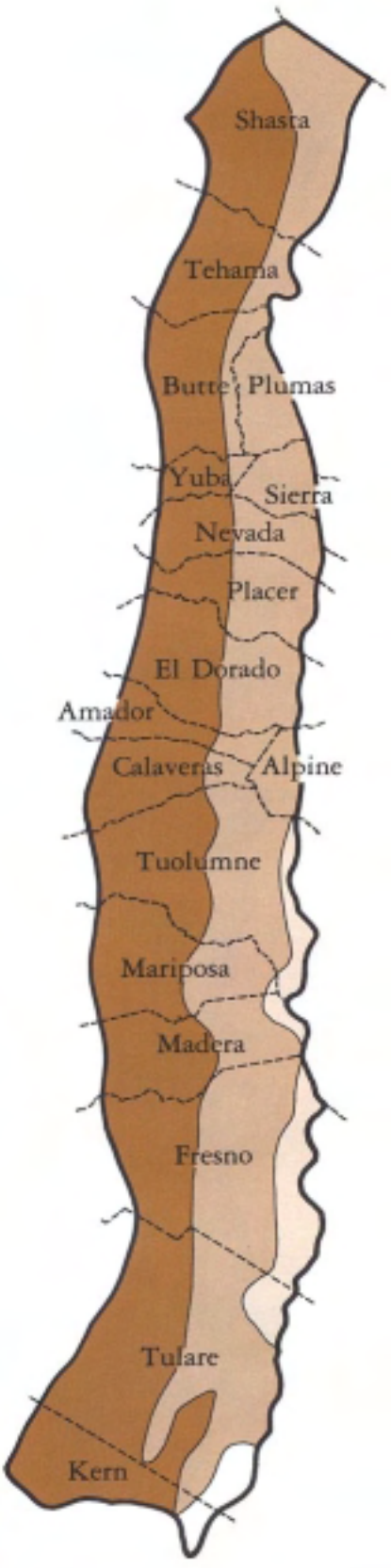
TERRITORY/HOME RANGE: No data available.

FOOD HABITS: Feeds primarily on insects, spiders, snails, earthworms, and vegetable matter on surface of dry or moist ground, or in shallow water.

OTHER:

REFERENCES: Grinnell and Storer 1924, Bent 1929, Stout 1967, Gerstenberg and Jurek 1972, Jurek and Leach 1973.





Common Snipe

B053 (*Capella gallinago*)

STATUS: No official listed status. Game species. Uncommon resident up to 2000 ft (610 m); rare migrant up to 9000 ft (2740 m); rarely nests above 6700 ft (2040 m). Numbers markedly reduced by hunting in early 1900's; some evidence of recovery noted (Grinnell and Miller 1944).

DISTRIBUTION/HABITAT: Breeds from annual grasslands up to mixed-conifer forests; more common at lower elevations. Prefers early seral stages with streams, ponds, springs, or seeps.

SPECIAL HABITAT REQUIREMENTS: Wet margins of ponds, lakes, streams, rivers, or marshes.

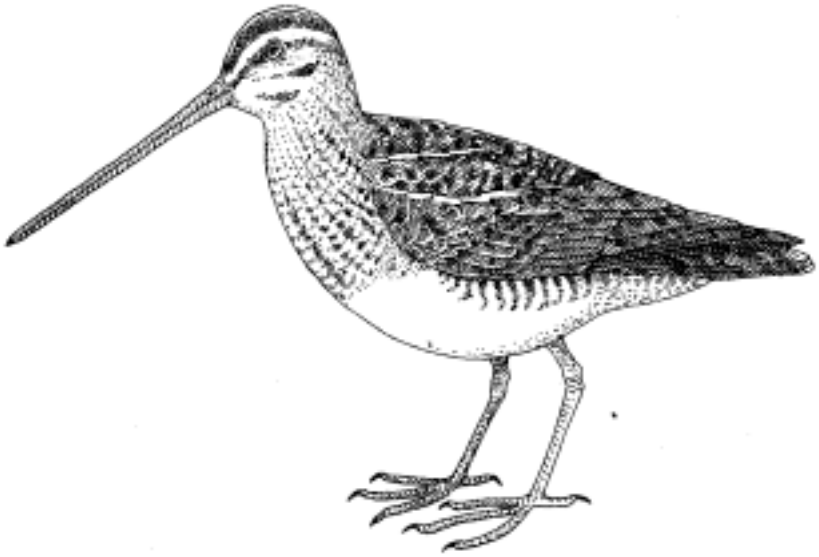
BREEDING: Breeds from late April to early August, with peak from mid-May to late June. Nests on ground in freshwater marshes, grassy borders of slow-moving streams, wet meadows, and farmland. Most clutches contain 4 eggs; some sets of 3 reported.

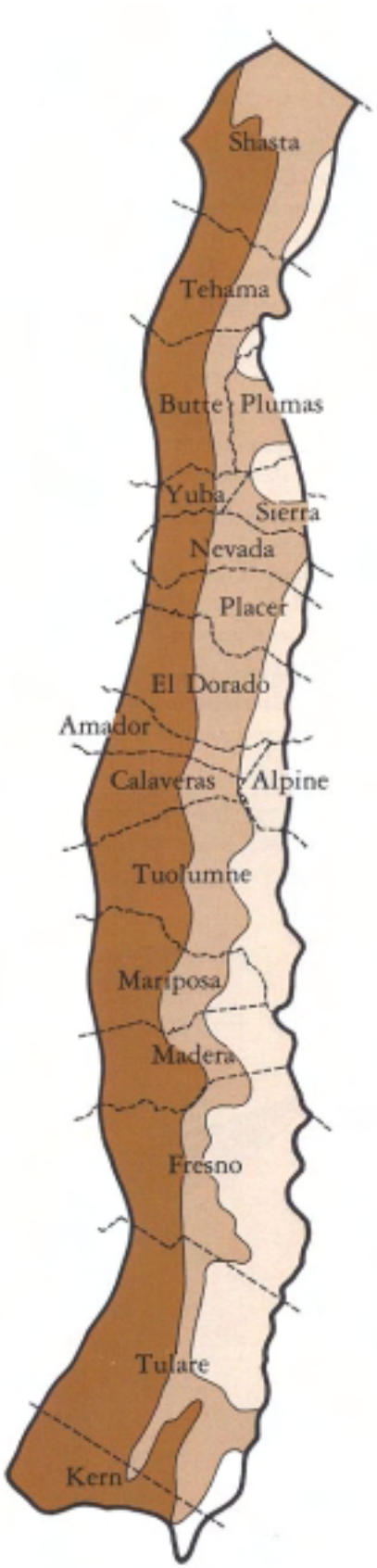
TERRITORY/HOME RANGE: Nesting density ranged from 1.4 to 7.0 pairs per 100 acres (40 ha) (Tuck 1972), and rough sketch maps by Tuck (1972) suggest territory sizes of 5 to 40 acres (2 to 16 ha) before incubation and 1 to 3 acres (0.4 to 1.2 ha) during incubation.

FOOD HABITS: Feeds mostly on insects, earthworms, and crustaceans; also on vegetation. Forages along streamsides and ponds, on shores and in shallows by surface feeding, as well as probing and pecking.

OTHER: Solitary or in pairs during most of year, but in winter somewhat social. Fogarty and Arnold (1977) present management recommendations.

REFERENCES: Bent 1927, Stout 1967, Tuck 1972, Gerstenberg and Jurek 1972, Jurek and Leach 1973.





Spotted Sandpiper

B054 (*Actitis macularia*)

STATUS: No official listed status. Uncommon nesting species from base of mountains to treeline; scarce fall and winter resident at low elevations. More common in northern two-thirds of region and at elevations below 6000 ft (1830 m).

DISTRIBUTION/HABITAT: Primarily found in grass/forb and shrub/seedling/sapling stages from annual grasslands through ponderosa pine and mountain meadows.

SPECIAL HABITAT REQUIREMENTS: Gravelly or sandy margins of ponds, lakes, streams, or rivers.

BREEDING: Breeds from early May to early July, with peak from mid-May to late June. Nests usually under thick, low ground cover near water and a display area. Clutch size averages 4.

TERRITORY/HOME RANGE: No data on territory size. Defends breeding territories (Oring and Knudson 1972) and winter territories (Palmer in Stout 1967). In Wyoming, Kuenzel and Weigert (1973) noted species remained in area of about 3 acres (1.2 ha) when food abundant. In Michigan, Nelson (1930) reported broods stayed within about 0.25 mi (0.4 km) of lake shoreline.

FOOD HABITS: Mainly feeds on insects and other invertebrates; also some fish fry. Feeds on margins of sandy, gravelly ponds and streams, meadows, or irrigated fields by snapping at insects, surface feeding.

OTHER:

REFERENCES: Bent 1929, Nelson 1930, Grinnell and Miller 1944, Miller and Miller 1948, Stout 1967, Gerstenberg and Jurek 1972, Jurek and Leach 1973.





American Avocet

B055 (*Recurvirostra americana*)

STATUS: No official listed status. Extremely rare spring and summer visitor to low elevations on west slope; abundant nesting species east of the Sierra Nevada crest (Gaines 1977). Only scattered records exist for west slope above 1000 ft (305 m). Historically more common, but reduction of freshwater marshland by drainage resulted in retraction of breeding range (Grinnell and Miller 1944).

DISTRIBUTION/HABITAT: Found primarily in grass/forb stage of annual grassland through chaparral types, arid in mountain meadows.

SPECIAL HABITAT REQUIREMENTS: Open terrain; pond or lake margins.

BREEDING: Breeds from mid-April to late June, with peak from early to late May. Nests on dry, sun-baked mudflats or gravelly, sandy islands with scanty vegetation. Clutch size from 3 to 8, with 4 most common.

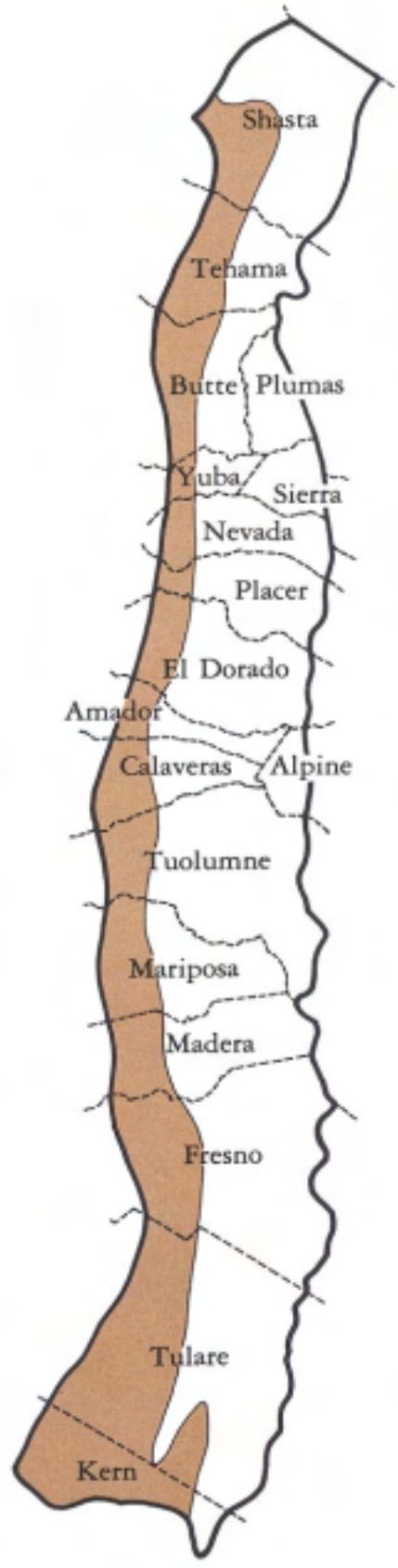
TERRITORY/HOME RANGE: In Oregon, defended separate territories around nest and feeding areas during breeding season; after young left nest, adults defended area of 65 to 330 ft (20 to 100 m) in diameter around moving brood of chicks (Gibson 1971). In California, defended foraging areas of about 2.5 to 4.9 acres (1 to 2 ha), while nests placed from 6.6 to 138 ft (2 to 42 m) apart along dike; mean separation 72 ft (22 m) (Hamilton 1975).

FOOD HABITS: Eats primarily insects, crustaceans, and rarely small fish; also some seeds. Forages in shallow water over muddy bottom and along pond edges by side-to-side sweeping of bill in shallow water; also by probing and tip-up.

OTHER:

REFERENCES: Bent 1927, Grinnell and Miller 1944, Stout 1967, Gibson 1971, Gerstenberg and Jurek 1972, Jurek and Leach 1973, Hamilton 1975, Gaines 1977.





Wilson's Phalarope

B056 (*Steganopus tricolor*)

STATUS: No official listed status. Extremely rare summer visitor to lakes at all elevations west of the Sierra Nevada crest. Arrives in California by early May, departs for the south by middle of September (Bent 1927).

DISTRIBUTION/HABITAT: Found in grass/forb, shrub/seedling/sapling, and open-canopied pole, medium, and large tree stages from annual grasslands through alpine meadows.

SPECIAL HABITAT REQUIREMENTS: Open terrain; pond, lake, or marsh edges.

BREEDING: Not known to breed on west slope.

TERRITORY/HOME RANGE: No data available on home range. Not known to be territorial in Alberta (Höhn 1967).

FOOD HABITS: Feeds on insects (adults and larvae), crustaceans, and some marsh plants. Forages on mud flats, dry shore, and open water (shallow or deep) by side-sweeping bill in shallow water, whirling in deep water, gleaning surfaces, and probing in mud.

OTHER:

REFERENCES: Bent 1927, Höhn 1967, Stout 1967, Gerstenberg and Jurek 1972, Jurek and Leach 1973, Gaines 1977.





California Gull

B057 (*Larus californicus*)

STATUS: No official listed status. Uncommon spring and fall migrant and summer visitor.

DISTRIBUTION/HABITAT: Found in all successional stages from annual grasslands through alpine meadows. Most common at higher elevations. Only one winter record on west slope.

SPECIAL HABITAT REQUIREMENTS: Lakes, rivers.

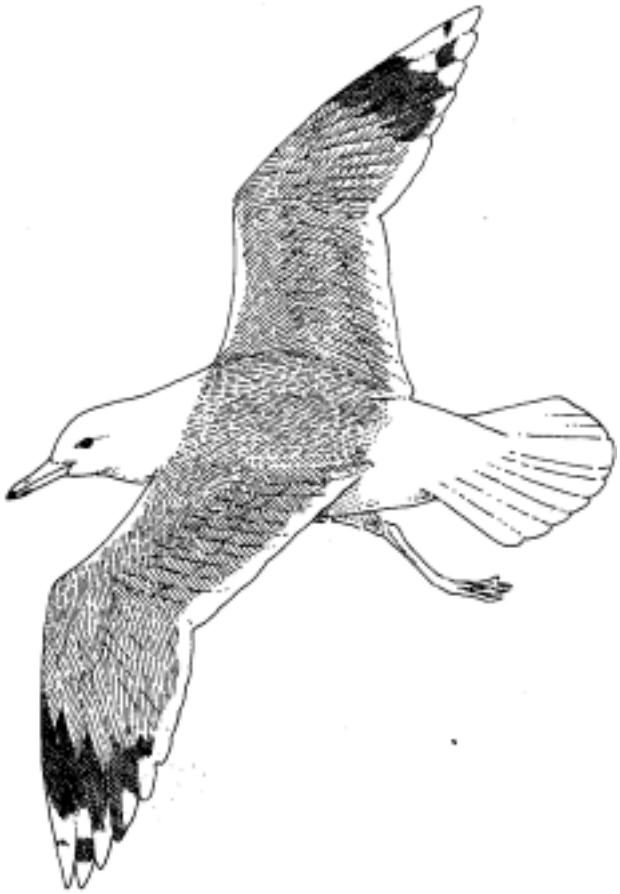
BREEDING: Nonbreeder on west slope of the Sierra Nevada.

TERRITORY/HOME RANGE: Not known to be territorial during nonbreeding period. No data available on home range of nonbreeding birds.

FOOD HABITS: Feeds on garbage, insects, rodents, carrion, plant material, and fish; flies over large area to search ground and water surface; dives for fish.

OTHER:

REFERENCES: Greenhalgh 1952, Behle 1958, Vermeer 1970.





Ring-billed Gull

B058 (*Larus delawarensis*)

STATUS: No official listed status. Rare spring and fall migrant and summer visitor. Status uncertain because easily confused with more common California gull.

DISTRIBUTION/HABITAT: Found in all successional stages from annual grasslands to alpine meadows.

SPECIAL HABITAT REQUIREMENTS: Lakes, rivers.

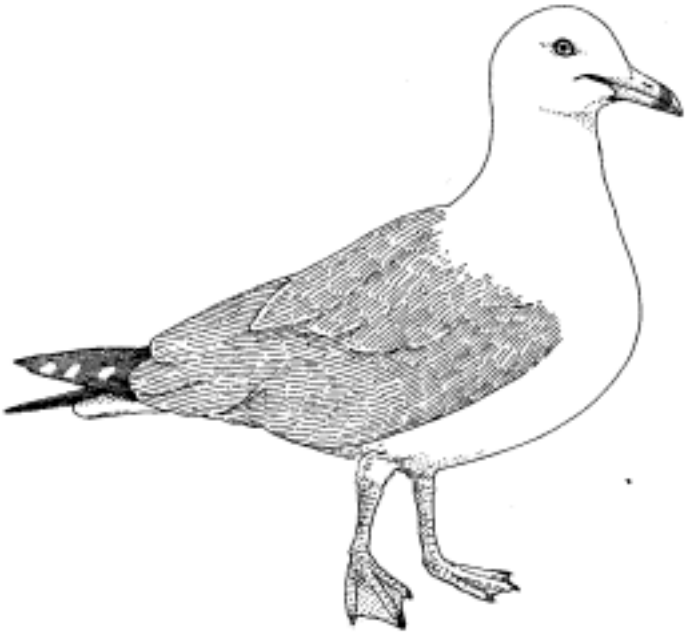
BREEDING: Nonbreeder on west slope of the Sierra Nevada.

TERRITORY/HOME RANGE: Not known to be territorial during nonbreeding period. No data on home range of nonbreeding birds.

FOOD HABITS: Feeds on garbage, plants, insects, rodents, fish, and invertebrates. Forages on ground or near surface of water. Has flight search over large areas and dives for fish.

OTHER:

REFERENCES: Johnston and Forster 1954, Vermeer 1970.





Band-tailed Pigeon

B059 (*Columba fasciata*)

STATUS: No official listed status. Game species. Fairly common resident in oak and conifer belts; also common visitor to higher elevations in the Sierra Nevada. Numbers erratic in winter, depending on food supply.

DISTRIBUTION/HABITAT: Found from blue oak savannah to lodgepole pine types. Found mainly in open-canopied, large tree stages of blue oak savannah, digger pine-oak, ponderosa pine, black oak, mixed-conifer, and deciduous riparian types. Extremely gregarious, even when nesting. After nesting, flocks nomadically search for food. Have traditional mineral springs, roosting areas, and watering spots (Glover 1953b).

SPECIAL HABITAT REQUIREMENTS: Large trees; nearby water.

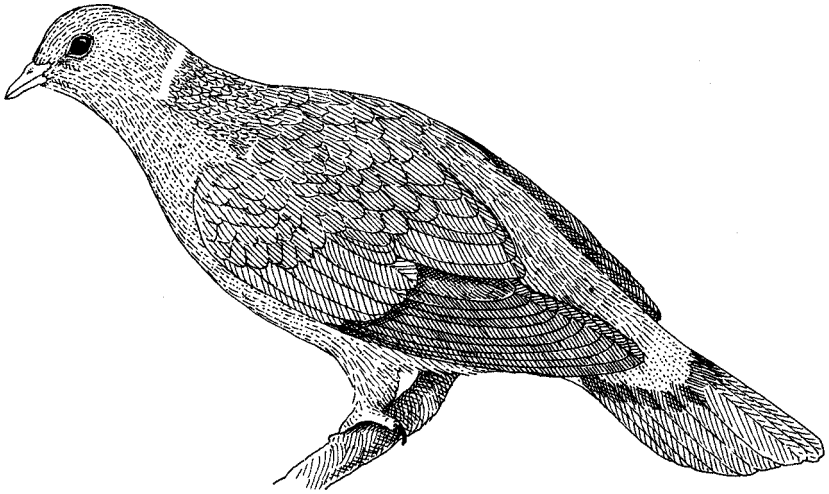
BREEDING: Breeds from early February to mid-October, with peak from early May to mid-July. Will double-brood. Usually nests in areas with dense cover, such as alder thickets or groves of conifers or oaks. Needs sturdy limbs for nest placement and roosting. Proximity to water required. Nest height from 8 to 80 ft (2.4 to 24m), average 20 ft (6.1 m). Clutch size 1 or 2, with 1 most common.

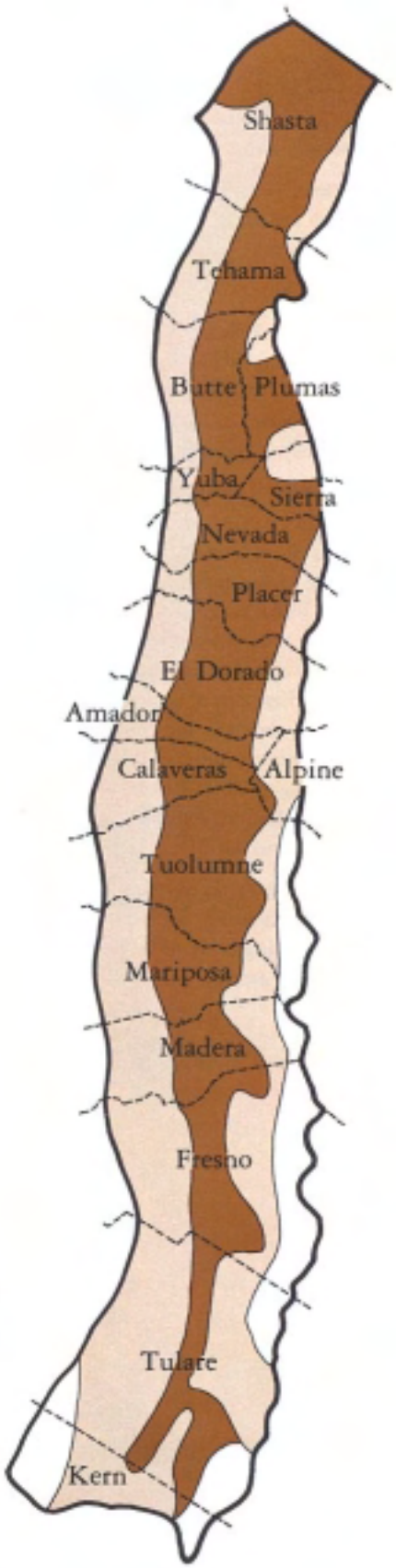
TERRITORY/HOME RANGE: No available data on home range. In Humboldt County, breeding territory roughly estimated to have radius around nest ranging from 0.1 to 0.5 mi (0.2 to 0.8 km), and averaging 0.25 mi (0.4 km) (Glover 1953b). In Contra Costa County, Peeters (1962) estimated that nesting territories ranged from about 2 to 4 acres (0.8 to 1.6 ha). In New Mexico, evidence of colonial nesting reported (Neff 1947).

FOOD HABITS: Main food in winter and spring is mast; berries and grains dominate in summer. Forages in trees and on ground, often in flocks.

OTHER:

REFERENCES: Glover 1953b, Gutierrez *et al.* 1975, Jackman and Scott 1975, Blackman 1976.





Mourning Dove

B060 (*Zenaida macroura*)

STATUS: No official listed status. Game species. Abundant resident in lowlands; extremely rare fall migrant to high elevations.

DISTRIBUTION/HABITAT: Breeds from blue oak savannahs up to Jeffrey pine forests, though breeding above 3000 ft (915 m) rare. Exhibits strong preference for stands with low percent canopy cover.

SPECIAL HABITAT REQUIREMENTS: Trees for nesting; nearby water.

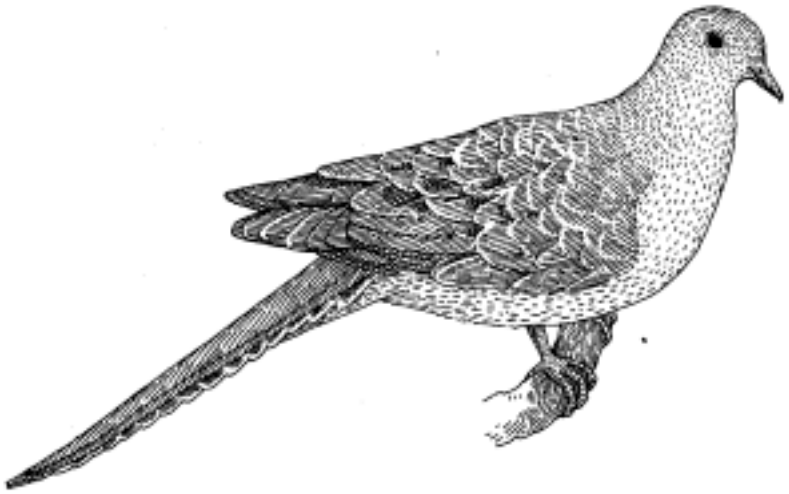
BREEDING: Breeds from mid-March to mid-September, with peak from early may to mid-June. In California, reported nesting almost all year, depending on weather conditions (Nice 1923). Nests in oaks or conifers usually, but also in willows, cottonwoods, and elms. Nest height averages 11 ft (3.4 m). Clutch size almost invariably 2, though clutches of 1 and 3 reported. Multiple brooded (Cowan 1952).

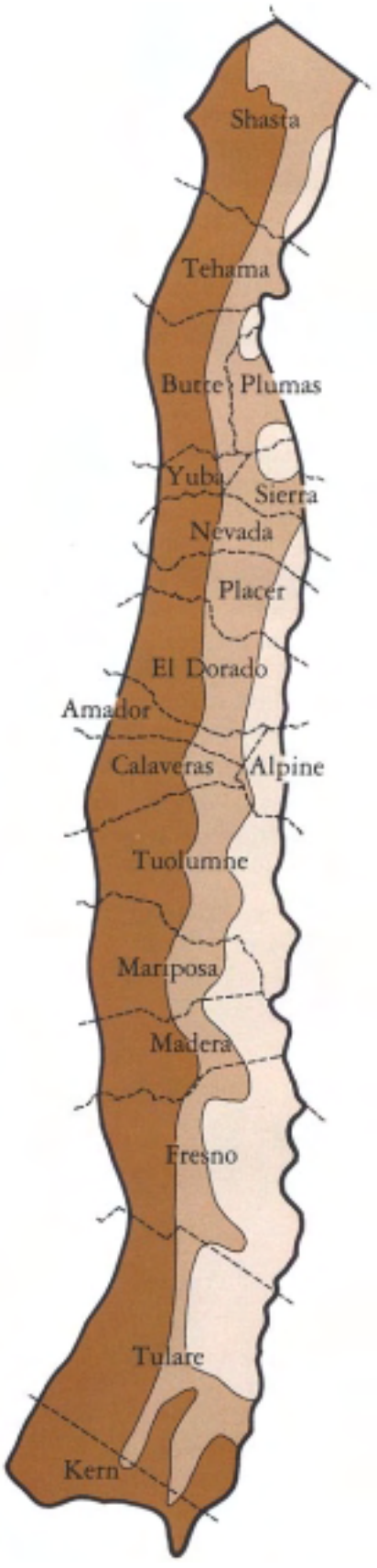
TERRITORY/HOME RANGE: Literature unclear on these aspects of dove biology. Whether or not unmated males defend territories unconfirmed. Mated males defend areas around nest; some observers believe territories decrease in size as nesting season progresses (Lund 1952, Edminster 1954), sometimes to only a few square feet immediately around nest. Records exist of as many as three active nests in same tree (Swank 1955). Others did not observe any marked reduction in territory size (Jackson and Baskett 1964). In Ohio, Mackey (1954) reported an average diameter of nesting territories of 100 ft (30 m). In an urban environment in Missouri, Jackson and Baskett (1964) found a range in size, from 210 to 300 ft (64 to 91 m) in diameter. Doves regularly feed away from their territory. Home range data meagre; Tomlinson *et al.* (1960) reported local summer movements of banded birds in Missouri regularly up to 1 mi (1.6 km) from banding site and as far as 3.25 mi (5.2 km) for one male.

FOOD HABITS: Feeds almost entirely on seeds of grasses, hemp, and cultivated grains, consuming almost no animal matter most of year, although snails important in spring before and during egg laying (S. Harris, pers. commun.). Obtains food from ground by pecking.

OTHER:

REFERENCES: Nice 1922, 1923; Bent 1932; Cowan 1952; Hanson and Kossack 1963.





Roadrunner

B061 (*Geococcyx californianus*)

STATUS: No official listed status. Rare resident in foothills; apparently more common in the past (Sumner and Dixon 1953).

DISTRIBUTION/HABITAT: Confined to chaparral and grass/forb and shrub stages of blue oak and digger pine-oak types, where found year-round.

SPECIAL HABITAT REQUIREMENTS: Nearby water.

BREEDING: Breeds from late February to late July, with peak from mid-March to early May. Usually nests off ground in trees or shrubs, rarely on ground. Nest height from 0 to 15 ft (0 to 4.6 m) up. Clutch size from 2 to 9, with mean of 5.

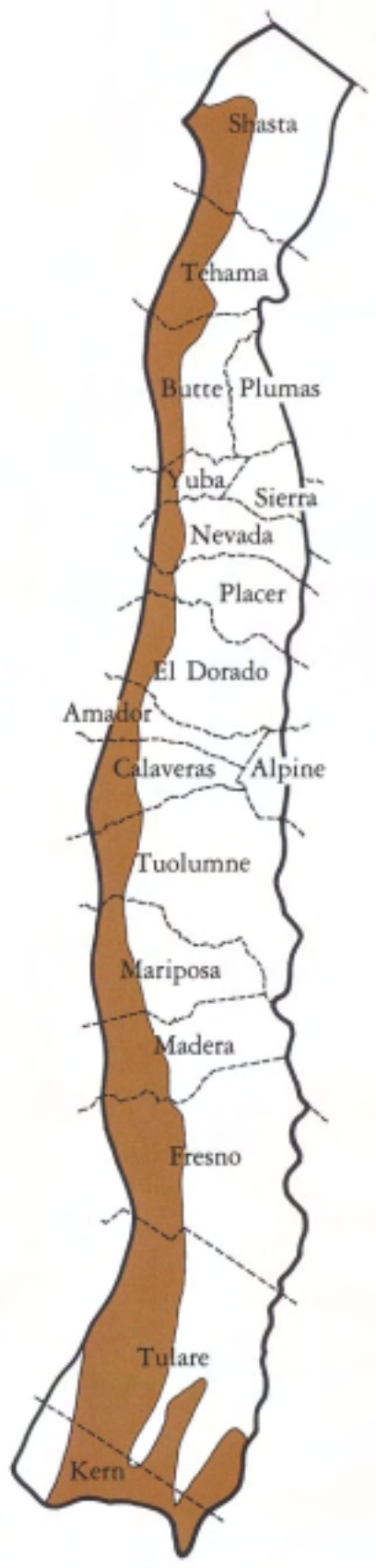
TERRITORY/HOME RANGE: Mean home range size of several square miles in California (Bryant 1916), otherwise no data on size of home range or territory.

FOOD HABITS: Eats mainly lizards, insects, spiders, rats, snakes, wild fruit, and seeds. Feeds on ground and in air. Actively pursues prey on ground; sometimes leaps into air to capture food.

OTHER: Reasons for decline in numbers in the western Sierra Nevada unknown; might speculate that recent fire control efforts eliminated much of open habitat that birds require in chaparral or chaparral-like stands of shrubs.

REFERENCES: Bryant 1916, Bent 1940, Ohmart 1973.





Barn Owl

B062 (*Tyto alba*)

STATUS: No official listed status; on the Audubon Society Blue List for 1978. Declining status in many sections of the country not apparent in the western Sierra Nevada. Common resident in appropriate habitat.

DISTRIBUTION/HABITAT: Breeds from annual grasslands upslope into chaparral zone; prefers areas with low percent canopy coverage. Also breeds in mountain meadow areas, generally below 4000 ft (1220 m). In Tulare County, altitudinal vagrants recorded to about 5500 ft (1680 m).

SPECIAL HABITAT REQUIREMENTS: Cliffs, crevices, or old buildings for nesting.

BREEDING: Breeds from late January to early June, with peak in early May; a second breeding period from early June to mid-November peaks in early October. Nests usually on ledges and crannies of old buildings or in crevices in cliffs; rarely uses cavities in oak trees; very rarely digs tunnels in a streambank. Nest height from 20 to 145 ft (6.1 to 44 m), with average of 70 ft (21 m). Clutch size from 3 to 7, with mean of 4.2.

TERRITORY/HOME RANGE: No information on home range. A Utah study indicated area within 15 to 30 ft (4.6 to 9.1 m) of the nest defended (Smith *et al.* 1974).

FOOD HABITS: Eats primarily rodents; insects, reptiles, amphibians, and birds also eaten. Captures prey on ground and in air. A nocturnal hunter; searches and pounces on prey in open areas and occasionally hovers.

OTHER: Increased in range and abundance in California in recent years because of increase in suitable nest sites. Thought to be more common because of reduction in numbers of its predators, such as prairie falcons (Grinnell and Miller 1944).

REFERENCES: Karalus and Eckert 1974, Marti 1974, Smith *et al.* 1974.





Screech Owl

B063 (*Otus asio*)

STATUS: No official listed status. Fairly common resident in suitable habitat.

DISTRIBUTION/HABITAT: Breeds from blue oak savannah up to ponderosa pine and black oak types, as well as in riparian deciduous and lower elevation forest meadows, below 4800 ft (1460 m).

SPECIAL HABITAT REQUIREMENTS: Oaks; nest cavities.

BREEDING: Breeds from early February to early June, with peak from late April to mid-May. Nests in abandoned woodpecker holes or natural cavities in coniferous and deciduous trees. Nest cavities range from 20 to 60 ft (6.1 to 18 m) in height. Clutch size from 2 to 6, with mean of 4.4.

TERRITORY/HOME RANGE: No information available.

FOOD HABITS: In the western Sierra Nevada, eats primarily insects; though rodents, amphibians, reptiles, and small birds also eaten. Captures food on ground, in air, and occasionally from foilage. Searches and pounces on prey during evening and night hours.

OTHER:

REFERENCES: Earhart and Johnson 1970, Karalus and Eckert 1974, Van Camp and Henry 1975.





Flammulated Owl

B064 (*Otus flammeolus*)

STATUS: No official listed status. Common summer resident in suitable habitat; among most migratory of all owls, with most migration thought to be nocturnal.

DISTRIBUTION/HABITAT: Breeds in conifer habitats from ponderosa pine type up to red fir forests. Prefers low to intermediate canopy coverage; particularly common in suitable ponderosa pine forests.

SPECIAL HABITAT REQUIREMENTS: Yellow pines or black oaks (Marcot, pers. commun.) in nesting habitat; nest cavities.

BREEDING: Breeds from late April to early October, with peak from mid-June to mid-July. Nests almost always in flicker nest cavity in aspen, oak, or pine. Nest sites range in height from 7 to 25 ft (2.1 to 7.6 m). Clutch size 2 to 5, with mean of 3.5.

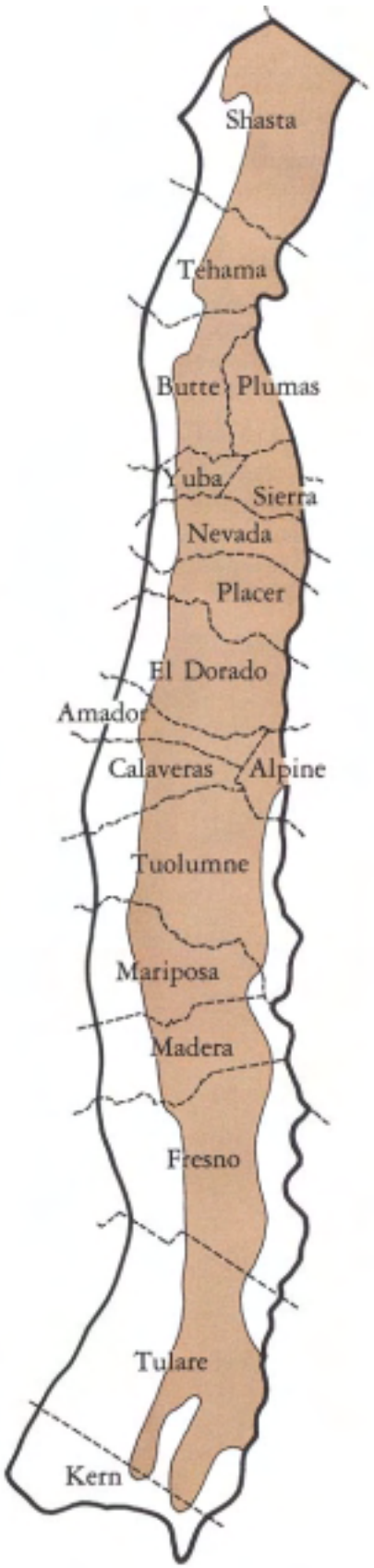
TERRITORY/HOME RANGE: A crude map in a study of territories in Sierra Nevada ponderosa pine forests suggests territories ranging in size from about 7.4 to 15 acres (3 to 6 ha) (Marshall 1939). Data on home range lacking, though Winter (1974) found a density of 2.1 males per 100 acres (40 ha) in the Sierra Nevada.

FOOD HABITS: Feeds primarily on insects, but also some spiders. Takes prey from the air, foliage, or ground. Sometimes searches for and pounces on food; more often hawks for insects from a perch.

OTHER:

REFERENCES: Marshall 1939, Karalus and Eckert 1974, Winter 1974.





Great Horned Owl

B065 (*Bubo virginianus*)

STATUS: No official listed status. Common permanent resident at lower elevations, with some elevational movements seasonally.

DISTRIBUTION/HABITAT: Breeds in all types from blue oak savannah up to mixed conifer; prefers lower elevation sites with low to intermediate canopy coverage. Exhibits considerable upslope movement in summer months for feeding.

SPECIAL HABITAT REQUIREMENTS: Large openings for foraging.

BREEDING: Breeds from mid-January to mid-June, with peak from mid-April to early May. Nests almost always on abandoned nests of red-tailed hawks in tall conifers, hollow logs, cliffs, and other sites. Height of nest ranges from 40 to 70 ft (12 to 21 m). Clutch size from 1 to 5, with mean of 2.

TERRITORY/HOME RANGE: In a Kansas oak woodland, average territory size was 160 acres (65 ha) (Fitch 1958). In heterogeneous habitat at Moose, Wyoming, home range varied from 0.45 to 1.1 mi^2 (1.2 to 2.8 km^2), with mean of 525 acres (212 ha) (Craighead and Craighead 1956).

FOOD HABITS: Small- to medium-sized mammals comprise 90 percent of diet, small birds 5 percent, and insects, amphibians, and reptiles 5 percent. Food captured on the ground, during evening and nighttime hours, by low, rapid flight from perch to ground.

OTHER:

REFERENCES: Craighead and Craighead 1956, Karalus and Eckert 1974, Marti 1974.





Pygmy Owl

B066 (*Glaucidium gnoma*)

STATUS: No official listed status. Fairly common resident; some movement in fall in response to adverse weather.

DISTRIBUTION/HABITAT: Breeds in all timbered types from blue oak savannah up to mixed-conifer forests; prefers sites with low to intermediate canopy coverage. Scarce above 6000 ft (1800 m). Most common near edges of meadows, lakeshores, and other clearings.

SPECIAL HABITAT REQUIREMENTS: Nest cavities.

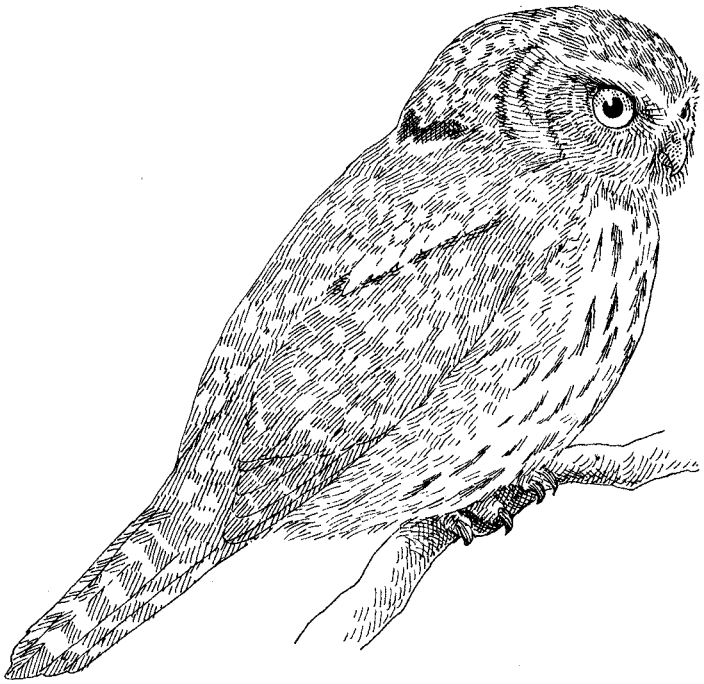
BREEDING: Breeds from early May to late August, with peak from mid-June to mid-July. Almost always nests in abandoned woodpecker hole, from 6 to 75 ft (1.8 to 23 m) up, with average nest height of 40 ft (12 m). Clutch size from 2 to 7 , most sets 3 or 4.

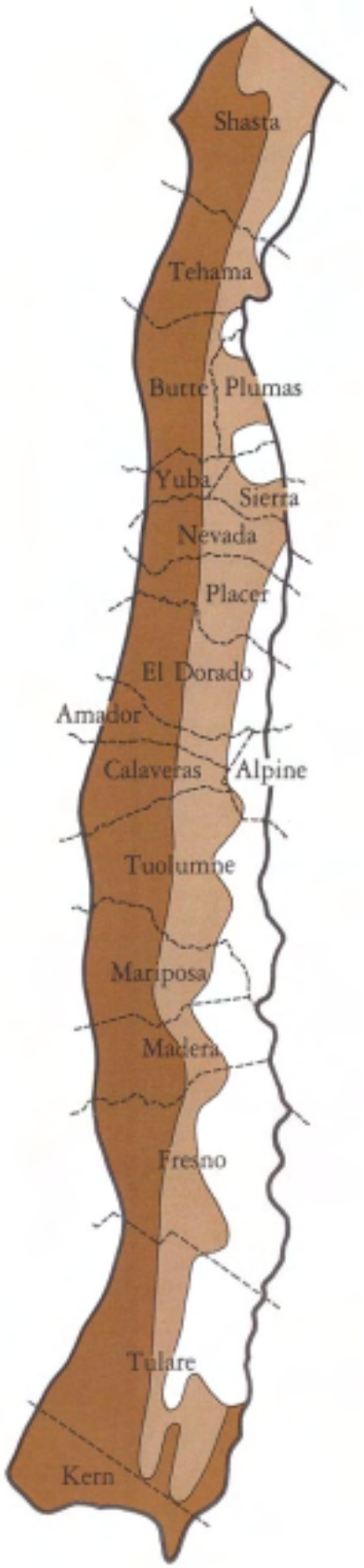
TERRITORY/HOME RANGE: No information, though Marshall (1957) refers to "immense territories" and reports following one bird in the same direction for 0.75 mi (1.2 km).

FOOD HABITS: Eats mainly small mammals, small birds, lizards, and insects. Captures prey on ground by search and pounce methods, though some aerial hawking of insects also occurs.

OTHER:

REFERENCES: Earhart and Johnson 1970, Karalus and Eckert 1974.





Burrowing Owl

B067 (*Athene cunicularia*)

STATUS: No official listed status; on the Audubon Society Blue List for 1978. Fairly common resident, considered somewhat reduced in numbers recently because of destruction of ground squirrel colonies.

DISTRIBUTION/HABITAT: Restricted to areas of grasses, forbs, and early shrub stages from annual grasslands up to ponderosa pine type. Breeds in all habitats but prefers lower elevation types. Found as high as 5300 ft (1610 m) in Lassen County.

SPECIAL HABITAT REQUIREMENTS: Ground burrows.

BREEDING: Breeds from early March to late August, with peak from mid-April to mid-May. Nests generally located in bare, level ground in abandoned rodent burrows. Collins and Landry (1977) described a successful method of constructing artificial nesting burrows. Also digs own burrows if necessary. Clutch size from 6 to 11, with mean of 8.

TERRITORY/HOME RANGE: No information on territories, but home ranges at the Oakland Municipal Airport ranged from 0.1 to 4 acres (0.04 to 1.6 ha), averaging 2 acres (0.8 ha) (Thomsen 1971).

FOOD HABITS: Eats mostly insects, but small birds and mammals also eaten. Captures prey in air and on ground. Hunts in the evening and night. Searches and pounces, hover-dives, and also pursues prey on ground by hopping.

OTHER: Probably the most gregarious owl in North America.

REFERENCES: Coulombe 1971, Karalus and Eckert 1974, Zarn 1974.





Spotted Owl

B068 (*Strix occidentalis*)

STATUS: No official listed status. Fairly common permanent resident in suitable habitat, with some seasonal movement downslope and upslope.

DISTRIBUTION/HABITAT: Breeds from ponderosa pine type upslope to lower elevation red fir forests (not above 7600 ft [2300 m]). Mixed conifer the optimum forest type on west slopes of the Sierra Nevada. Black oak in forest canopy enhances habitat suitability (G. Gould, pers. commun.). Stands of large trees, typically with some understory trees combining to give much shade, considered important in breeding sites. Most or all records in pole to medium-sized trees are of young or other nonbreeding birds (N. Johnson, pers. commun.). In Oregon, Forsman *et al.* (1977) reported density about 12 times greater in old-growth forests than in second-growth forests.

SPECIAL HABITAT REQUIREMENTS: Water probably needed; large trees.

BREEDING: Breeds from early March to late June, with peak from mid-April to mid-June. Nests in tree hollows or occasionally on cliffs and abandoned raptor nests. Nests range in height from 30 to 50 ft (9.1 to 15 m). Clutch size from 1 to 4, with mean of 2.

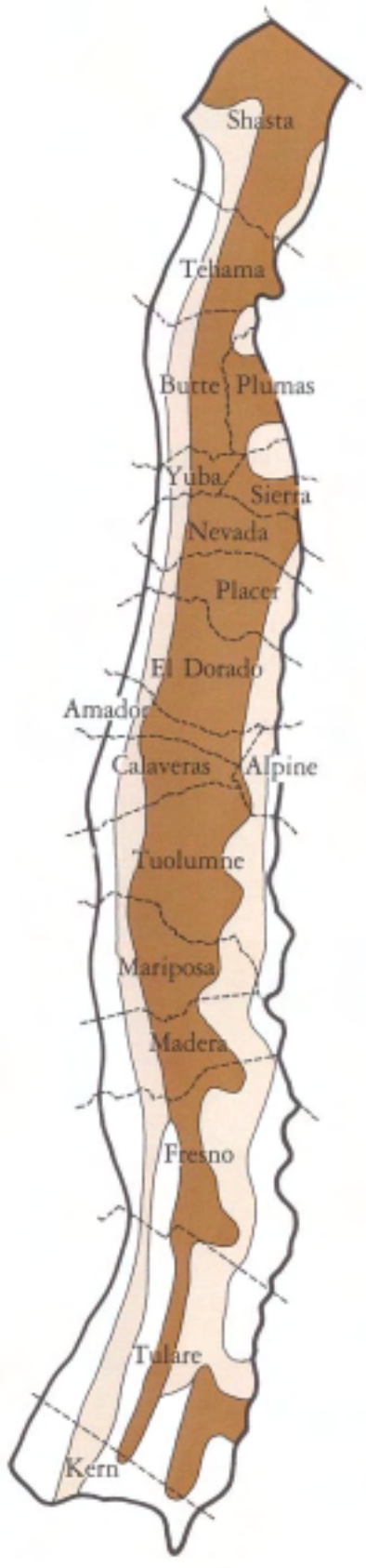
TERRITORY/HOME RANGE: According to Gould (1974), territory size in conifer forests in the Sierra Nevada ranges from 100 to 340 acres (40 to 138 ha), with mean of 230 acres (93 ha), and home range size varies from 300 to 600 acres (121 to 242 ha), with mean of 450 acres (182 ha). In Oregon, Forsman (pers. commun.) found home ranges from 2270 to 3400 acres (920 to 1375 ha), with mean of 2910 acres (1177 ha), on the basis of 8 birds with radio transmitters. Adjacent birds overlapped 3 to 25 percent (mean 12 percent) in home ranges; members of pairs overlapped about 66 percent.

FOOD HABITS: Eats primarily small mammals, large insects, and small birds. Captures most of prey by search and pounce methods in forest canopy. Fully nocturnal.

OTHER: Until recently, considered rare throughout range. A study by Gould (1974), however, revealed fairly common in dense, coniferous forests at mid-elevations. Because of their solitary, nocturnal habits, rarely seen.

REFERENCES: Marshall 1942, Gould 1974, Jackman and Scott 1975, Forsman *et al.* 1977.





Great Gray Owl

B069 (*Strix nebulosa*)

STATUS: No official listed status, though probably rarest of all owls in the western Sierra Nevada. A rare and localized resident; exhibits some upslope movement in late summer and fall.

DISTRIBUTION/HABITAT: Breeds in mixed-conifer and red fir forests; prefers dense stands bordering meadows. Found in lodgepole pine forests in late summer and fall and in ponderosa pine forests in fall and winter.

Note: Range map shows breeding and nonbreeding distributions over considerable extent of the western Sierra Nevada, although no confirmed record of breeding outside Yosemite National Park. Ranges given based on occurrence of suitable habitat, where presence seems likely.

SPECIAL HABITAT REQUIREMENTS: Trees/grass-forbs.

BREEDING: Breeds from late Feburary to mid-June, with peak from mid-April to late May. Nests in abandoned goshawk or red-tailed hawk nest in dense conifer or deciduous tree, or on top of large broken snag, from 50 to 100 ft (15 to 30 m) above ground. Clutch size 1 to 5, with mean of 3.

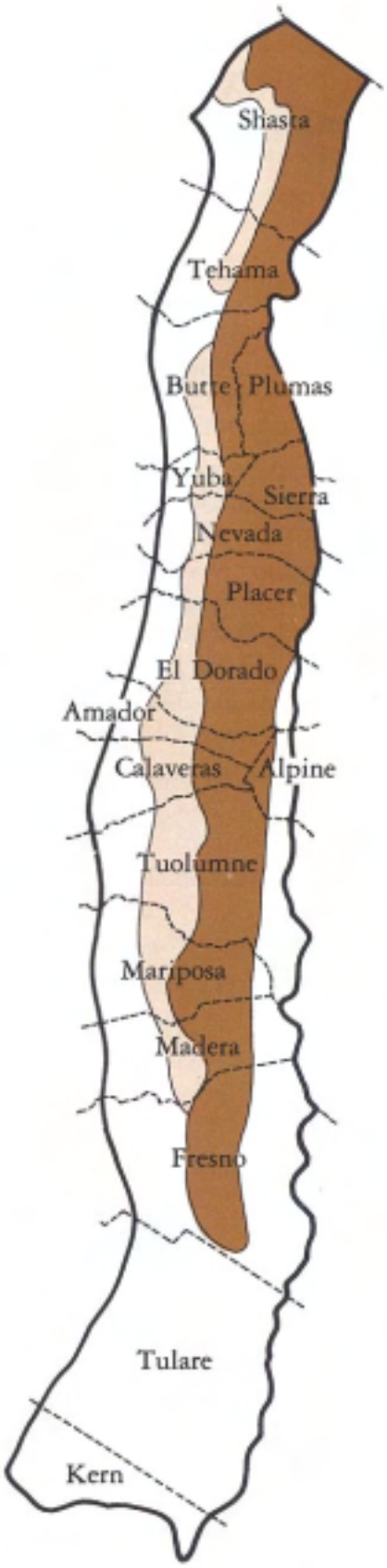
TERRITORY/HOME RANGE: In Quebec, Brenton and Pittaway (1971) reported mean territory size of 112 acres (45 ha) in coniferous forest. In Wyoming, Craighead and Craighead (1956) reported variation in home range size from 640 to 1000 acres (259 to 405 ha) in coniferous forests.

FOOD HABITS: Eats primarily medium-sized mammals and some birds (to grouse size). Captures prey most often in meadows, on the ground, but occasionally in shrubs. Searches and pounces, and sometimes hovers, in capturing prey.

OTHER: May be more common than number of records indicate. Should be sought in the central and northern Sierra Nevada in suitable habitat.

REFERENCES: Brenton and Pittaway 1971, Karalus and Eckert 1974, Jackman and Scott 1975.





Long-eared Owl

B070 (*Asio otus*)

STATUS: No official listed status. Fairly common resident in riparian habitats; some westward movement in fall.

DISTRIBUTION/HABITAT: Breeds in lower elevation habitats from blue oak savannah up to ponderosa pine and black oak types. Occurrence in these types depends on presence of nearby riparian habitat.

SPECIAL HABITAT REQUIREMENTS: Trees/grass-forbs; riparian habitat nearby.

BREEDING: Breeds from early March to late June, with peak from early April to late May. Nests in dense foliage, almost invariably in abandoned nest of magpie, crow, hawk, or heron. Nests from 15 to 50 ft (4.6 to 15 m) above ground, usually between 20 to 30 ft (6.1 to 9.1 m) up. Three to 9 eggs per clutch, with mean of 5.

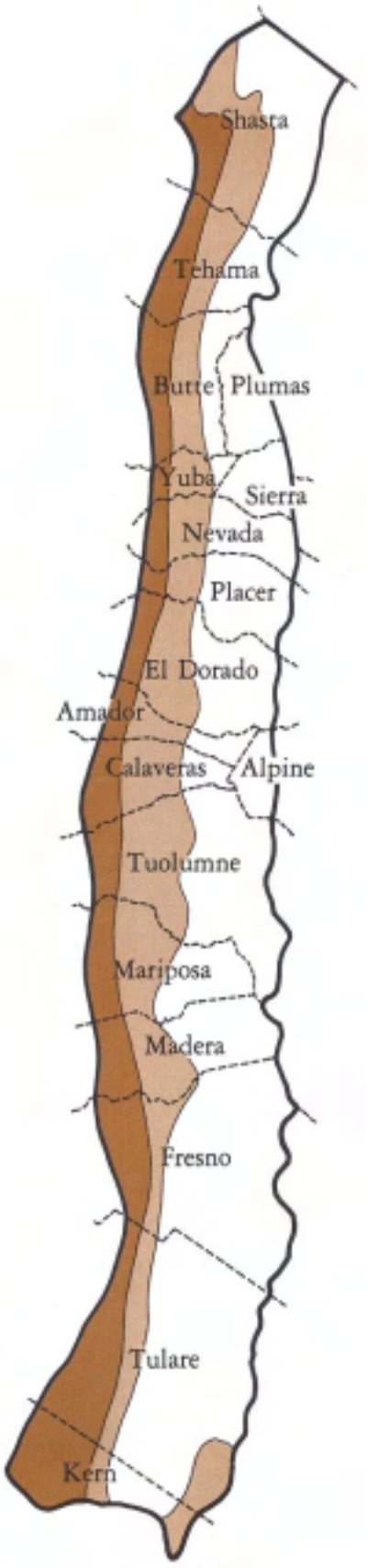
TERRITORY/HOME RANGE: No information available on territory. Near Moose, Wyoming, Craighead and Craighead (1956) reported home ranges from 0.13 to 0.41 m^2 (0.34 to 1.06 km^2), with average of 136 acres (55 ha), in riparian habitat.

FOOD HABITS: Eats mainly rodents but also preys on birds, including screech owls. Captures food on ground and occasionally in thickets and shrubs in riparian woodland. Searches for and pounces on prey, forages in evening and nighttime hours.

OTHER: Recent decline in numbers because of extensive destruction of riparian habitat and groves of live oaks. Has become highly localized in the Sierra Nevada.

REFERENCES: Randal and Austing 1952, Karalus and Eckert 1974, Marti 1974.





Short-eared Owl

B071 (*Asio flammeus)*

STATUS: No official listed status; on the Audubon Society Blue List for 1978. Small resident population in the western Sierra Nevada; in winter, a large migrant population moves into low elevation grasslands.

DISTRIBUTION/HABITAT: Nests in annual grasslands below about 2000 ft (610 m). During nonbreeding period, may be found in blue oak savannah, digger pine/oak woodlands, and early seral stages of chaparral. Prefers sites with few or no trees.

SPECIAL HABITAT REQUIREMENTS: Annual grassland or marsh.

BREEDING: Breeds from late March to early July, with peak from late April to late May. Nests on ground, in a slight depression, or rarely in underground burrows. Clutch size 4 to 14, with 5 to 7 most frequent.

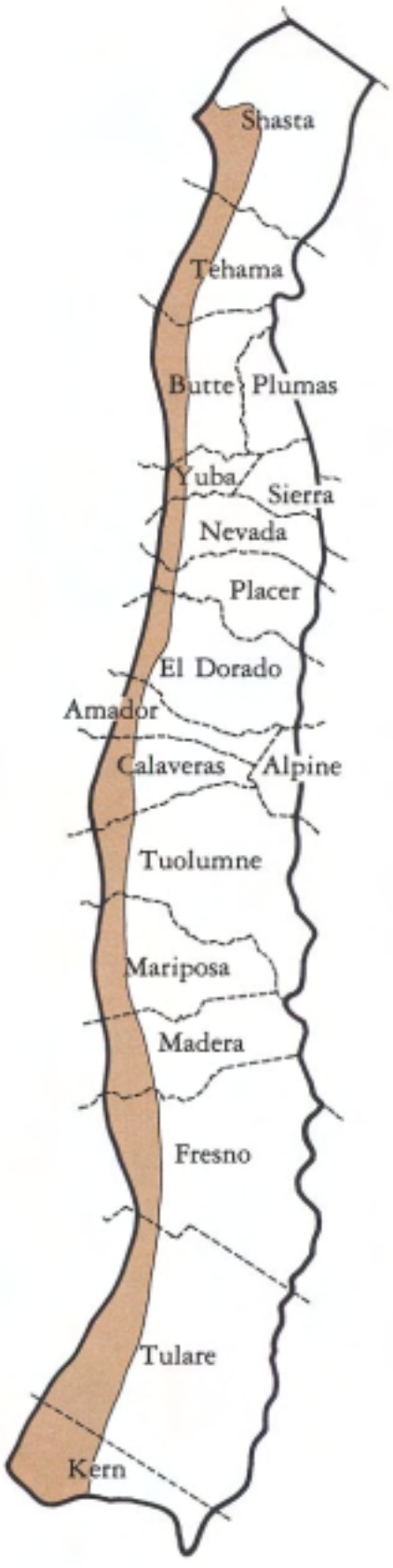
TERRITORY/HOME RANGE: In Manitoba's marsh-prairie, breeding territories in 1969 averaged 183 acres (74 ha), with range from 57 to 242 acres (23 to 98 ha) (n= 5); a single territory in 1968 occupied 300 acres (121 ha) (Clark 1975). In Alaska, Pitelka et al. (1955) reported breeding territories of "about 50 acres" (20 ha). In European populations, reports of annual variations in mean territory size range from 44 to 339 acres (18 to 137 ha) (Lockie 1955). Extreme differences in mean territory size related to prey density: denser prey apparently attracted more owls, so territories decreased in size. No data available on home range.

FOOD HABITS: Eats voles, reptiles, and (rarely) amphibians; takes song-birds during nesting season. Captures prey on ground. Searches and pounces over meadows and marshes during daylight and evening hours.

OTHER: Most suitable habitat in the Sierra Nevada destroyed by grazing by sheep, water diversion, and recreational development. Habitat in Central Valley reduced significantly by cultivation and marsh drainage. Although largely restricted to low elevations, altitudinal vargrants seen up to 11,000 ft (3350 m) in Yosemite National Park.

REFERENCES: Karalus and Eckert 1974, Clark 1975, Murray 1976.





Saw-whet Owl

B072 (*Aegolius acadicus*)

STATUS: No official listed status. Poorly known species; considered resident in suitable habitat; possibly some altitudinal movement in response to adverse weather conditions.

DISTRIBUTION/HABITAT: Breeds in mid-elevation habitats from digger pine-oak type up to the red fir zone. Prefers stands of intermediate canopy coverage.

SPECIAL HABITAT REQUIREMENTS: Trees/grass-forbs; nest cavities.

BREEDING: Breeds from early March to late August, with peak from mid-May to mid-June. Nests usually in abandoned flicker nest cavity, from 5 to 25 ft (1.5 to 7.6 m) up. Clutch size from 3 to 7, with mean of 5.

TERRITORY/HOME RANGE: In a cedar swamp in Minnesota, Forbes and Warner (1947) found home range size of a single, radio-tagged bird in winter was 281 acres (114 ha); 76 acres (31 ha) of that seldom used. Bird's movements tracked for 20-day period.

FOOD HABITS: Eats small mammals and birds, reptiles, amphibians, and large insects. Captures prey usually on ground, rarely in air. Searches and pounces, typically at night, but sometimes in evening. Also does some aerial flycatching.

OTHER: Records geographically and chronologically scattered; therefore, difficult to generalize about distribution and abundance. A tame owl, allowing close approach, rarely flushed by observer, and usually overlooked.

REFERENCES: Mumford and Zusi 1958, Forbes and Warner 1974, Karalus and Eckert 1974.





Poor-will

B073 (*Phalaenoptilus nuttallii*)

STATUS: No official listed status. Fairly common summer visitor to low and middle elevations; rare at higher elevations in late summer and early fall.

DISTRIBUTION/HABITAT: Breeds from digger pine-oak woodlands up to Jeffrey pine forests, especially in open habitats as represented by early seral stages.

SPECIAL HABITAT REQUIREMENTS: Trees/shrubs; rock outcrops or logs for nesting cover.

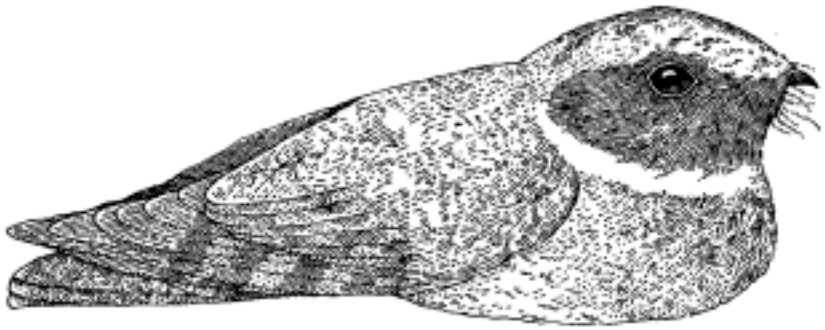
BREEDING: Breeds from mid-March to early August, with peak from early May to late June. Nests on ground, usually in scrape matted with pine needles, typically next to a log and concealed by shrubs or rock outcropping. Requires clear, wide-angle view from nest. Typically, 2 eggs per clutch.

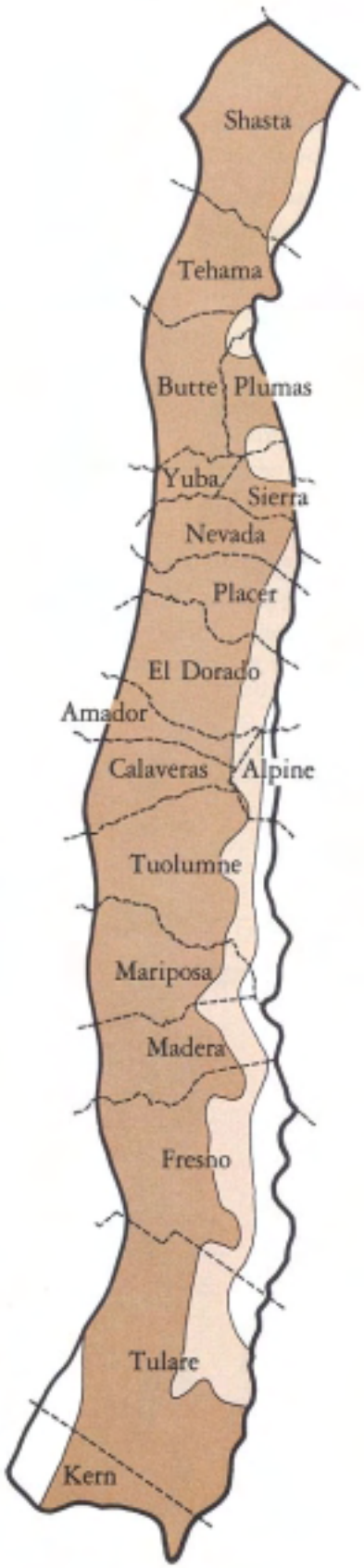
TERRITORY/HOME RANGE: No information available.

FOOD HABITS: Insects make up entire diet; captures mostly in air by making short, vertical, hawking flights from ground. Captures some insects on ground.

OTHER: Nocturnal; sometimes enters state of torpor.

REFERENCES: Aldrich 1935, Bent 1940, Grinnell and Miller 1944.





Common Nighthawk

B074 (*Chordeiles minor*)

STATUS: No official listed status. Uncommon spring migrant and summer visitor to middle and high elevations.

DISTRIBUTION/HABITAT: Breeds from chaparral zone up to lodgepole pine forests; prefers open sites, as in early seral stages. Rare nesting records to as high as 11,000 ft (3350 m).

SPECIAL HABITAT REQUIREMENTS: Open terrain for feeding.

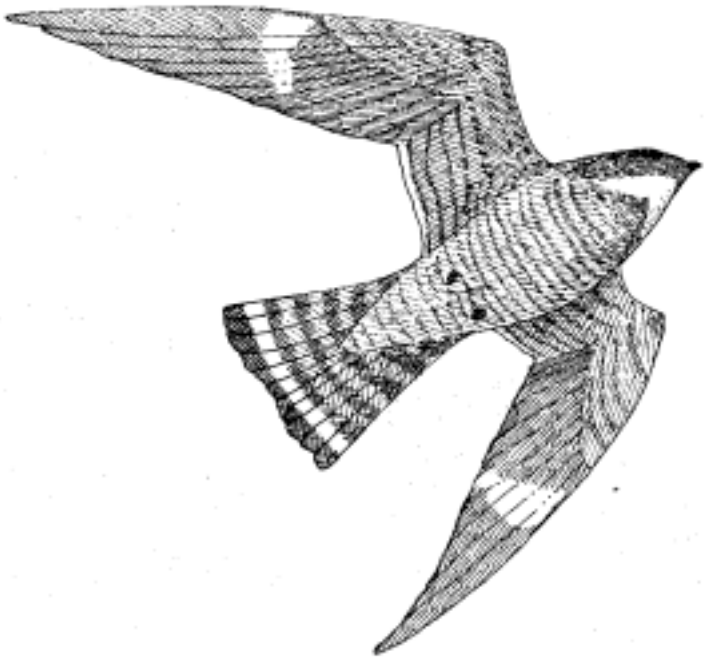
BREEDING: Breeds from mid-March to late July, with peak from mid-June to late July. Nests on ground in open, gravelly or sandy areas unobstructed by tall shrubs or trees, as in forest burns, agricultural fields, creekbeds, or gravelled rooftops. Clutch typically contains 2 eggs.

TERRITORY/HOME RANGE: In Kansas, Fitch (1958) reported a home range at least 0.5 mi (0.8 km) in diameter. In Michigan, mean territory size reported by Armstrong (1965) as 26 acres (10.5 ha), with range from 10.3 to 57 acres (4.2 to 23.1 ha).

FOOD HABITS: Feeds primarily on flying insects captured by swooping through swarms of insects with mouth open wide. Some vegetable matter eaten. Forages low over ground, generally beginning at dusk and continuing into dark. Most foraging done over the territory.

OTHER:

REFERENCES: Grinnell and Miller 1944, Selander 1954, Caccamise 1974.





Black Swift

B075 (*Cypseloides niger*)

STATUS: No official listed status. Uncommon summer resident and spring migrant.

DISTRIBUTION/HABITAT: Breeds from ponderosa pine and black oak woodland types up to Jeffrey pine forest. Successional stage unimportant, providing moist cliff faces available. In spring and summer, forages over lowlands at least as far downslope as blue oak savannahs.

SPECIAL HABITAT REQUIREMENTS: Cliffs for nesting.

BREEDING: Breeds from early June to late August, with peak from late June to early August. Nests in crevice on sheer, high, moist cliff, often behind waterfall, or hit by spray. Clutch always contains only 1 egg. Nests in small, widely scattered colonies of about 5 to 15 pairs.

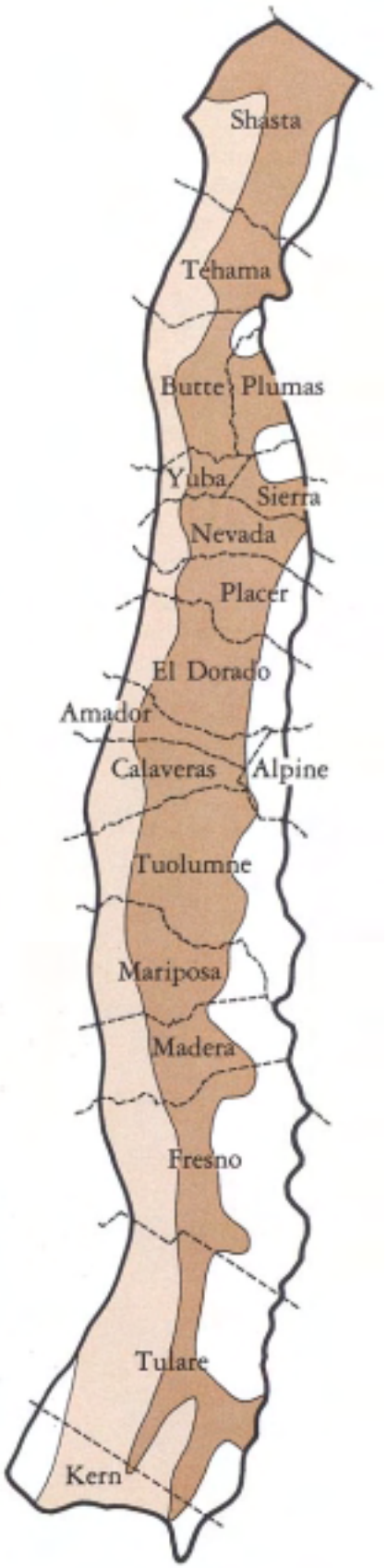
TERRITORY/HOME RANGE: Home range large (Grinnell and Miller 1944), though precise data on size lacking. No data on territory size; territory confined to area immediately surrounding nest site.

FOOD HABITS: Feeds exclusively on flying insects captured usually high in air during sustained, long-distance foraging flights over all types of terrain.

OTHER:

REFERENCES: Bent 1940, Knorr 1961, Hunter and Baldwin 1962.





Vaux's Swift

B076 (*Chaetura vauxi*)

STATUS: No official listed status. Uncommon migrant and summer resident; only one confirmed breeding record for the Sierra Nevada, but probably breeds regularly in small numbers.

DISTRIBUTION/HABITAT: Breeds in areas with large trees in ponderosa pine, mixed-conifer, and Jeffrey pine forests, and possibly in black oak woodlands. Forages regularly downslope to digger pine-oak woodlands.

SPECIAL HABITAT REQUIREMENTS: Hollow stubs or snags for nesting.

BREEDING: Breeds from early May to early August, with peak from mid-June to late July. Nests usually in tall, hollow, dead stub, frequently one burned out. Nests usually within 1.6 ft (0.5 m) of bottom of cavity and attached to vertical surface. Nest height ranges from below ground level to at least 40 ft (12 m). Clutch size from 3 to 7, with mean of about 5.

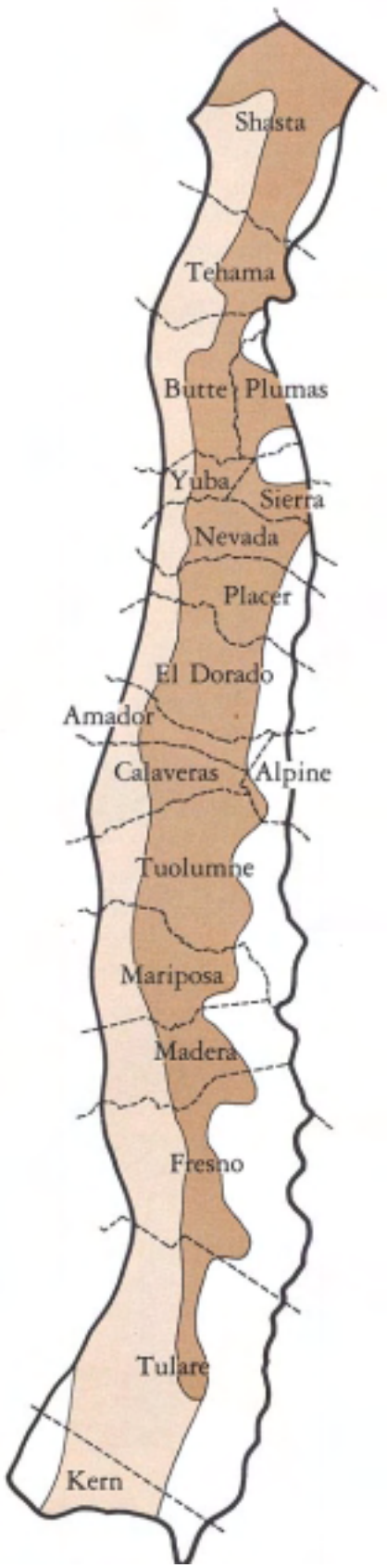
TERRITORY/HOME RANGE: No data on either, though likely the only defended area would be immediate vicinity of nest.

FOOD HABITS: Feeds exclusively on flying insects captured in mid-air in forest openings, especially over lakeshores and streams. Forages in extended, continuous flights, cruising back and forth through swarms of insects.

OTHER: Forest fires may be crucial source of suitable nest sites.

REFERENCES: Bent 1940, Baldwin and Hunter 1963, Baldwin and Zaczkowski 1963.





White-throated Swift

B077 (*Aeronautes saxatalis*)

STATUS: No official listed status. Abundant spring migrant and summer resident, expecially from Yosemite National Park southward.

DISTRIBUTION/HABITAT: Breeds from annual grasslands on up through all habitat types to as high as Jeffrey pine zone, and regularly forages up to lodgepole pine forests.

SPECIAL HABITAT REQUIREMENTS: Cliffs for nesting.

BREEDING: Breeds from early May to mid-August, with peak from late May to late July. Nests in deep crevice in steep, rocky cliff face, from 10 to 200 ft (3.1 to 61 m) or more above base of cliff. Clutch contains from 3 to 6 eggs, with mode of 4.

TERRITORY/HOME RANGE: No data on territory. Home range extremely large (Grinnell and Miller 1944).

FOOD HABITS: Eats flying insects captured over any terrain by flying swiftly back and forth through swarms of insects, usually high above ground.

OTHER:

REFERENCES: Bent 1940, Grinnell and Miller 1944, Bartholomew *et al.* 1957.





Black-chinned Hummingbird

B078 (*Archilochus alexandri*)

STATUS: No official listed status. Fairly common spring and summer visitor to low and middle elevations; rare at high elevations after breeding season (T. Manolis, pers. commun.).

DISTRIBUTION/HABITAT: Breeds in blue oak savannahs, digger pine-oak woodlands, and low elevation riparian deciduous habitats; prefers sites with low percentage canopy coverage. Some upslope movement in late summer to as high as the red fir zone.

SPECIAL HABITAT REQUIREMENTS: Nectar source; water.

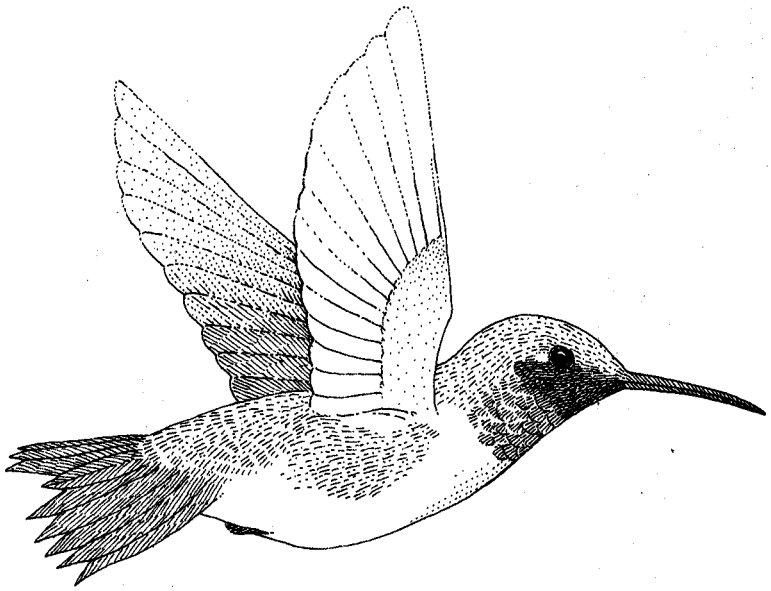
BREEDING: Breeds from early April to late July, with peak from mid-May to late July. Nests in foliage of small trees or shrubs near creeks or springs; prefers live oaks. Nest height from 3 to 30 ft (0 .9 to 9.1 m). Typically 2 eggs per clutch.

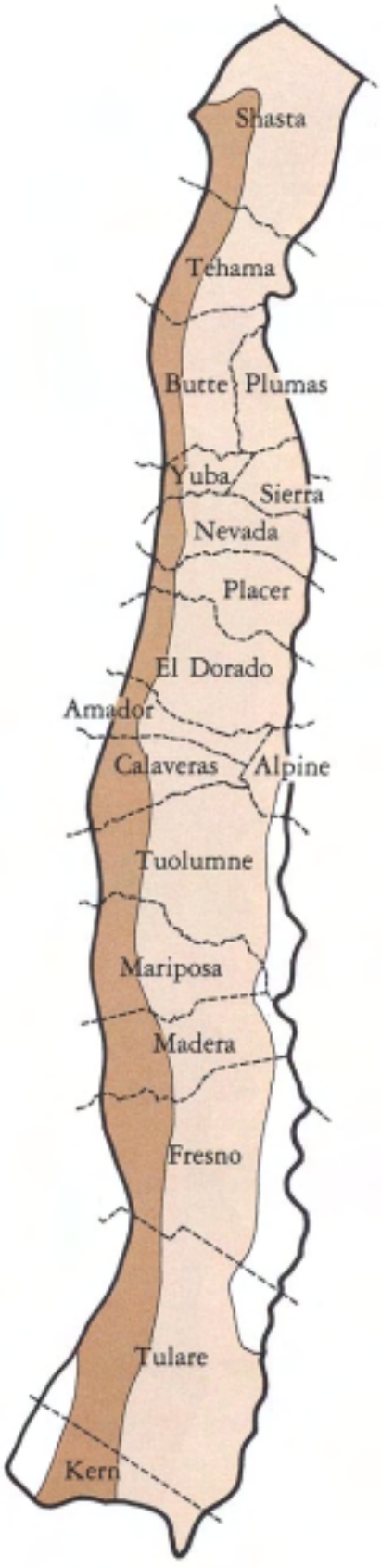
TERRITORY/HOME RANGE: No data on home range. In the Santa Monica Mountains, Stiles (1973) reported a range in defended area around nest from 50 to 100 ft (15 to 30 m) in diameter.

FOOD HABITS: Eats insects and nectar, from wide variety of flower sources. Probes flowers for nectar while hovering, gleans insects from foliage, and hawks for flying insects.

OTHER:

REFERENCES: Bent 1940, Grinnell and Miller 1944, Stiles 1973.





Anna's Hummingbird

B079 (*Calypte anna*)

STATUS: No official listed status. Common resident in suitable habitat.

DISTRIBUTION/HABITAT: Breeds from oak savannahs up to ponderosa pine and black oak woodland zone; prefers timbered sites with low percent canopy cover. In spring and summer, observed as high as the Jeffrey pine forests.

SPECIAL HABITAT REQUIREMENTS: Nectar source; small, medium, or large openings; water.

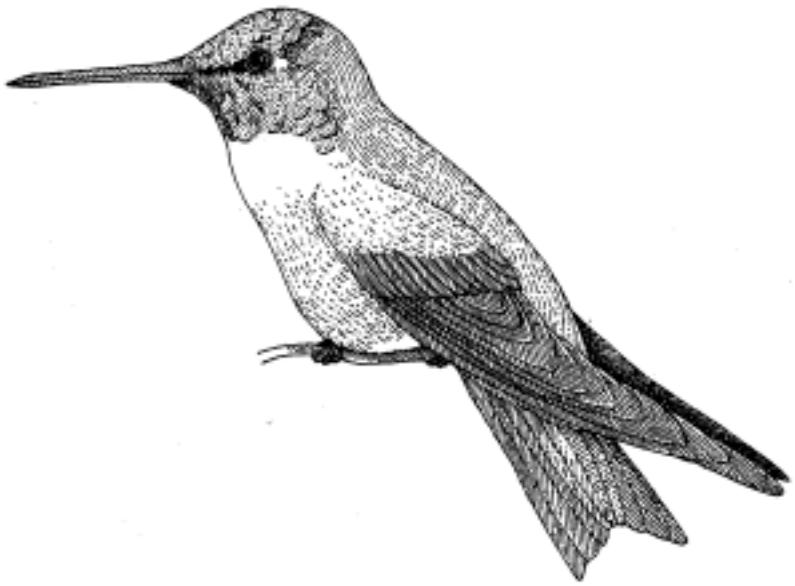
BREEDING: Breeds from mid-December to mid-June, with peak from mid-February to mid-May. Possibly three broods per season (Pitelka 1951b). Nests in trees or shrubs, from 5 to 30 ft (1.5 to 9.1 m) up. Typically, 2 eggs per clutch.

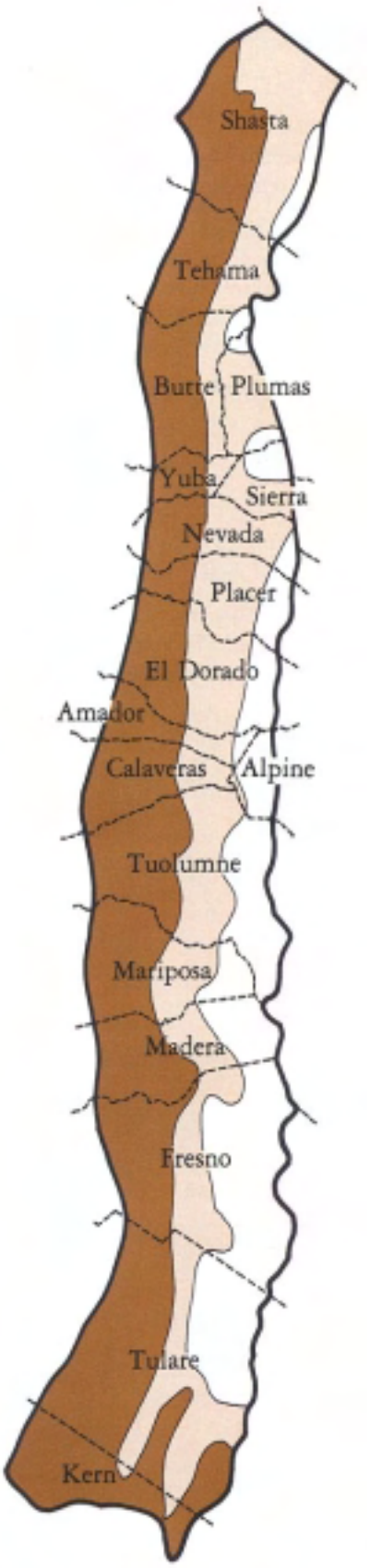
TERRITORY/HOME RANGE: No data on home range size. Size of territory, and vigor with which defended, vary with season and physiological state of male. Feeding territories defended in nonbreeding period, generally including several plants capable of supporting one bird for 1 day (Stiles 1973). During breeding season, most males establish large, actively defended territories (Williamson 1956). Average territory size 0.3 acre (0.1 ha) (Stiles 1973).

FOOD HABITS: Eats nectar from wide variety of flowers, especially *Ribes* spp.; also takes pollen and minute insects and spiders. Probes flowers while hovering, picks insects and spiders from flowers and foliage, and hawks aerial insects.

OTHER:

REFERENCES: Grinnell and Miller 1944, Pitelka 1951b, Stiles 1973.





Allen's Hummingbird

B080 (*Selasphorus Basin*)

STATUS: No official listed status. On basis of specimen records, an extremely rare late summer migrant; actual status unknown, but possibly regular at all elevations in fall (Gaines 1977).

DISTRIBUTION/HABITAT: Knowledge of distribution and abundance sketchy because cannot be distinguished from rufous hummingbird in most plumages (see comments below, under "OTHER"). Less common in the Sierra Nevada than rufous hummer (Gaines 1977). Found in open sites from digger pine-oak woodlands up to alpine meadows during summer months.

SPECIAL HABITAT REQUIREMENTS: Nectar source.

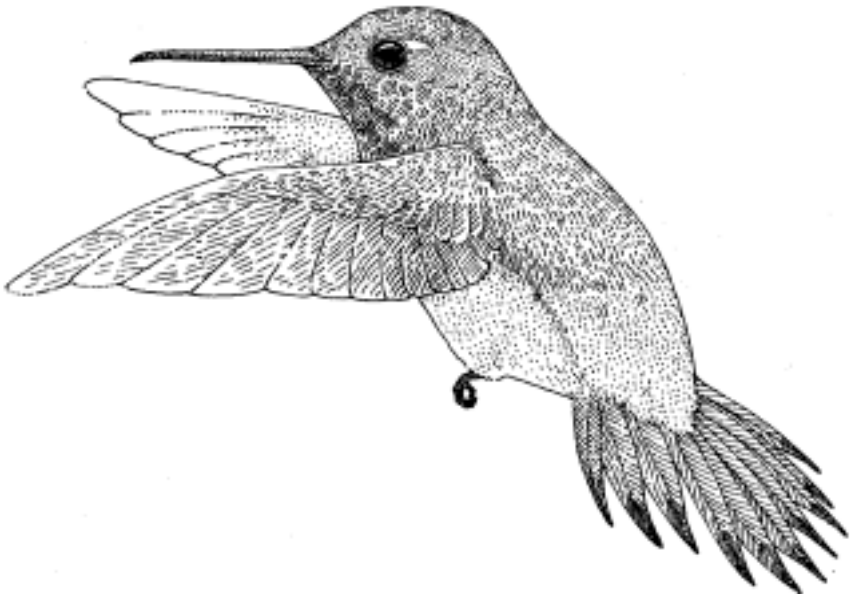
BREEDING: Nonbreeder in the Sierra Nevada.

TERRITORY/HOME RANGE: No data on home range or territory sizes.

FOOD HABITS: Eats nectar from wide variety of flowers, also eats some insects. Probes flowers while hovering, gleans insects from flowers and foliage, and hawks for aerial insects.

OTHER: Adult males distinguished from adult male rufous hummingbirds by all-green back; back of male rufous hummer mostly rufous, perhaps with some green feathers (Stiles 1972).

REFERENCES: Bent 1940, Grinnell and Miller 1944, Pitelka 1951b.





Rufous Hummingbird

B081 (*Selasphorus rufus*)

STATUS: No official listed status. Common spring transient at low elevations; fall transient at middle and high elevations.

DISTRIBUTION/HABITAT: During spring migration, found in grass/forb, shrub, and sparsely timbered areas from annual grasslands up to ponderosa pine and black oak woodland zone. Southward migrants tend to be higher, even up into alpine meadows.

SPECIAL HABITAT REQUIREMENTS: Nectar Source.

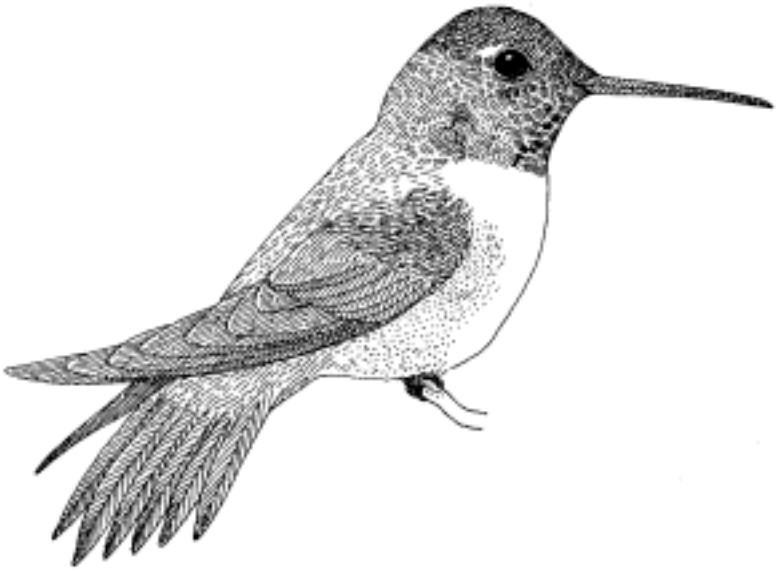
BREEDING: Does not breed in the western Sierra Nevada, although early literature suggests it does. Confusion because spring migration generally continues until May; males begin return southward migration as early as June, because they do not assist with raising young in northern breeding grounds.

TERRITORY/HOME RANGE: Defends feeding territories, but unknown whether or not they do so while migrating through the Sierra Nevada. In Yellowstone National Park, five feeding territories actively defended in area about 20 by 50 ft (6.1 by 15 m) (Armitage 1955).

FOOD HABITS: Eats nectar from wide variety of flowers, especially *Ribes* spp.; also takes some insects. Probes flowers while hovering, gleans insects from flowers and foliage, and hawks aerial insects.

OTHER:

REFERENCES: Grinnell and Storer 1924, Bent 1940, Grinnell and Miller 1944.





Calliope Hummingbird

B082 (*Stellula calliope*)

STATUS: No official listed status. Uncommon spring migrant and summer resident.

DISTRIBUTION/HABITAT: Breeds from ponderosa pine and black oak woodland zone up to lodgepole pine forests. Prefers timbered stands with low to intermediate percent canopy cover, near water. In spring, migrates through lower elevations as low as digger pine-oak type.

SPECIAL HABITAT REQUIREMENTS: Nectar source; water.

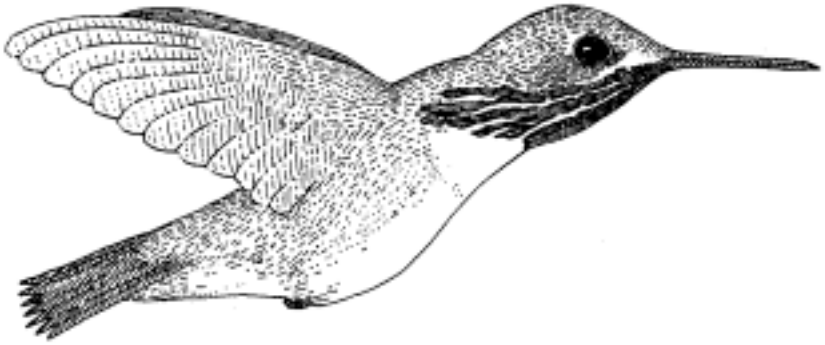
BREEDING: Breeds from early May to late July, with peak from early June to early July. Nesting generally coincides with blooming of wild currant. Nests almost always in a lodgepole pine or aspen, immediately beneath live branches, and typically in riparian area. Nest height ranges from 10 to 30 ft (3 to 9 m). Mean clutch size 2.

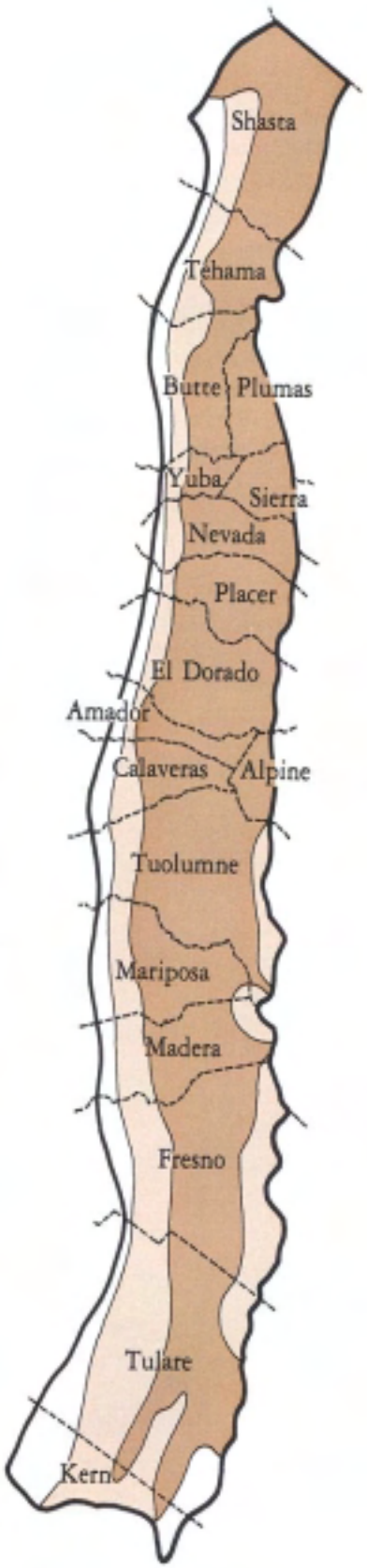
TERRITORY/HOME RANGE: No data on home range. Nesting density in Lassen County, four pairs per 6 acres (2.4 ha) (Grinnell *et al.* 1930). Each male vigorously defends patch of wild currant in early nesting season.

FOOD HABITS: Eats nectar from variety of flowers, including gooseberry, currant and manzanita, by hovering and probing. Also hawks for flying insects.

OTHER: Only hummingbird species that regularly nests at middle and high elevations in western Sierra Nevada.

REFERENCES: Grinnell and Storer 1924, Bent 1940, Calder 1971.





Belted Kingfisher

B083 (*Megaceryle alcyon*)

STATUS: No official listed status. Uncommon resident.

DISTRIBUTION/HABITAT: Found in all vegetation types and successional stages except alpine meadows; breeds from annual grassland zone up to Jeffrey pine forests, but restricted to streamside or lakeside situations. Moves southward and downslope in fall and winter; some move upslope to treeline in late summer and early fall. Most breeding records in the Sierra Nevada from Kings Canyon region northward; most winter records from that region southward.

SPECIAL HABITAT REQUIREMENTS: Earthen bank for nesting; pond, lake, stream, or river for feeding.

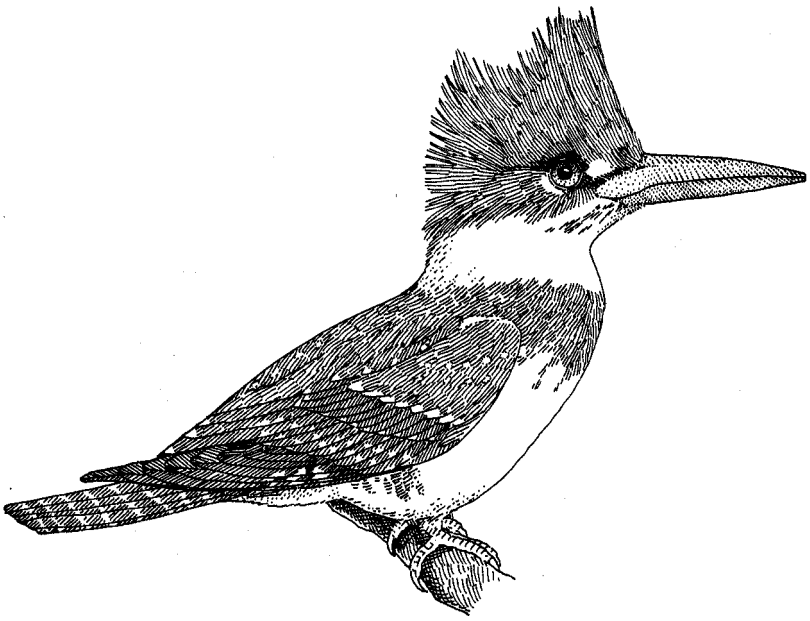
BREEDING: Breeds from early April to early August, with peak from late April to late June. Nests in burrow excavated by birds themselves in sandy or earthen bank, usually by edge of water. Burrow opening usually within 2 ft (0.6 m) of top of bank, and usually more than 5 ft (1.5 m) above water surface. Clutch size from 5 to 11, usually 6 or 7.

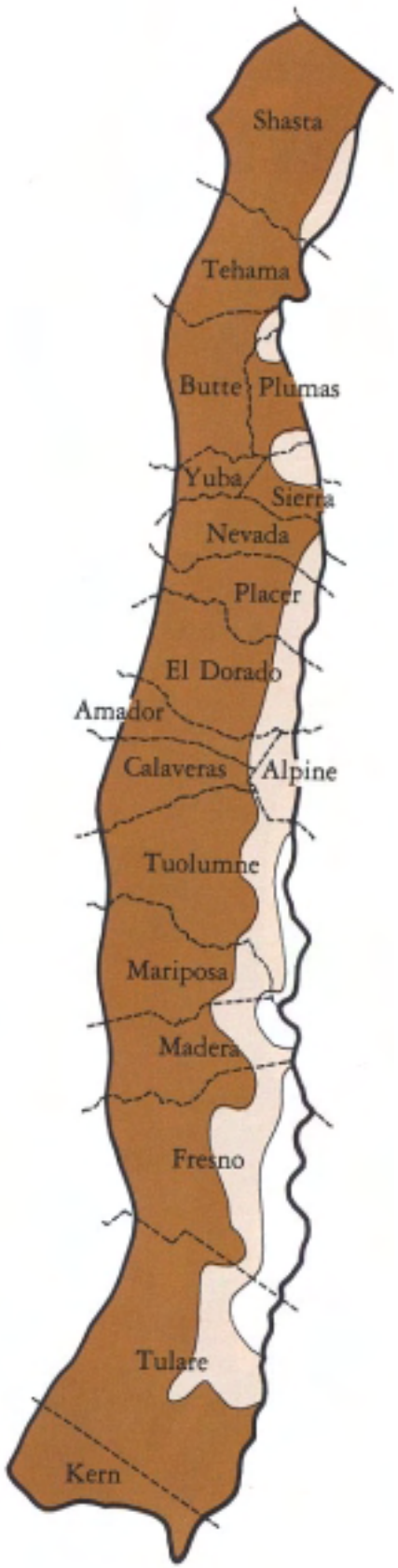
TERRITORY/HOME RANGE: In Michigan, stayed within 0. 5 to 3 mi (0.8 to 4.8 km) of shoreline during breeding season (Salyer and Lagler 1946). In Minnesota, pairs ranged from 2 to 5 mi (3.2 to 8 km) along a stream course (Cornwell 1963).

FOOD HABITS: Adult eats fish and crayfish but feeds young nestlings on insects. Dives from a perch or a hovering position, 20 to 50 ft (6.1 to 15 m) above water surface, capturing prey usually within 2 ft (0.6 m) below water surface. Prefers to hunt in shallow, slow-moving streams or in lakes.

OTHER: Not important predators on trout except at fish hatcheries, where fish can be protected by screens.

REFERENCES: Salyer and Lagler 1946, White 1953, Cornwell 1963.





Common Flicker

B084 (*Colaptes auratus*)

STATUS: No official listed status. Common permanent resident.

DISTRIBUTION/HABITAT: Usually versatile in habitat selection; breeds in all forest types in the western Sierra Nevada. Prefers low stand densities with large, scattered trees. Usually stays below snowline in winter; some may linger high in the mountains.

SPECIAL HABITAT REQUIREMENTS: Snags or trees with soft heartwood.

BREEDING: Breeds from mid-April to late July, with peak activity from late May to late June. Clutch size from 5 to 12, with 6 or 7 most common. As cavity nesters, excavate own cavities in tree trunks with soft wood, whether dead or alive. Occasionally use posts or holes in banks. Height ranges from 0 to 100 ft (0 to 30 m).

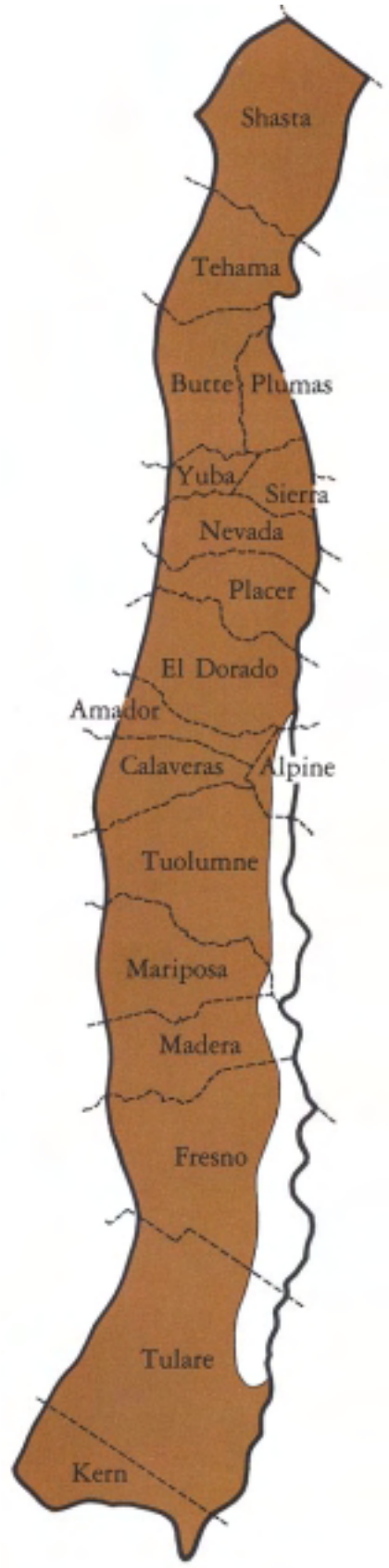
TERRITORY/HOME RANGE: In Ontario, territories averaged 40 acres (16 ha) in mature conifer forest during breeding season (Lawrence 1967). Home range and territory the same; presence of territories in winter not reported in the literature.

FOOD HABITS: Omnivorous, eating ants, seeds, miscellaneous insects, fruits, and berries. Feeds mainly on ground, rarely on bark; digs with bill, and gleans from surfaces.

OTHER: Roosts year-round in hole similar to nest sites.

REFERENCES: Jackman and Scott 1975, Kilham 1959, Lawrence 1967.





Pileated Woodpecker

B085 (*Dryocopus pileatus*)

STATUS: No official listed status, though probably declining as a result of logging of mature forests with snags.

DISTRIBUTION/HABITAT: Generally distributed in conifer forest from ponderosa pine to red fir types; prefers at least 40 percent canopy cover and mature trees. Prefers Douglas-fir, white fir, and, occasionally, red fir over all other conifers.

SPECIAL HABITAT REQUIREMENTS: Large snags; low human disturbance.

BREEDING: Breeds from early March to early July, with peak activity from early May to mid-June. Clutch size 3 or 4 eggs laid in large cavity of dead conifer or large aspen averaging 1.6 ft (0. 5 m) in diameter. Excavates own cavities from 15 to 70 ft (4.6to21m)up.

TERRITORY/HOME RANGE: Territory size not known. In Ithaca, New York, home range, estimated year-round, had radius of 3 to 4 mi (4.8 to 6.4 km) in mixed forest of deciduous and coniferous trees (Hoyt 1957). In conifer forests of northeastern Oregon, ranged over 320 to 600 acres (130 to 243 ha); minimum density of 13 pairs was 1 pair per 1620 acres (656 ha) (Bull and Meslow 1977).

FOOD HABITS: Eats insects, especially carpenter ants; also fruits and nuts. Obtains much food by deep excavation in decaying wood on standing trees or fallen logs, usually within 10 ft (3 m) of the ground.

OTHER: Drills the largest of woodpecker holes; may be sole provider of nest cavities for tree-nesting ducks, such as bufflehead, wood duck, and common merganser. Recommend leaving 90 snags, plus replacement snags, per section (256 ha), all at least 20 in (51 cm) d.b.h. (Bull and Meslow 1977).

REFERENCES: Hoyt 1957, Jackman and Scott 1975, Bull and Meslow 1977.





Acorn Woodpecker

B086 (*Melanerpes formicivorous*)

STATUS: No official listed status. Continued elimination of oaks in California a serious threat to this species' continued presence.

DISTRIBUTION/HABITAT: Strictly confined to stands with oaks, breeds from blue oak savannahs up into black oak woodlands and ponderosa pine forests. Prefers lower elevations and stands with lower tree densities. In fall, may wander upslope into mixed-conifer forests where black oaks occur.

SPECIAL HABITAT REQUIREMENTS: oaks; large trees for acorn storage.

BREEDING: Breeds from early April to late July, with peak from mid-May to late June. Clutch size from 4 to 6, most contain 4 or 5 eggs. Excavates own nest cavity in live or dead oaks, in sycamores, or in dead conifers, from 6 to 70 ft (1.8 to 21 m) up.

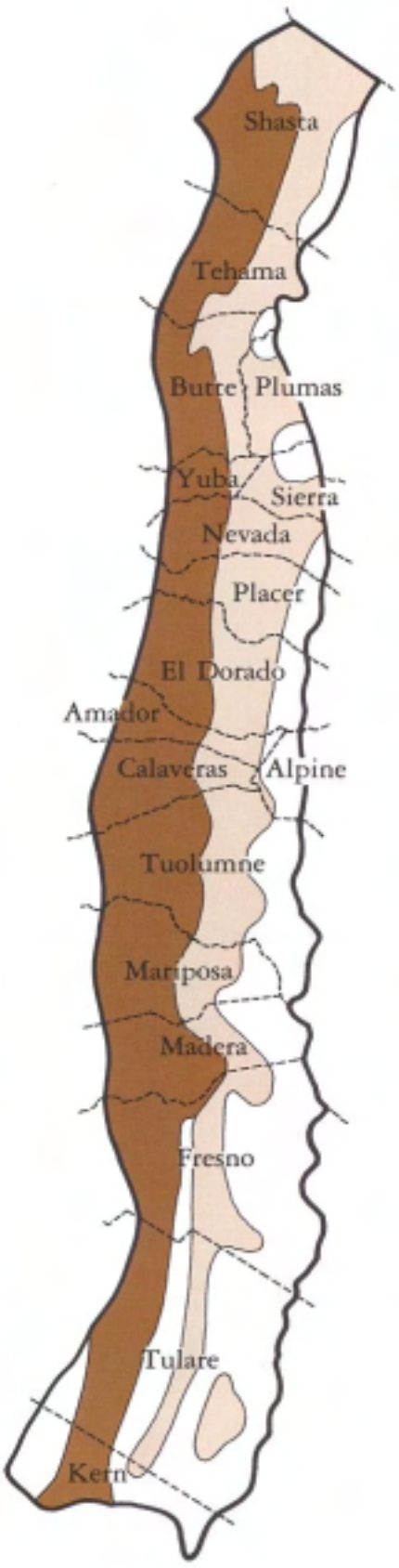
TERRITORY/HOME RANGE: Territory and home range the same. In Monterey County, territory ranged from 9 to 23 acres (3.6 to 9.3 ha) and averaged 15 acres (6.1 ha) (MacRoberts and MacRoberts 1976). In Yolo County, Swearingen (1977) cites Roberts (pers. commun.) as finding territories ranging in size from 3.7 to 19.8 acres (1.5 to 8.0 ha), with mean of 11.4 acres (4.6 ha). In San Mateo County, Swearingen (1977) reported territory sizes from 2.2 to 10.6 acres (0.9 to 4.3 ha), with mean of 5.9 acres (2.4 ha).

FOOD HABITS: Eats mostly acorns, flying insects, and sap. Picks acorns from trees and stores in individual holes drilled in snags, posts, telephone poles, and thick bark of live trees. Hawks for insects and drills holes in live trees to obtain sap.

OTHER: Food storage behavior frequently damages fence posts and telephone poles to the extent they must be replaced. Recommend traditional acorn storage trees and nearby large oaks never be cut.

REFERENCES: MacRoberts 1970, MacRoberts and MacRoberts 1976, Gutierrez and Koenig 1978.





Lewis' Woodpecker

B087 (*Melanerpes lewis*)

STATUS: No official listed status; on the Audubon Society Blue List for 1978. A nonbreeding visitor to the western Sierra Nevada from August to May. Source of visitors uncertain; however, species breeds east of the Sierra Nevada crest, and may migrate across mountains into the western Sierran zone. Some old nesting records exist from southern end of the western Sierra Nevada.

DISTRIBUTION/HABITAT: Found from blue oak savannahs up to Jeffrey pine forests. Prefers stands of low to intermediate density. Opportunistic and of erratic occurrence in any given area. Brushfields optimal habitat, providing scattered live or dead trees available for foraging perches. Favors old burns with tall standing snags or poles above brushfields.

SPECIAL HABITAT REQUIREMENTS: Oaks in fall and winter.

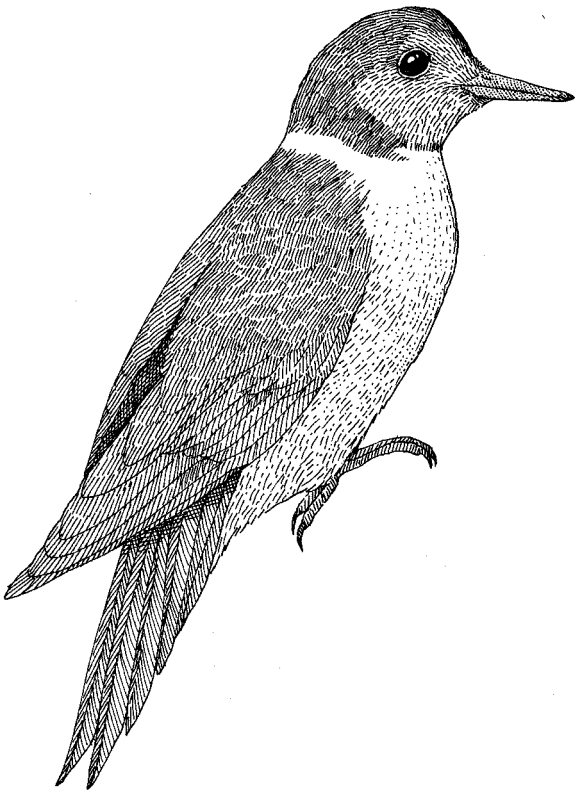
BREEDING: Apparently does not breed in the western Sierra Nevada today (Bock 1970).

TERRITORY/HOME RANGE: Fall and winter territories established in areas with sufficient supply of acorns and insects. Defends only immediate vicinity of acorn storage site.

FOOD HABITS: Eats primarily adult insects; acorns important in winter, also berries and fruit. Picks acorns from trees; hawks for insects, also drops from perch to lower vegetation to capture insects.

OTHER:

REFERENCES: Bock 1970, Jackman and Scott 1975.





Yellow-bellied Sapsucker

B088 (*Sphyrapicus varius*)

STATUS: No official listed status. Common resident on the west slopes of the Sierra Nevada, with pronounced altitudinal migration.

DISTRIBUTION/HABITAT: Breeds in timbered stands of low to intermediate density in ponderosa pine, black oak, riparian deciduous, and mixed-conifer types; strongly prefers to nest in deciduous trees along water courses. In summer, feeds as high up as lodgepole forests; in winter, found as low as blue oak savannahs.

SPECIAL HABITAT REQUIREMENTS: Snags or trees with soft heartwood for cavity excavation.

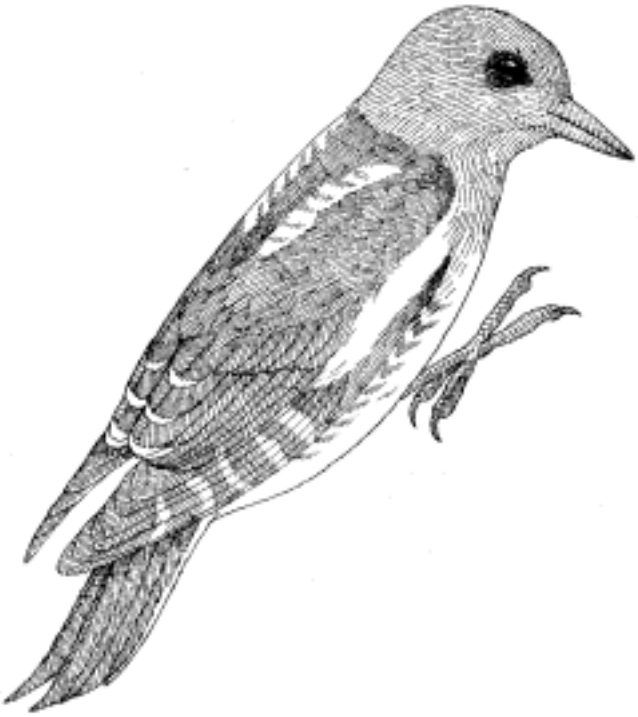
BREEDING: Breeds from early May to late July, with peak from early June to early July. Clutch size from 4 to 6, most contain 4 or 5. Excavates own nest cavity in dead trees or live trees with rotted heartwood, from 15 to 60 ft (4.6 to 18 m) above ground.

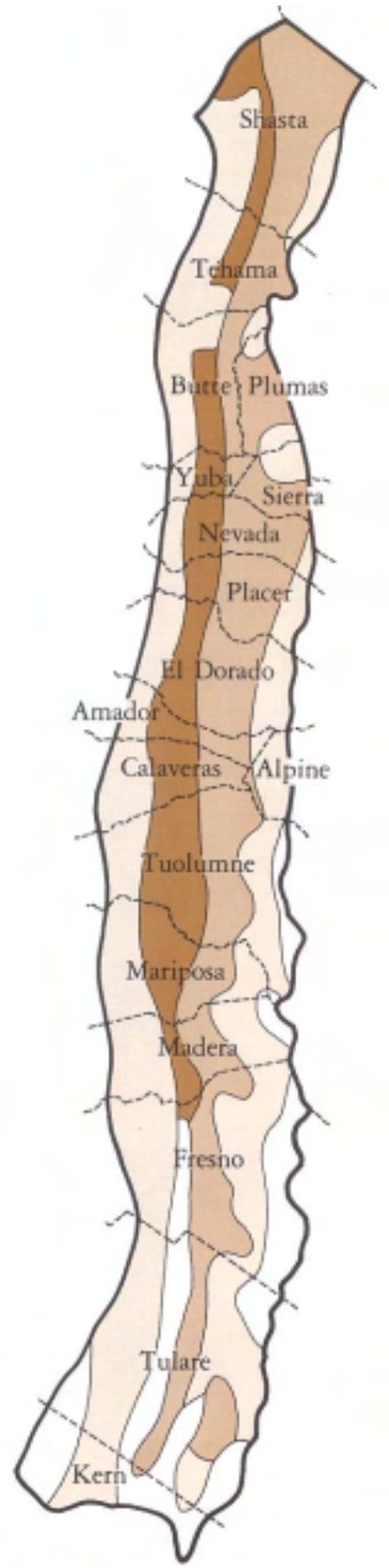
TERRITORY/HOME RANGE: In British Columbia study, Howell (1952) reported range in territory size from 1.6 to 15 acres (0.7 to 6.1 ha). In Ontario, Lawrence (1967) indicated home range and territory the same, averaging 5.3 acres (2.1 ha) in a mature conifer forest (range from 5.1 to 5.4 acres [2.1 to 2.2 ha]).

FOOD HABITS: Eats primarily cambium, soft parts of tree trunks, sap, insects, and fruit; mainly ants during breeding season. Drills for and eats sap; hawks for insects.

OTHER: Classification of this complex undecided, with some ornithologists recognizing three different species. Almost all in the western Sierra Nevada are members of a red-breasted form (*S.v. daggeti*, American Ornithologists' Union 1957), but a form with more red on the head (*S. v. ruber*, American Ornithologists' Union 1957) also occurs.

REFERENCES: Howell 1952, Lawrence 1967, Devillers 1970.





Williamson's Sapsucker

B089 (*Sphyrapicus thyroideus*)

STATUS: No official listed status. Fairly common resident.

DISTRIBUTION/HABITAT: Breeds in Jeffrey pine, red fir, and especially in lodgepole pine forests. Prefers sites with large trees and low to intermediate percent canopy coverage. Winter distribution poorly known; at least part of population moves downslope into ponderosa pine and mixed-conifer forests.

SPECIAL HABITAT REQUIREMENTS: Snags.

BREEDING: Breeds from late April to late July, with peak from late May to mid-July. Nests usually in old lodgepole pine with a dead core; also nests in other conifer types (Granholm, unpubl.). In Colorado, however, most nests found in aspen (Crockett 1975, Crockett and Hadow 1975). Excavates own nest cavity, from 5 to 60 ft (1.5 to 18 m) up. Clutch contains from 3 to 7 eggs, with 5 or 6 most frequent.

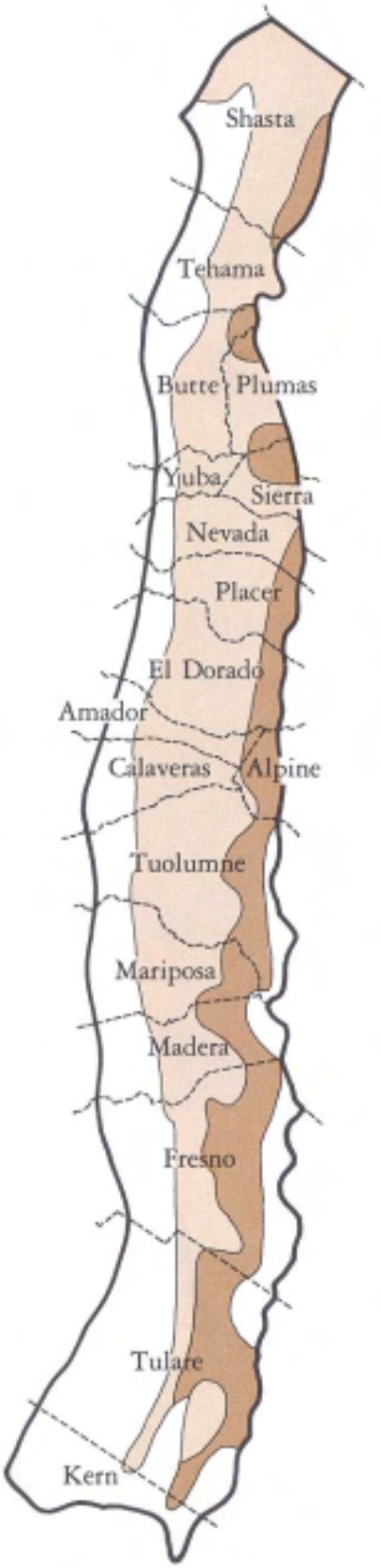
TERRITORY/HOME RANGE: Home range in breeding season the same as territory. In the Colorado Rockies, Crockett (1975) found a range in territory size from 10 to 22.5 acres (4.1 to 9.1 ha), with a mean of 16.9 acres (6.8 ha).

FOOD HABITS: Eats ants when feeding young; at other times of year eats sap and sapwood of conifers; may eat wood-boring insects during winter. Obtains most food from trunks and limbs of living conifers, from the ground, and from downed logs. Gleans insects and bores into live trees to obtain sap.

OTHER:

REFERENCES: Bent 1939, Grinnell and Miller 1944, and Crockett 1975.





Hairy Woodpecker

B090 (*Picoides villosus*)

STATUS: No official listed status. Fairly common permanent resident in suitable habitat.

DISTRIBUTION/HABITAT: Prefers, for breeding habitat, stands of large mature trees, of sparse to intermediate stand density, from ponderosa forests upslope to lodgepole pine forests. In fall and winter, some move down into digger pine-oak woodlands. Often numerous in recently burned areas.

SPECIAL HABITAT REQUIREMENTS: Snags.

BREEDING: Breeds from mid-March to late August, with peak from late May to mid-July. Clutch size from 3 to 6 eggs, with 4 most frequent. Excavates own nest cavity, from 3 to 50 ft (0.9 to 15 m) up, in dead tree or live tree with dead heartwood.

TERRITORY/HOME RANGE: Territory and home range the same. In a mature coniferous forest in Ontario, territory size ranged from 6 to 8 acres (2.4 to 3.2 ha) (Lawrence 1967).

FOOD HABITS: Eats primarily insect larvae, ants, and pine seeds. Obtains food by drilling into bark of dead trees, logs, and less often into live trees. Picks pine seeds from cones.

OTHER:

REFERENCES: Lawrence 1967, Kilham 1970.





Downy Woodpecker

B091 (*Picoides pubescens*)

STATUS: No official listed status. Locally common resident in suitable habitat.

DISTRIBUTION/HABITAT: Breeds in riparian woodlands associated with low elevation oak and pine/oak forests and upward into ponderosa pine and black oak types. Occasionally feeds in adjacent oak or coniferous forests. Wanders upslope in late summer as high as 7800 ft (2380 m).

SPECIAL HABITAT REQUIREMENTS: Snags or trees with soft heartwood.

BREEDING: Breeds from early April to early September, with peak from early May to mid-June. Clutch size from 3 to 6, 4 or 5 most common. Excavates own nest cavity, 4 to 20 ft (1.6 to 6.1 m) up, in decaying branch or tree trunk.

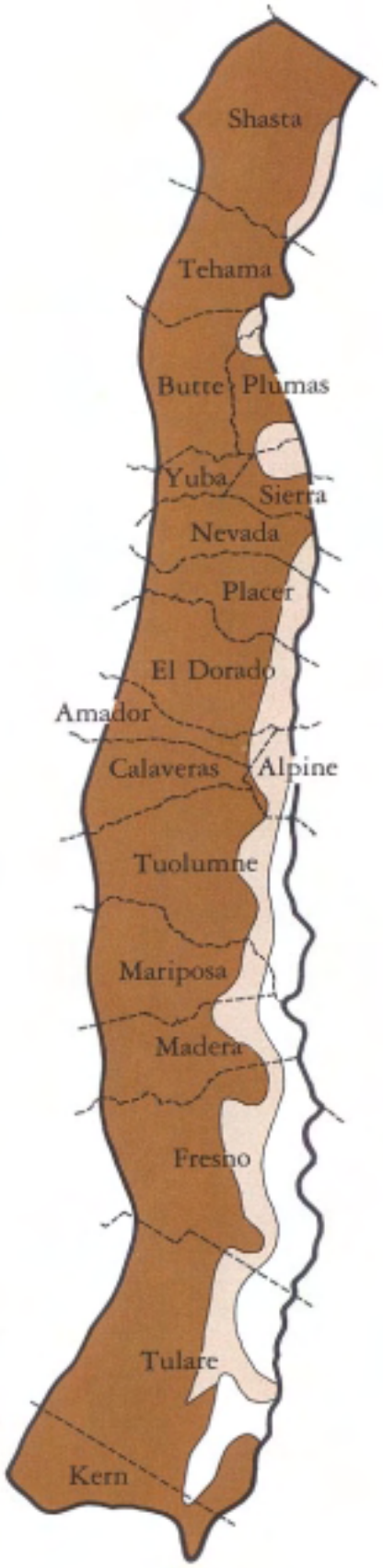
TERRITORY/HOME RANGE: Territory and home range the same. Two territories in a mature conifer forest in Ontario were 5 and 8 acres (2 and 3.2 ha) in size (Lawrence 1967).

FOOD HABITS: Obtains adult and larval insects from bark of small tree trunks and branches, living or dead, by gleaning and probing.

OTHER:

REFERENCES: Kilham 1962, 1970; Lawrence 1967.





Nuttall's Woodpecker

B092 (*Picoides nuttallii*)

STATUS: No official listed status. Fairly common permanent resident in suitable habitats.

DISTRIBUTION/HABITAT: Most often found in riparian vegetation bordered by or mixed with oaks. Prefers oaks for foraging and riparian trees for nests. Some move upslope in late summer and fall, regularly to 4000 ft (1220 m) and sometimes to 7000 ft (2130 m), usually in riparian habitats.

SPECIAL HABITAT REQUIREMENTS: Snags.

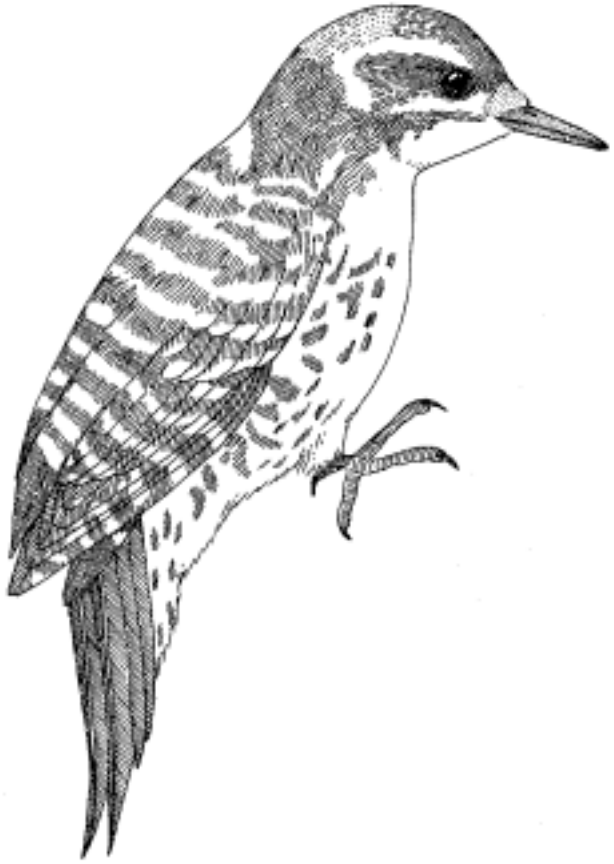
BREEDING: Breeds from late March to late June, with peak from early May to early June. Clutch size from 3 to 6, with mean of 4.6. Excavates own nest cavity, from 2.5 to 60 ft (0.8 to 18 m) up, usually in dead tree trunk or limb (occasionally live).

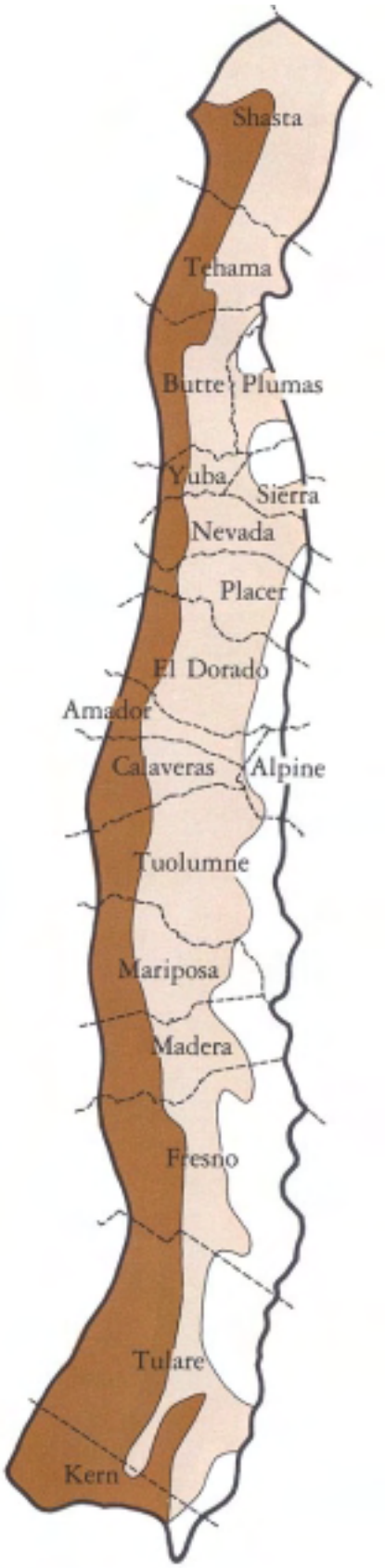
TERRITORY/HOME RANGE: Only estimate from a study by Miller and Bock (1972) in Monterey County where average home range, estimated year-round, was a riparian strip about 0.5 mi (800 m) long.

FOOD HABITS: Feeds mainly on insects; also takes some fruits, berries, and seeds. Obtains food mainly from trunks, branches, and twigs, by surface gleaning, probing, and twig scanning. Also excavates, eats sap, and even hawks flying insects.

OTHER:

REFERENCES: Miller and Bock 1972.





White-headed Woodpecker

B093 (*Picoides albolarvatus*)

STATUS: No official listed status. Common permanent resident.

DISTRIBUTION/HABITAT: Found in conifer forests from ponderosa pine type up to red fir type; prefers areas with large trees providing 40 to 70 percent canopy coverage.

SPECIAL HABITAT REQUIREMENTS: Snags.

BREEDING: Breeds from mid-April to late August, with peak from mid-June to mid-July. Clutch size from 3 to 7, most contain 4. Excavates cavities in dead trees, or even in stumps, generally close to the ground.

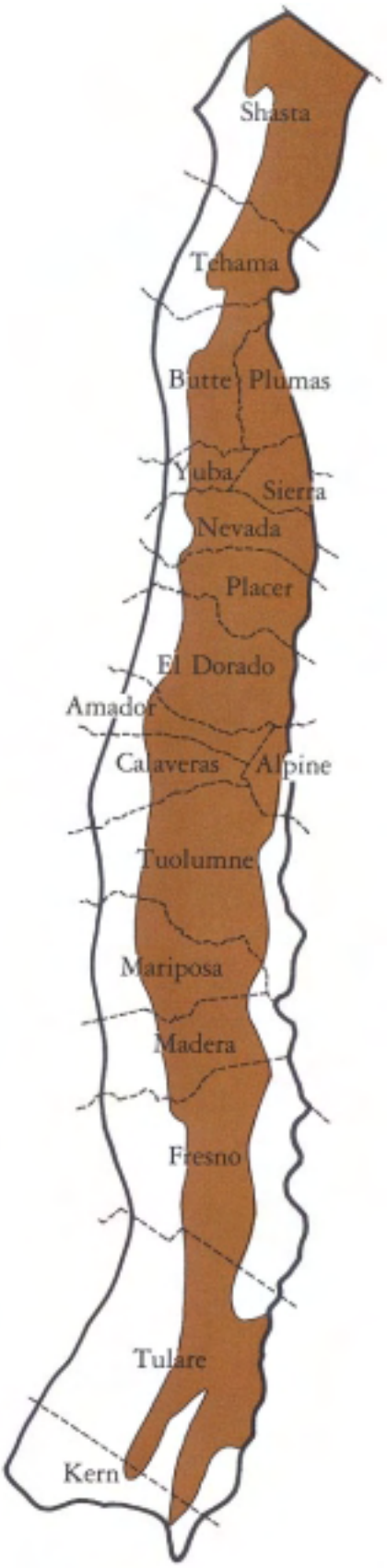
TERRITORY/HOME RANGE: No data available.

FOOD HABITS: Pine seeds make up 60 percent and insects 40 percent of diet (on an annual basis). Chips open pine cones to obtain seeds; gleans insects from needles or picks them from under bark flakes that are pried loose.

OTHER:

REFERENCES: Ligon 1973, Jackman and Scott 1975.





Black-backed Three-toed Woodpecker

B094 (*Picoides arcticus*)

STATUS: No official listed status. Uncommon to rare resident in forests at higher elevations; moves into lower elevations in fall, winter, and spring.

DISTRIBUTION/HABITAT: Breeds in red fir and lodgepole pine forests; prefers stands with large trees; stand density not too important. In fall, winter, and spring may be found in all conifer types down to ponderosa pine.

SPECIAL HABITAT REQUIREMENTS: Snags or trees with soft heartwood.

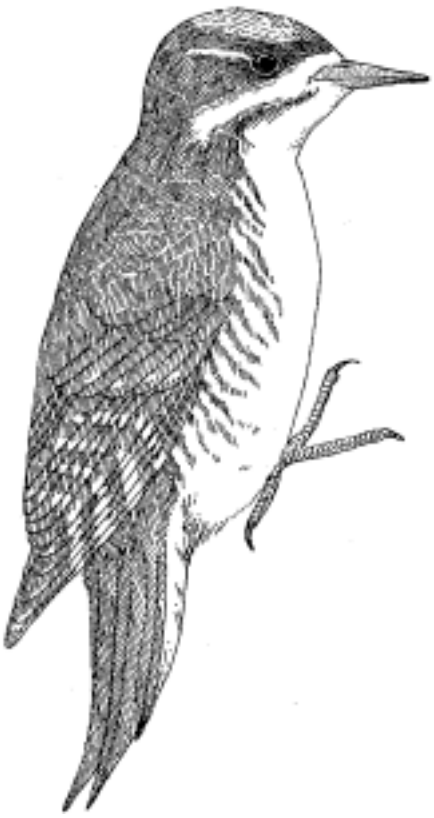
BREEDING: Breeds from early May to early September, with peak from mid-June to late July. Clutch size from 2 to 6, most consist of 4. Excavates nest cavities from 2 to 80 ft (0 .6 to 24 m) and usually from 10 to 20 ft (3.1 to 6.1 m) up, in live or dead tree trunks.

TERRITORY/HOME RANGE: No data available.

FOOD HABITS: Eats primarily insect larvae and adults, obtained by scaling away bark or by drilling into the trunk of live or dead trees.

OTHER: Life history is not well known, especially in Western United States. Specific habitat requirements in the Sierra Nevada unclear; apparently prefers burns, windfalls, or other areas with wood-boring insect infestations. Common forestry practices to prevent such infestations harmful to this species.

REFERENCES: Mayfield 1958, Bock and Bock 1974, Short 1974.





Western Kingbird

B095 (*Tyrannus verticalis*)

STATUS: No official listed status. Common spring migrant and summer resident; usually leaves the western Sierra Nevada by late summer.

DISTRIBUTION/UABITAT: Breeds in arid, low elevation habitats with low to intermediate canopy coverage.

SPECIAL HABITAT REQUIREMENTS: Elevated perches.

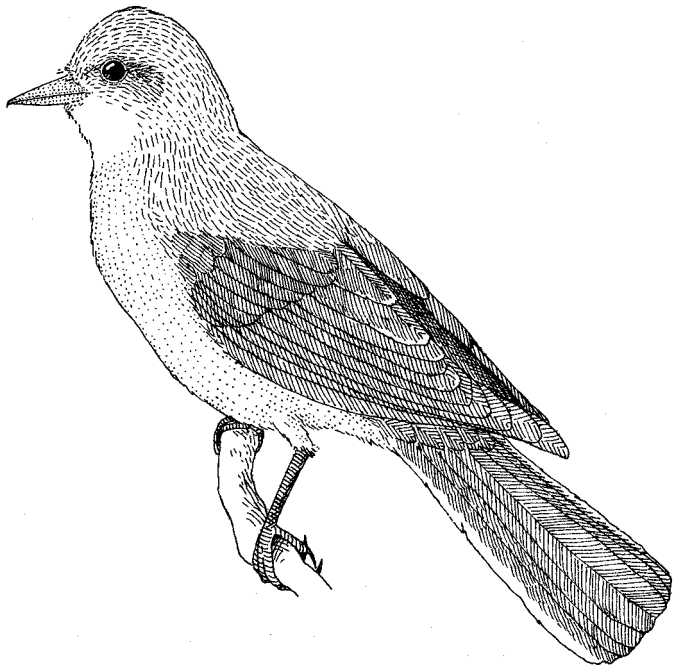
BREEDING: Breeds from early April to early July, with peak from mid-May to early June. Nests from 15 to 30 ft (4.6 to 9.1 m) up on a horizontal branch of oak, cottonwood, or willow. Clutch size from 3 to 5, with mean of 4.

TERRITORY/HOME RANGE: No good information available, although Hespenheide (1964) indicates will forage at least 0.25 mi (400 m) from the nest.

FOOD HABITS: Eats primarily insects; also some seeds. Captures insects in flight, by hawking from low, conspicuous branches.

OTHER: Although largely restricted to low elevations, altitudinal vagrants observed to 8500 ft (2590 m) in Tuolumne Meadows, Yosemite National Park.

REFERENCES: Grinnell and Storer 1924, Whedon 1938, Smith 1966, Ohlendorf 1974.





Ash-throated Flycatcher

B096 (*Myiarchus cinerascens*)

STATUS: No official listed status. Fairly common summer resident at lower elevations.

DISTRIBUTION/HABITAT: Breeds in shrublands and timbered sites from blue oak savannah up to ponderosa pine and black oak woodland types; prefers stands with low percent canopy coverage.

SPECIAL HABITAT REQUIREMENTS: Natural tree cavities.

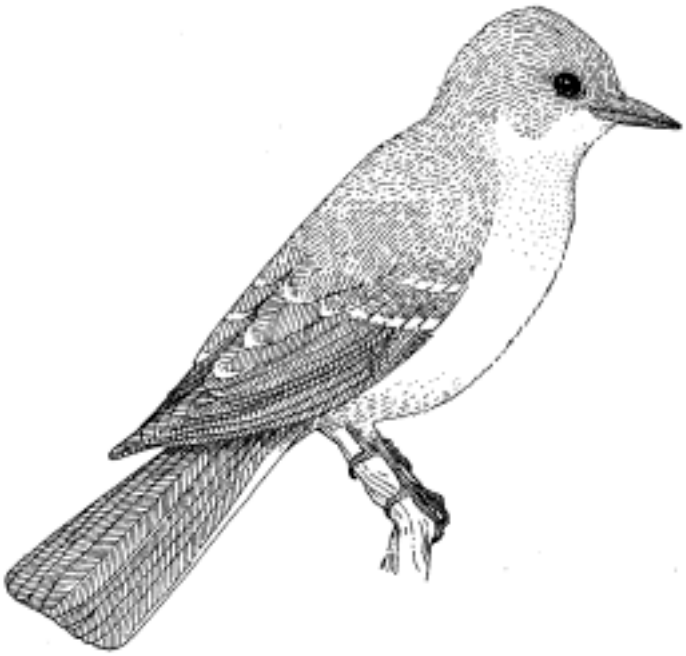
BREEDING: Breeds from mid-April to late June, with peak from mid-May to early June. Nests usually in knotholes of oaks or cottonwoods, but sometimes in old stumps or woodpecker holes. Nests as much as 20 ft (6.1 m) above ground. Clutch size from 3 to 7, with mean of 4.

TERRITORY/HOME RANGE: No data on home range, but Hensley (1954) reported a territory in a desert wash at 7.3 acres (3.0 ha) and another in open desert at 24.7 acres (10 ha).

FOOD HABITS: Feeds primarily on insects; also eats some berries and seeds. Hawks for aerial insects from conspicuous perches; also gleans insects from foliage, generally by flying upward from perch and snapping insect from leaf surface.

OTHER: Though normally restricted to arid foothills and chaparral-covered canyons at lower elevations, has been noted, exceptionally, at 9700 ft (2960 m) in Yosemite National Park.

REFERENCES: Bent 1942, Small 1974.





Black Phoebe

B097 (*Sayornis nigricans*)

STATUS: No official listed status. Fairly common to common resident in riparian habitats throughout most of State, up to about 4000 ft (1220 m).

DISTRIBUTION/HABITAT: Restricted for breeding to riparian deciduous or lake margin habitat in low to mid-elevation ranges, and occasionally in wet meadows from 4000 to 5000 ft (1220 to 1520 m). Altitudinal vagrants observed to 8600 ft (2620 m) in Tuolumne Meadows, Yosemite National Park.

SPECIAL HABITAT REQUIREMENTS: Water source; cliffs, old buildings, or bridges for nesting.

BREEDING: Breeds from early March to mid-July, with peak from mid-April to mid-June. Nests on steep cliffs, walls of old buildings or bridges, or often under eaves. Height varies with substrate. Clutch size from 3 to 7, with mean of 4.

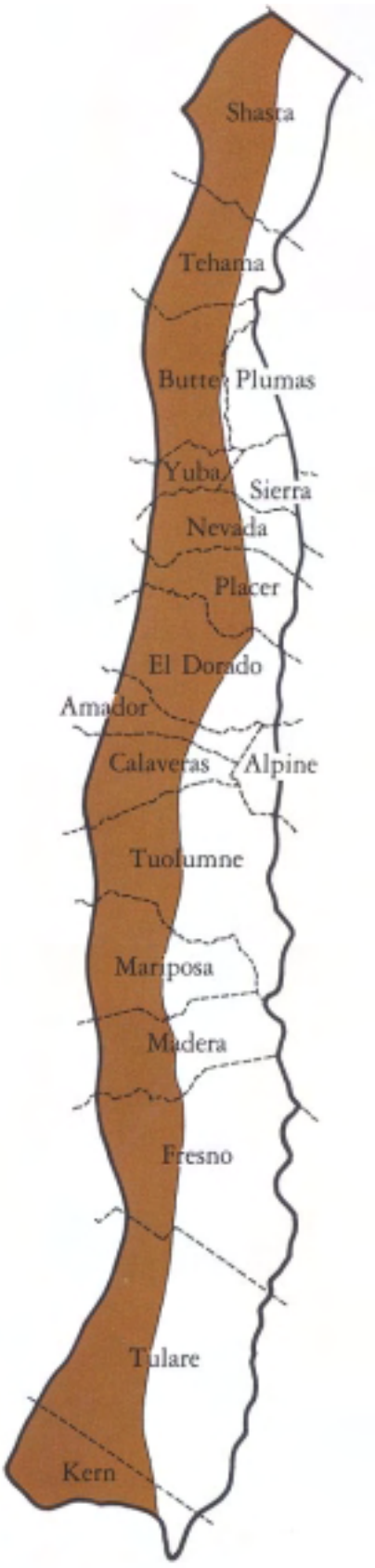
TERRITORY/HOME RANGE: No information available.

FOOD HABITS: Eats mainly flying insects, captured over grassy fields or open water. Captures aerial insects by hawking from perch; occasionally gleans insects from foliage.

OTHER: Tends to wander widely during prenesting season, but during nesting period restricted to area around nest.

REFERENCES: Oberlander 1939, Verbeek 1975, Ohlendorf 1976.





Say's Phoebe

B098 (*Sayornis saya*)

STATUS: No official listed status. Common to abundant resident in appropriate annual grassland areas, though only spring and summer visitor in upslope habitat types.

DISTRIBUTION/HABITAT: Breeds in all habitat types up to about 4000 ft (1220 m), except in riparian deciduous. Elevational vagrants recorded as high as 7000 ft (2130 m) in Yosemite National Park. Prefers sites with little shrub or tree cover.

SPECIAL HABITAT REQUIREMENTS: Crevices, old buildings, or bridges for nesting.

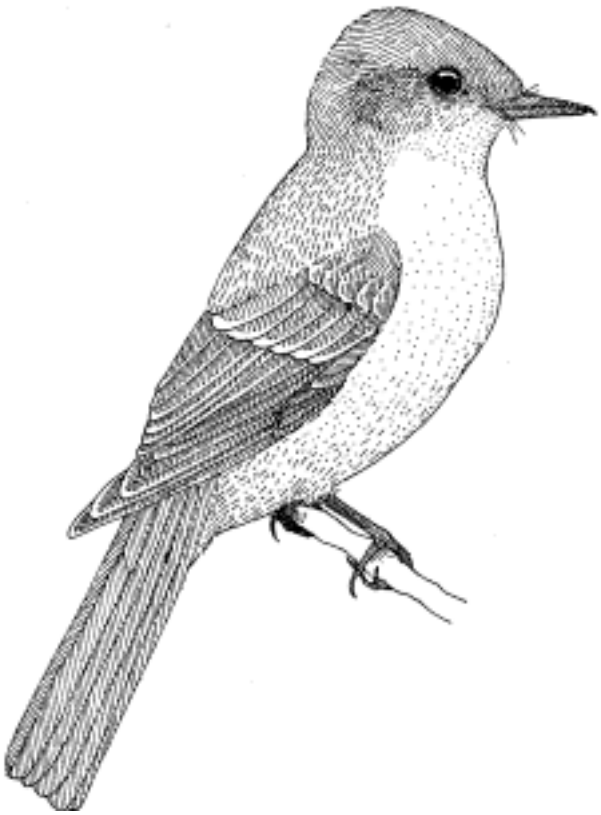
BREEDING: Breeds from early March to late July, with peak from mid-April to mid-June. Often produces two broods per season. Nests usually on walls of old buildings, under eaves; also on cliffs, steep river banks, or under bridges; rarely in tree cavities. Clutch size 3 to 7, with mean of 5.

TERRITORY/HOME RANGE: No information on home range.

FOOD HABITS: Eats mostly flying insects, captured by hawking from low perches.

OTHER:

REFERENCES: Phillips 1955, Ohlendorf 1976, Gaines 1977.





Willow Flycatcher

B099 (*Empidonax traillii*)

STATUS: No official listed status. Rare to uncommon summer resident; declined markedly in recent years because of destruction of riparian deciduous habitat, and nest parasitism by brown-headed cowbirds (Gaines 1977).

DISTRIBUTION/HABITAT: Breeds in low to middle elevations of riparian deciduous habitats and wet meadows with willow thickets, generally below 7000 ft (2130 m).

SPECIAL HABITAT REQUIREMENTS: Willow thickets.

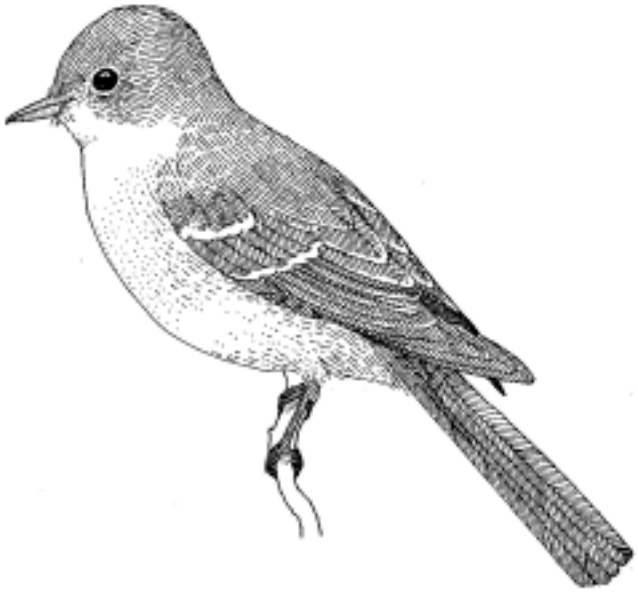
BREEDING: Breeds from late May to mid-July, with peak from mid-June to early July. Nests usually in a low crotch in a patch of willows, from ground level to 3 ft (0.9 m) up. Clutch size from 2 to 5, with mean of 3.

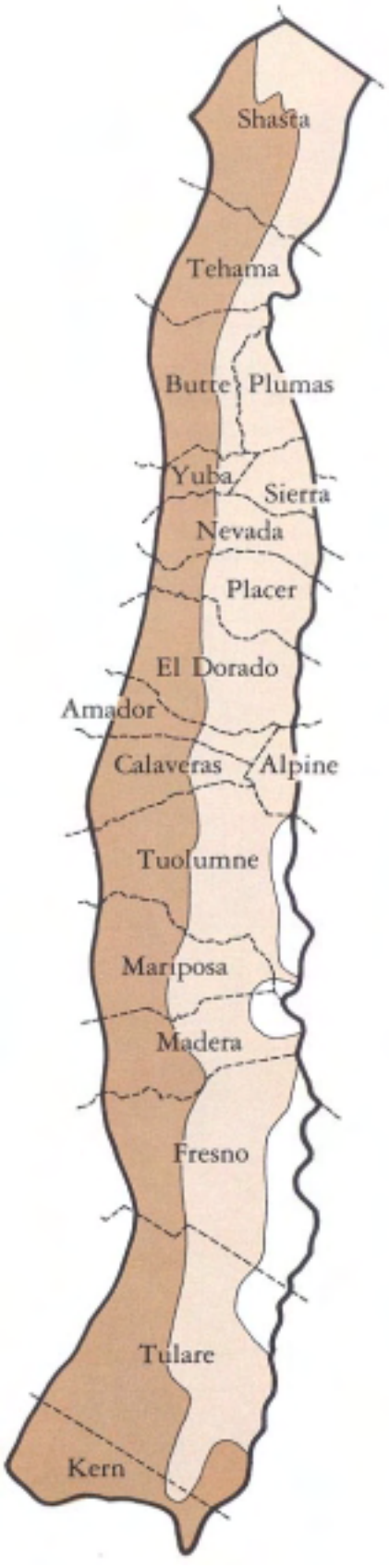
TERRITORY/HOME RANGE: No information on home range or territory size. In eastern Washington, King (1955) reported a breeding density of from 9.2 to 14 pairs per 100 acres (40 ha) in scrub habitat.

FOOD HABITS: Feeds almost entirely on flying insects, captured by hawking from exposed perches. Also gleans some insects from foliage.

OTHER:

REFERENCES: Grinnell and Storer 1924, Aldrich 1953, King 1955.





Hammond's Flycatcher

B100 (*Empidonax hammondii*)

STATUS: No official listed status. Common summer resident in the Sierra Nevada forest of middle elevations.

DISTRIBUTION/HABITAT: Widely distributed in spring and summer in forests with medium to high canopy coverage from ponderosa pine type up to lodgepole pine type. Most common in mature forests form mixed-conifer zone upward, where breeds in cool, well-shaded sites.

SPECIAL HABITAT REQUIREMENTS:

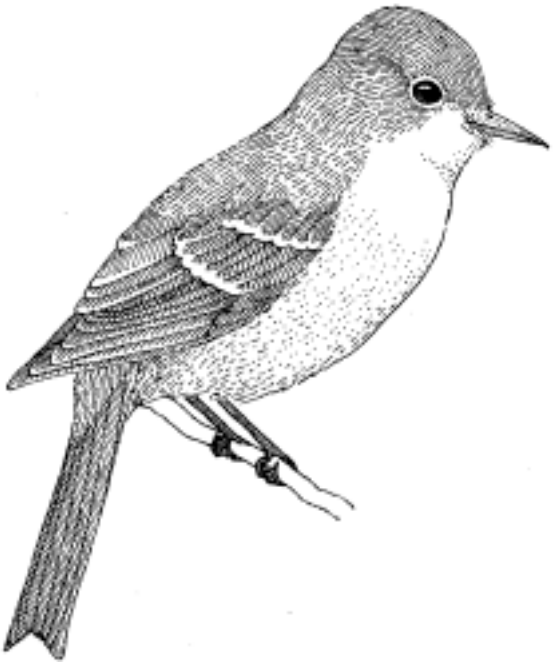
BREEDING: Breeds from mid-May to late July, with peak from mid-June to early July. Nests on horizontal limbs of deciduous or coniferous trees, from 12 to 50 ft (3.7 to 15 m) up, with average height of 25 ft (7.6 m). Clutch size from 3 to 5, with mean of 4.

TERRITORY/HOME RANGE: No data on home range size. In a Montana coniferous forest, territory size varied from 1.5 to 3.8 acres (0.6 to 1.5 ha), averaging 2.6 acres (1.1 ha) (Manuwal 1970). In Colorado aspen habitat, Beaver and Baldwin (1975) reported densities of 4.7 and 1.4 birds/25 acres (10 ha) in 1965 and 1966, respectively. In aspen-conifer habitat, densities were 2.8 birds/25 acres (10 ha) in 1965 and 1.4 birds/25 acres (10 ha) in 1966.

FOOD HABITS: Eats mainly flying insects, taken by hawking from relatively high or exposed perches.

OTHER: In the field, extremely difficult to distinguish from congener, the dusky flycatcher. Most reliable criteria for field identification are song, nesting behavior, and habitat preference (Gaines 1977). Specimen record indicates this species found up to 10,000 ft (3050 m) in the Sierra Nevada.

REFERENCES: Davis 1954; Johnson 1963, 1965; Beaver and Baldwin 1975.





Dusky Flycatcher

B101 (*Empidonax oberholseri*)

STATUS: No official listed status. Common summer resident in suitable habitat.

DISTRIBUTION/HABITAT: Widely distributed in spring and summer from chaparral zone up to lodgepole pine forests. Generally avoids forests with high percentage canopy cover, preferring shrubby sites or low to intermediate density forests with substantial shrub understory.

SPECIAL HABITAT REQUIREMENTS: Trees/shrubs.

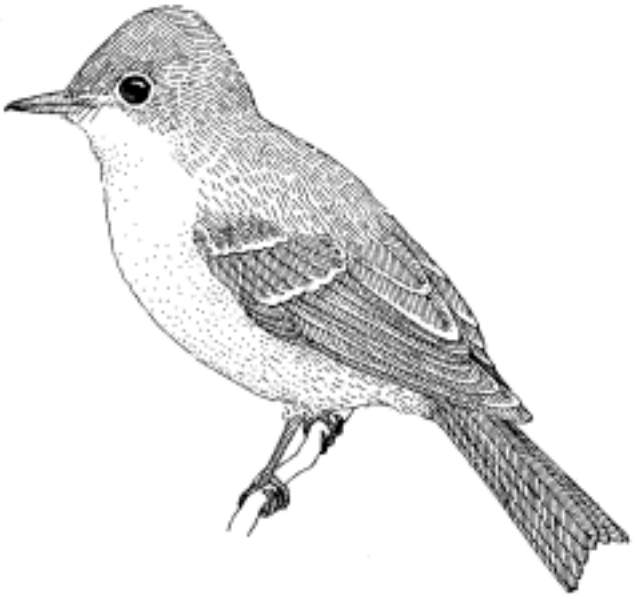
BREEDING: Breeds from early May to mid-July, with peak from mid-June to early July. Nests in low shrubs or trees in relatively dry sites. Nest usually attached to low twigs at heights from 4 to 6 ft (1.2 to 1.8 m). Clutch size 2 to 4, with mean of 3.

TERRITORY/HOME RANGE: No data on home range. In Montana, territory size in sparse coniferous forest ranged from 3.5 to 4.7 acres (1.4 to 1.9 ha), and averaged 4.0 acres (1.6 ha) (Manuwal 1970).

FOOD HABITS: Flying insects, taken aerially above brushy vegetation by hawking from low, exposed perches, comprise the diet.

OTHER: See comments on preceding page concerning field distinction between this and Hammond's flycatcher.

REFERENCES: Johnson 1963, 1966; Gaines 1977.





Western Flycatcher
B102 (*Empidonax difficilis*)

STATUS: No official listed status. Uncommon to fairly common summer resident in suitable habitat.

DISTRIBUTION/HABITAT: Breeds in timbered sites from blue oak savannah upslope to ponderosa pine and black oak types; prefers sites with high percentage canopy cover, typically moist situations near streams or springs. After breeding season, moves upslope to meadow/forest edges in mixed-conifer and red fir zones.

SPECIAL HABITAT REQUIREMENTS: Stream, spring, or seep probably needed for nesting.

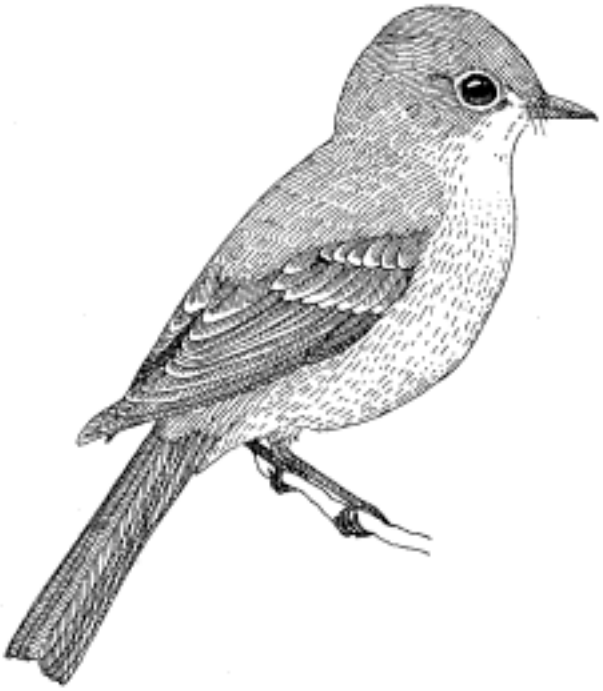
BREEDING: Breeds from early May to late July, with peak from mid-June to early July. Nest sites varied: often in crotches of large, riparian trees near water; also in old buildings and on rock ledges. Clutch size 3 to 5, with mean of 4. Sometimes double brooded.

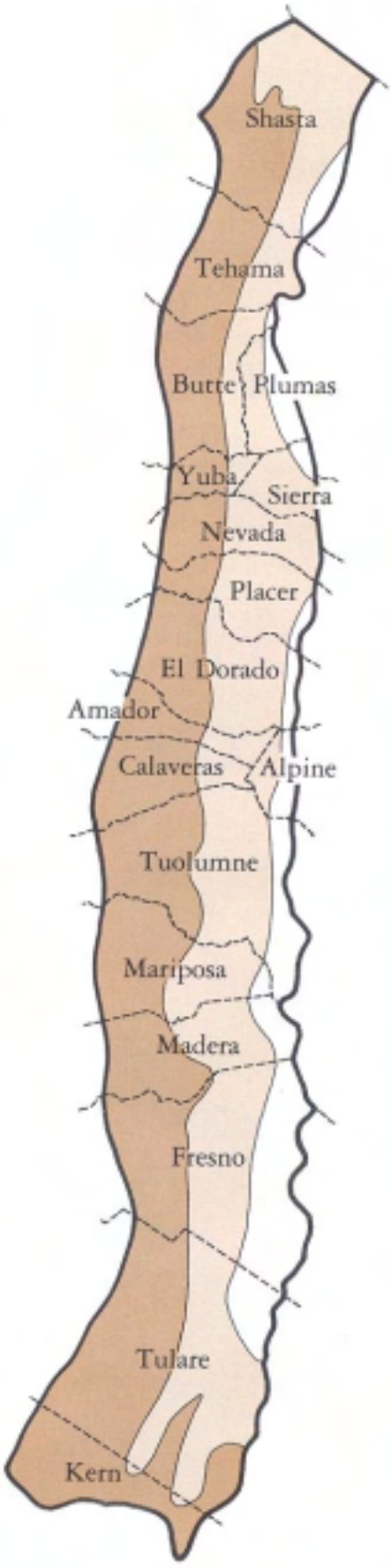
TERRITORY/HOME RANGE: No data on territory or home range size. In Colorado in 1965 and 1966, Beaver and Baldwin (1975) reported densities of 6.9 and 1.2 birds/25 acres (10 ha) respectively.

FOOD HABITS: Flying insects, captured by hawking from perches or taken from foliage, comprise the diet.

OTHER: Although typically an inhabitant of low elevation deciduous forests, have been recorded to 10,000 ft (3050 m) in Yosemite National Park.

REFERENCES: Davis *et al.* 1963, Beaver and Baldwin 1975, Verbeek 1975.





Western Wood Pewee

B103 (*Contopus sordidulus*)

STATUS: No official listed status. Common to abundant in spring and summer.

DISTRIBUTION/HABITAT: Widespread throughout all timbered types on west slopes of the Sierra Nevada, from blue oak savannah up to lodgepole pine forests. Prefers stands with low to intermediate percentage canopy cover; more common in edge situations-around meadows, burned or cutover sites, or near streams and rivers.

SPECIAL HABITAT REQUIREMENTS:

BREEDING: Breeds from early May to early August, with peak from mid-June to early July. Nests on top of horizontal branch or fork in tree of any species, from 10 to 50 ft (3.1 to 15 m) up. Clutch size from 2 to 4, with average of 3.

TERRITORY/HOME RANGE: In Colorado, Eckhardt (1976) reported territories averaged 3 acres (1.2 ha) over a 3-year period. In Colorado aspen habitat, Beaver and Baldwin (1975) reported densities of 2.5 birds/25 acres (10 ha) in 1965 and 0.3 birds/25 acres (10 ha) in 1966. No data on home range.

FOOD HABITS: Eats primarily flying insects; berries and grass seeds rarely eaten. Captures insects by hawking from prominent perch or, more rarely, by gleaning from foliage.

OTHER: Little published about ecology of species, considering abundance, conspicuousness, and wide distribution.

REFERENCES: Grinnell and Storer 1924, Beaver and Baldwin 1975.





Olive-sided Flycatcher

B104 (*Nuttallornis borealis*)

STATUS: No official listed status. Fairly common summer resident in mid-elevation coniferous forests.

DISTRIBUTION/HABITAT: Breeds in conifer forest types from ponderosa pine zone up to lodgepole pine; also breeds in black oak woodlands. Prefers stands with low percentage canopy cover. Extent and density of forest habitat seem less important than amount of air space scanned from highest perches. Most numerous where tall conifers overlook canyons or border on clearings.

SPECIAL HABITAT REQUIREMENTS: Trees/shrubs or trees/grass-forbs.

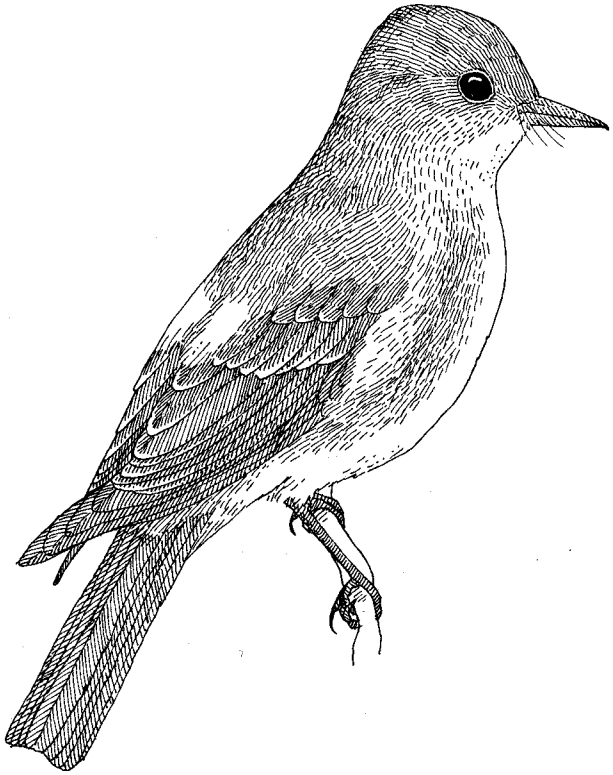
BREEDING: Breeds from mid-May to mid-July, with peak in mid-June. Nests on horizontal branches in tall conifers, ranging in height from 10 to 70 ft (3.1 to 21 m), usually from 40 to 50 ft (12 to 15 m). Clutch size from 3 to 4, with mean of about 3.

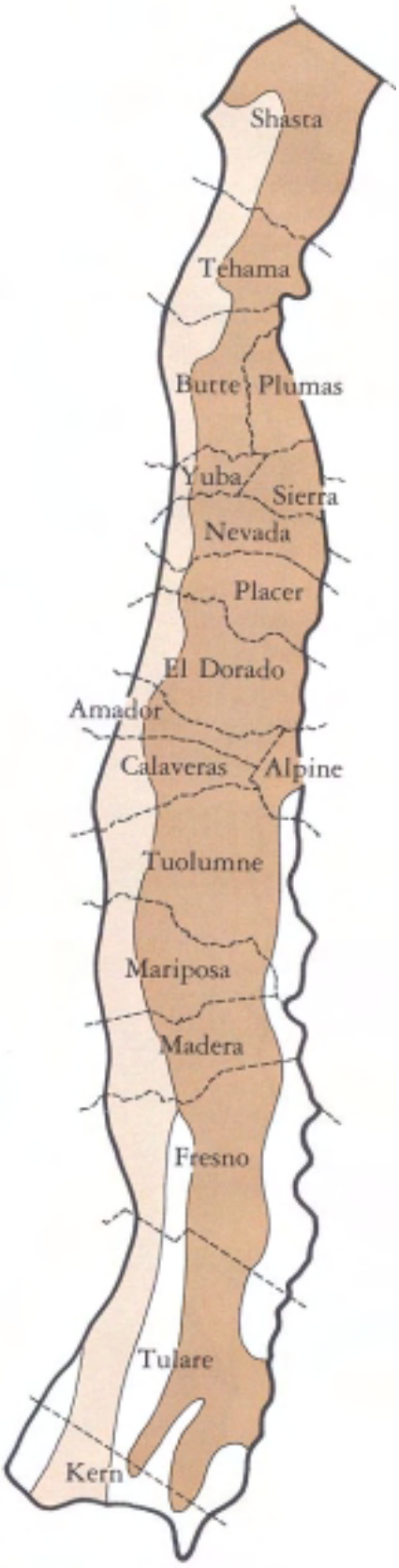
TERRITORY/HOME RANGE: No information available.

FOOD HABITS: Flying insects, hawked in midair from extremely high perches, comprise the diet.

OTHER:

REFERENCES: Tvrdik 1971, Gaines 1977.





Horned Lark

B105 (*Eremophila alpestris*)

STATUS: No official listed status. Two races found in the western Sierra Nevada. A lowland form is permanent resident, primarily from El Dorado County northward to Shasta County; second race spills over into high elevation areas from east slopes of the Sierra Nevada.

DISTRIBUTION/HABITAT: Breeds in grasslands and alpine meadows.

SPECIAL HABITAT REQUIREMENTS:

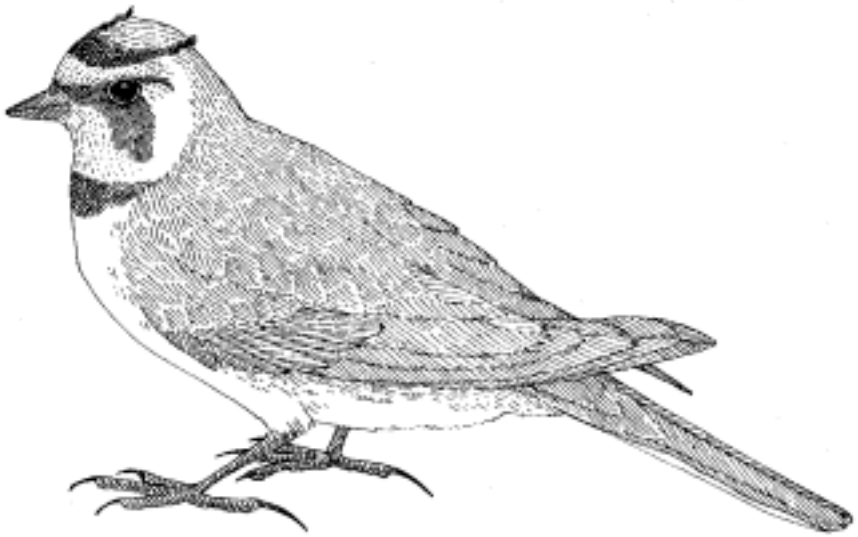
BREEDING: Breeds from early March to late July, with peak from mid-May to early July. Nests on dry ground among sparse vegetation. Clutch size from 2 to 5, with mean of 3.

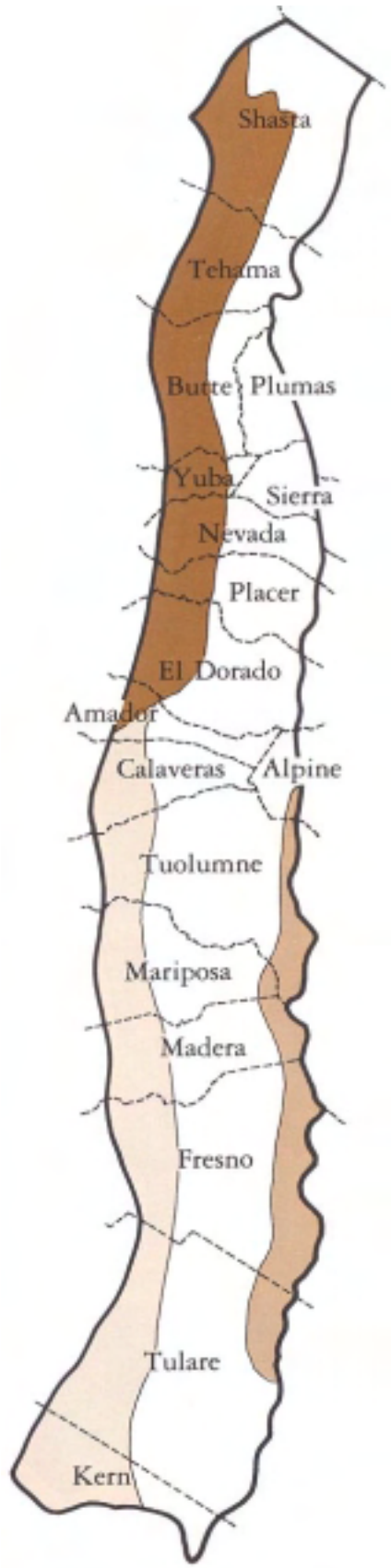
TERRITORY/HOME RANGE: Breeding territories in midwestern farmlands reported as about 12 acres (4.9 ha) (Fitch 1958), ranging from 1.5 to 7.8 acres (0.6 to 3.2 ha) (Beason and Franks 1974), and ranging from 1 to 13 acres (0.4 to 5.3 ha) (Pickwell 1931). In Wyoming alpine tundra, Verbeek (1967) roughly estimated breeding territories of birds as about 4 acres (1.6 ha). No data on home range.

FOOD HABITS: Eats mostly insects, with some seeds and other vegetable matter. Takes food from the ground.

OTHER:

REFERENCES: Behle 1942, Verbeek 1967, Beason and Franks 1974.





Violet-green Swallow
B106 (*Tachycineta thalassina*)

STATUS: No official listed status. Common spring migrant and summer resident.

DISTRIBUTION/HABITAT: Breeds in all habitat types from blue oak savannahs up to lodgepole pine forests, especially at middle elevations.

SPECIAL HABITAT REQUIREMENTS: Nest cavities or crevices; medium to large openings, or open terrain.

BREEDING: Breeds from late April to mid-August, with peak from late May to late July. Nests in small crevice or hole in cliff, in abandoned woodpecker hole in tree, or in hole in some human structure, generally above 5 ft (1.5 m). Clutch size from 4 to 7, usually 4 or 5.

TERRITORY/HOME RANGE: No precise data available on size of home range or territory, but Grinnell and Miller (1944) state that home range large. Presumably only immediate vicinity of nest site defended.

FOOD HABITS: Feeds on flying insects, captured in long, gliding flights above any habitat, passing through swarms of insects. Does not require bodies of water to forage over, but usually does so if such areas available.

OTHER: Solitary or weakly colonial nesters.

REFERENCES: Bent 1942, Edson 1943, Grinnell and Miller 1944, Combellack 1954.





Tree Swallow

B107 (*Iridoprocne bicolor*)

STATUS: No official listed status. Uncommon to rare spring migrant and summer resident.

DISTRIBUTION/HABITAT: Found from annual grasslands up to lodgepole pine forests. Breeds in sites with large trees; also breeds along riparian sites, around margins of ponds and lakes or in wet meadows where trees provide nest sites. Few records of nesting above 5000 ft (1520 m) in the Sierra Nevada probably exceptional.

SPECIAL HABITAT REQUIREMENTS: Nest cavities by pond, lake, stream, river, marsh, or wet meadow.

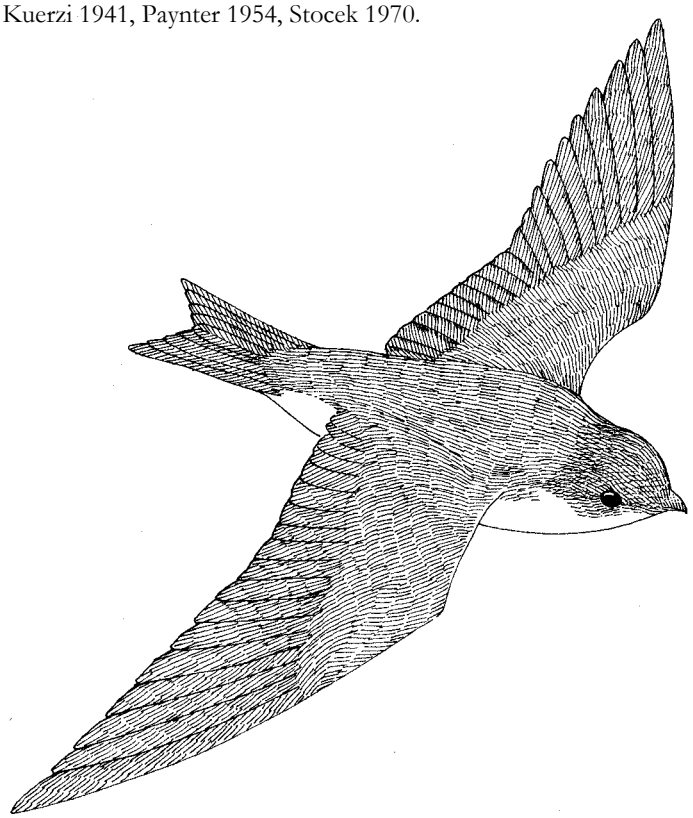
BREEDING: Breeds from mid-April to mid-August, with peak from late May to mid-July. Nests in abandoned woodpecker hole or other cavity in tree, preferably surrounded by water or on edge of water. Also uses nest boxes or cavities in buildings. No data on nest height in natural conditions. Clutch size from 3 to 7, with mean of about 5. Usually nests solitarily or in small groups.

TERRITORY/HOME RANGE: Home range is large (Kuerzi 1941, in a Connecticut study). Only nest site defended (Kuerzi 1941).

FOOD HABITS: Feeds almost exclusively on flying insects; also eats some berries and seeds. Captures insects by flying back and forth over water or at least a wet area.

OTHER: May be limited in the Sierra Nevada by availability of suitable nest sites, as has been true in other parts of the country.

REFERENCES: Kuerzi 1941, Paynter 1954, Stocek 1970.





Rough-winged Swallow
B108 (*Stelgidopteryx ruficollis*)

STATUS: No official listed status. Uncommon spring migrant and summer resident.

DISTRIBUTION/HABITAT: Breeds from annual grasslands up to ponderosa pine and black oak woodland types, expecially at lower elevations. Found in all successional stages, so long as suitable nest sites available.

SPECIAL HABITAT REQUIREMENTS: Earthen bank.

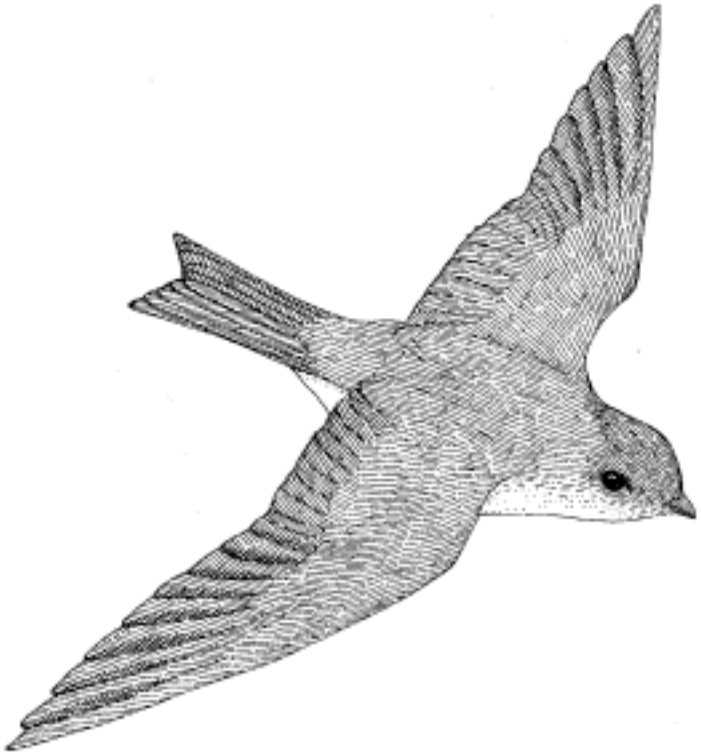
BREEDING: Breeds from early April to early August, with peak from late May to mid-July. Nests in hole in earthen bank; sometimes excavates own cavity or uses rodent's burrows, kingfisher nest sites, or natural cavities. Generally nests solitarily, unless a bank offers unusually good nest site characteristics, in which case more than one nest may be found in close proximity. Clutch size from 4 to 8, most contain 6 or 7.

TERRITORY/HOME RANGE: No data on home range. Only immediate vicinity of nest cavity defended (Lank 1962).

FOOD HABITS: Eats flying insects, captured in long, cruising flights, generally low over water or in gullies.

OTHER: Numbers probably limited by available nest sites.

REFERENCES: Bent 1942, Grinnell and Miller 1944, Lunk 1962.





Barn Swallow

B109 (*Hirundo rustica*)

STATUS: No official listed status. Common spring migrant and summer resident.

DISTRIBUTION/HABITAT: Breeds in all habitats and successional stages from annual grasslands up to mixed-conifer forests, providing suitable nest sites available. More abundant at lower elevations.

SPECIAL HABITAT REQUIREMENTS: Cliffs, old buildings, or bridges for nesting; nearby water for mud gathering.

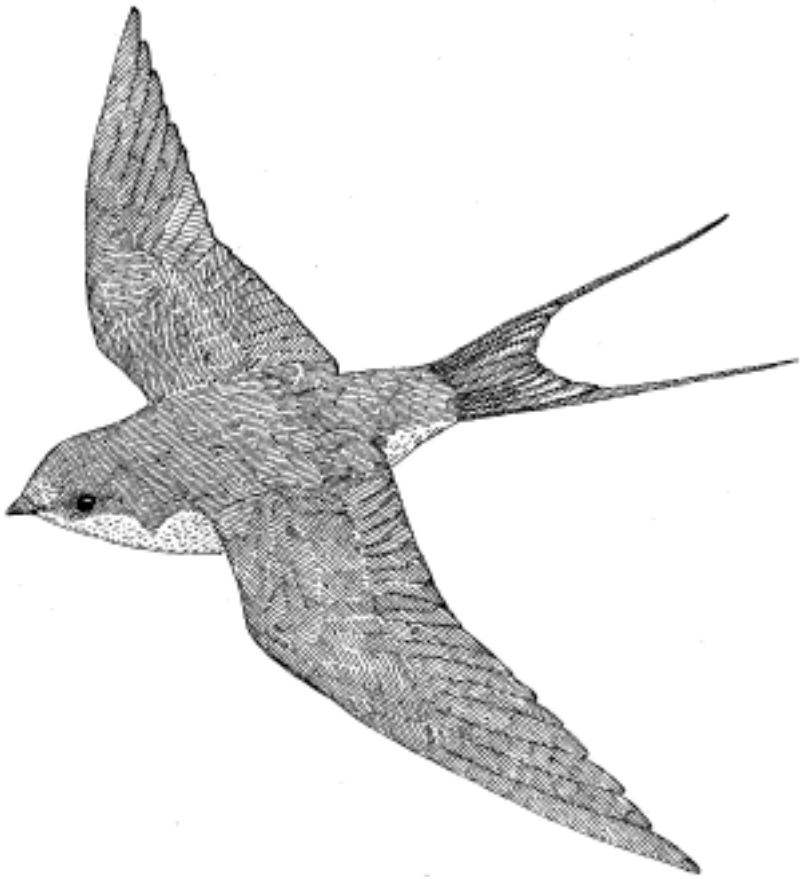
BREEDING: Breeds from early April to mid-August, with peak from mid-May to mid-July. Nests under eaves of buildings, under bridges, on rock surfaces under stream bank overhangs, or other suitably sheltered sites with solid substrate to which nest may be attached. Mud used in nest construction. Clutch size from 1 to 7, most contain 4 or 5.

TERRITORY/HOME RANGE: Data on home range scanty. Forages mostly within 4000 ft (1220 m) of the nest (Samuel 1971), or within 1300 ft (400 m) of the nest (Snapp 1976). Defends only the area immediately around nest (Davis 1937).

FOOD HABITS: Feeds on flying insects, captured in long, cruising flights, usually low over streams, ponds, or wet meadows.

OTHER:

REFERENCES: Bent 1942, Grinnell and Miller 1944, Samuel 1971, Snapp 1976.





Cliff Swallow

B110 (*Petrochelidon pyrrhonota*)

STATUS: No official listed status. Abundant spring migrant and summer resident.

DISTRIBUTION/HABITAT: Breeds from annual grasslands up into mixed-conifer forests; prefers low elevations. Occasionally known to nest at higher elevations; one colony with 30 nests located in Amador County, at 8400 ft (2560 m) elevation.

SPECIAL HABITAT REQUIREMENTS: Cliffs, old buildings, or bridges for nesting; nearby water for mud gathering.

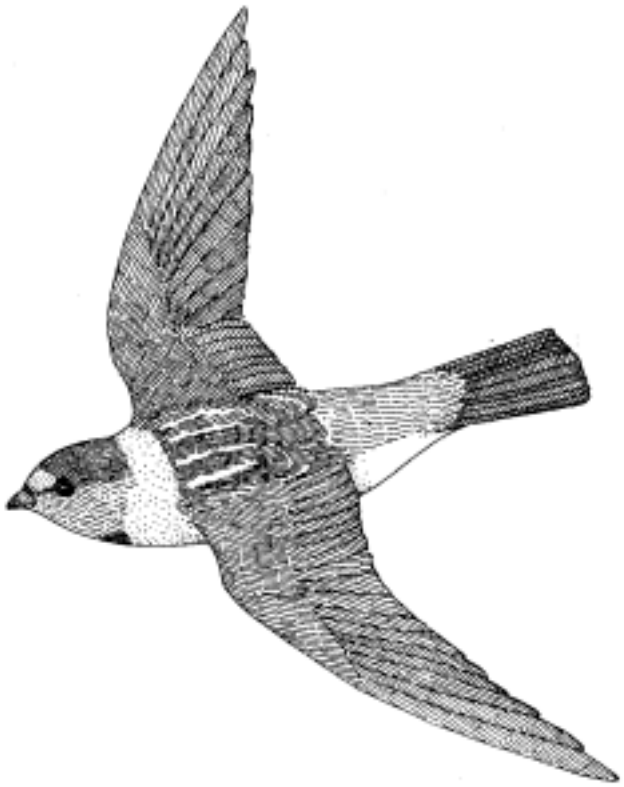
BREEDING: Breeds from mid-April to early August, with peak from early May to early July. Nest constructed of mud pellets, attached to solid, vertical surface. A funnel-shaped structure, nest has small opening directed outward from the surface to which the nest is attached. Nests often close together; species nests in colonies. Clutch size from 3 to 6, most contain 3 or 4.

TERRITORY/HOME RANGE: In Wyoming, Emlen (1954) reported a home range of 2 to 4 mi (3.2 to 6.4 km) foraging radius around the nest. Only the area in immediate vicinity of nest defended (Emlen 1954).

FOOD HABITS: Feeds exclusively on flying insects, captured in long, cruising flight over bodies of water, grasslands, marshes, or shrubs.

OTHER:

REFERENCES: Emlen 1952, 1954; Mayhew 1958; Samuel 1971.





Steller's Jay

B111 (*Cyanocitta stelleri*)

STATUS: No official listed status. Common to abundant resident.

DISTRIBUTION/HABITAT: Breeds from ponderosa pine and black oak woodland types up to lodgepole pine forests; prefers stands of mature trees with low to intermediate percent canopy coverage. Breeding range expanded in recent years in areas of human use. Most abundant around campgrounds and picnic areas. Exhibits some upslope movement after breeding period; at least part of population regularly moves downslope in fall and winter.

SPECIAL HABITAT REQUIREMENTS:

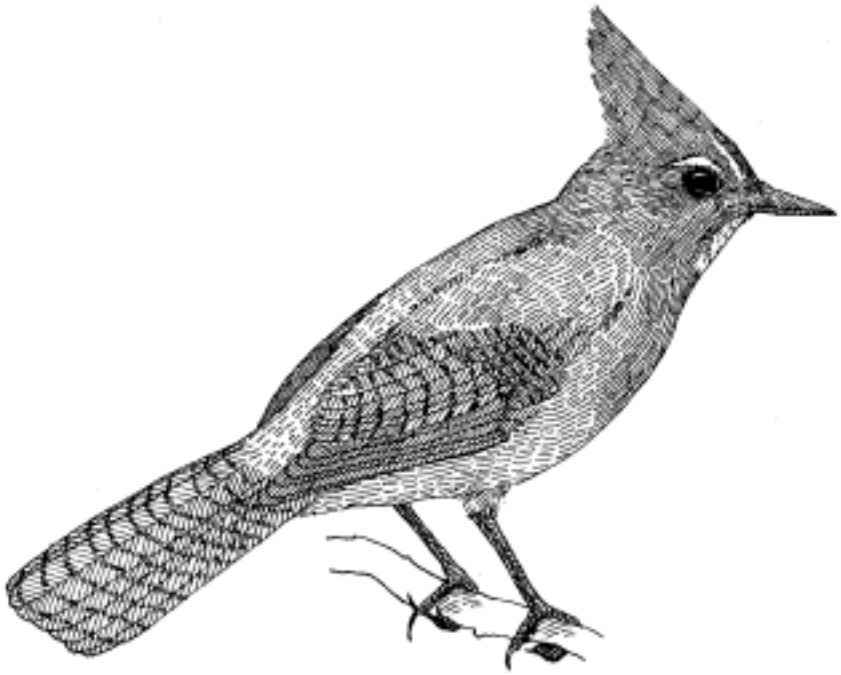
BREEDING: Breeds from early April to late July, with peak from early May to late June. Nests usually in dense foliage in young conifers, on horizontal branch near trunk. Sometimes nests in older conifers or deciduous trees. Nest height ranges from 2 to 100 ft (0.6 to 30 m); most nests between 8 and 15 ft (2.4 and 4.6 m) up. Clutch size from 3 to 5, with mode of 4.

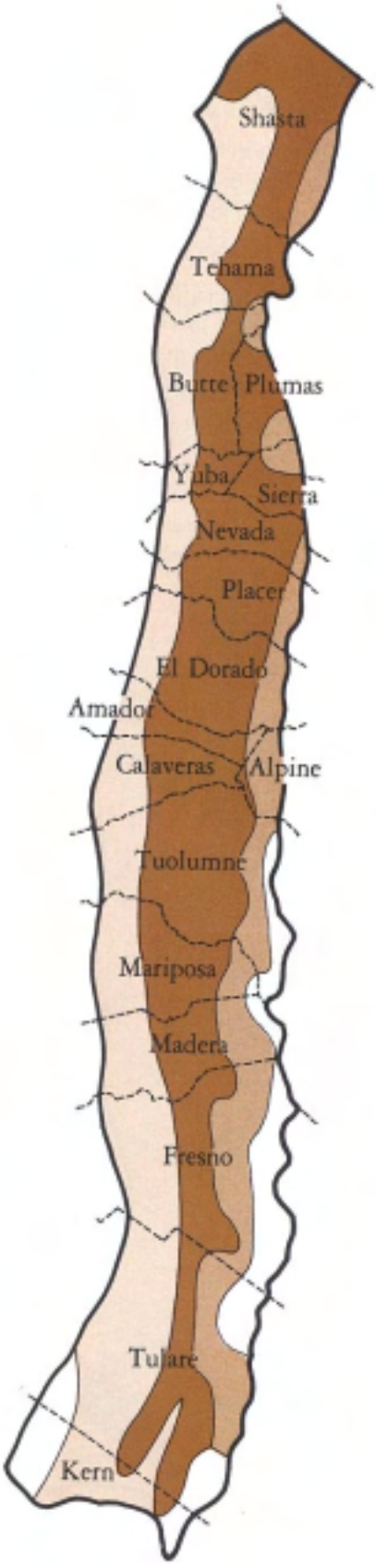
TERRITORY/HOME RANGE: No data on home range size. In Alameda County, hold year-round territories (Brown 1964), but no sizes reported.

FOOD HABITS: Omnivorous, eating mast, fruit, insects, seeds, carrion, birds' eggs and young. Uses variety of foraging techniques, including gleaning and picking. Takes food from ground and from foliage of conifers and broadleafed trees and shrubs.

OTHER: One of most secretive nesters of forest birds.

REFERENCES: Grinnell and Miller 1944, Bent 1946, Brown 1964.





Scrub Jay

B112 (*Aphelocoma coerulescens*)

STATUS: No official listed status. Common resident.

DISTRIBUTION/HABITAT: Breeds in low elevation oak and pine/oak sites, chaparral, and riparian deciduous types; prefers stands with low percent canopy coverage. Occasionally individuals wander upslope after breeding.

SPECIAL HABITAT REQUIREMENTS: Oaks or cultivated nut trees.

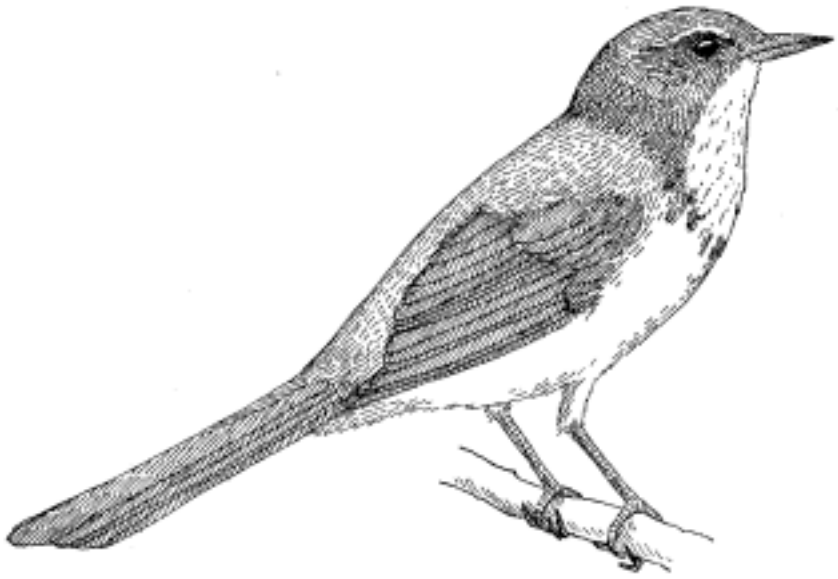
BREEDING: Breeds from early March to mid-August, with peak from late April to early July. Nests usually in low trees, vines, or shrubs, typically near water, from 3 to 50 ft (0.9 to 15 m) up. Clutch size from 2 to 7, with 4 or 5 most frequent.

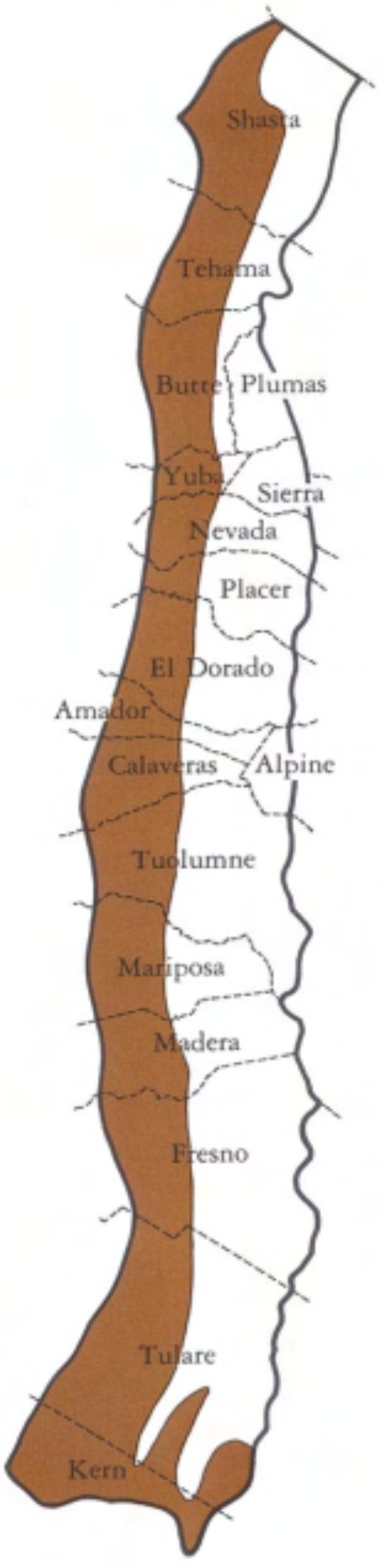
TERRITORY/HOME RANGE: In Butte County, two home ranges averaged 12.7 acres (5.1 ha), and five territories averaged 5.5 acres (2.2 ha) (Ritter 1972).

FOOD HABITS: Acorns, other nuts and seeds, insects, and fruit make up majority of diet. Commonly feeds on ground near cover, gleans food from ground and litter; also digs in ground and often buries acorns and other foods for later consumption. Picks acorns and nuts from trees, and gleans foliage of trees, forbs, and grasses.

OTHER:

REFERENCES: Pitelka 1951a, Ritter 1972, Verbeek 1973.





Black-billed Magpie

B113 (*Pica pica*)

STATUS: No official listed status. Breeds east of the Sierra Nevada crest, with infrequent vagrants on west slopes.

DISTRIBUTION/HABITAT: Found uncommonly from midsummer to late winter. Feeds in clearings and areas with scattered shrubs, resting in most sites with trees. Recorded from alpine meadows downslope to mixed-conifer zone.

SPECIAL HABITAT REQUIREMENTS: Water in dry season; openings.

BREEDING: Does not breed in the western Sierra Nevada.

TERRITORY/HOME RANGE: Probably none established in the western Sierra Nevada.

FOOD HABITS: Eats primarily insects, also carrion, small mammals, and sometimes birds' eggs, fruit, and grain. Feeds on the ground, in low vegetation, and on backs of large herbivores. Searches beneath objects and gleans food from foraging surfaces.

OTHER:

REFERENCES: Linsdale 1937, Jones 1960, Erpino 1968.





Yellow-billed Magpie

B114 (*Pica nuttalli*)

STATUS: No official listed status. Permanent resident only at low elevations in the southern and central Sierra Nevada; rare vagrant at higher elevations.

DISTRIBUTION/HABITAT: Breeds in wooded stages of blue oak savannah and digger pine-oak type; prefers sites with intermediate percent canopy coverage.

SPECIAL HABITAT REQUIREMENTS: Open terrain; trees; water in dry season.

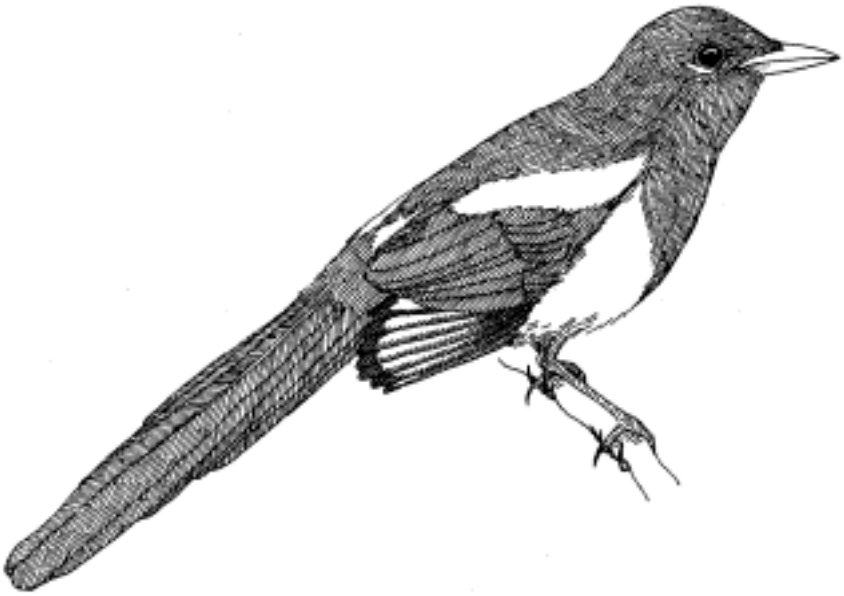
BREEDING: Breeds from late February to mid-July, with peak from early May to late June. Nests around periphery of canopy of large tree. Nests in loose colonies, usually in oaks, sycamores, cottonwoods, or digger pines. Nest height ranges from 30 to 80 ft (9.1 to 24 m), with mean of 55 ft (17 m) (Verbeek 1973). Clutch size from 5 to 8, with mean of 6.5.

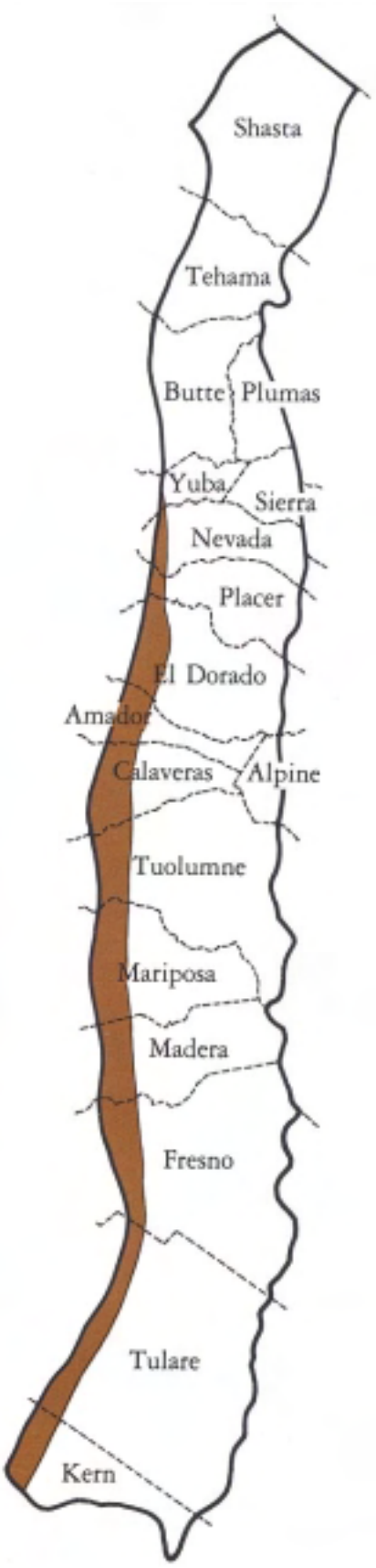
TERRITORY/HOME RANGE: In Monterey County, during breeding season, home range averaged about 100 acres (40 ha), expanding to about 1500 acres (607 ha) in nonbreeding period (Verbeek 1973). Also in Monterey County, territory size, year-round, ranged from 1. 5 to 4.8 acres (0.6 to 1.9 ha) with an average of 3 acres (1.2 ha) (Verbeek 1973).

FOOD HABITS: Eats insects, soil invertebrates, carrion, a wide variety of other animal foods, acorns, fruit, and occasionally raids birds' nests. Obtains food from ground, among grasses and forbs, and in air. Gleans, searches under objects (for example, dung, wood chips), and hawks for aerial insects.

OTHER: Feeds a great deal on territory during breeding season, but moves around in large flocks in nonbreeding season. Well adapted to agricultural areas.

REFERENCES: Linsdale 1937; Bent 1946; Verbeek 1972, 1973.





Common Raven

B115 (*Corvus corax*)

STATUS: No official listed status. Uncommon resident.

DISTRIBUTION/HABITAT: Breeds in all vegetation types from the annual grasslands upslope to Jeffrey pine forests, with a preference for lower elevation areas. Feeds and rests on up to the crest of the Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS: Large openings; cliffs or trees for nesting.

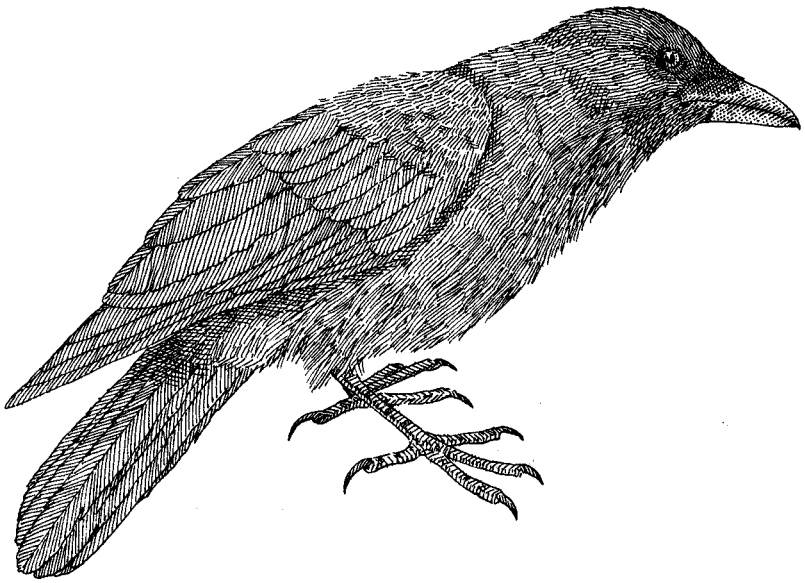
BREEDING: Breeds from mid-February to late July, with peak from mid-April to mid-June. For nesting, prefers ledge or crevice in cliff, but will use trees or manmade structures. Nest commonly sheltered by overhand or foliage. A nest tree typically the highest tree available with good cover at top. Nest height from 20 to 100 ft (6.1 to 30 m). Clutch size from 4 to 8, most contain 5 or 6.

TERRITORY/HOME RANGE: No data on territory. In Wyoming, Craighead and Craighead (1956) reported two breeding home ranges of 2.6 and 4.2 mi^2 (6.7 and 10.9 km^2).

FOOD HABITS: Feeds on carrion; small, live vertebrates; and large insects. Takes food from ground and nests. Searches for food while flying and soaring.

OTHER: Generally avoids human settlements. Little known of winter distribution or breeding sites in the Sierra Nevada. May have increased range recently; has not been reported in Yosemite National Park before 1950; now listed as "uncommon' (Gaines 1977).

REFERENCES: Harlow 1922, Tyrell 1945, Bent 1946.





Common Crow

B116 (*Corvus brachyrhynchos*)

STATUS: No official listed status. Common in Central Valley; status above 1000 ft (305 m) uncertain.

DISTRIBUTION/HABITAT: A permanent resident, breeds in blue oak savannah, in digger pine-oak woodlands, and in low and mid-elevation riparian deciduous habitats. Some upslope movement as high as mixed-conifer zone in spring and fall.

SPECIAL HABITAT REQUIREMENTS: Large openings; trees for nesting.

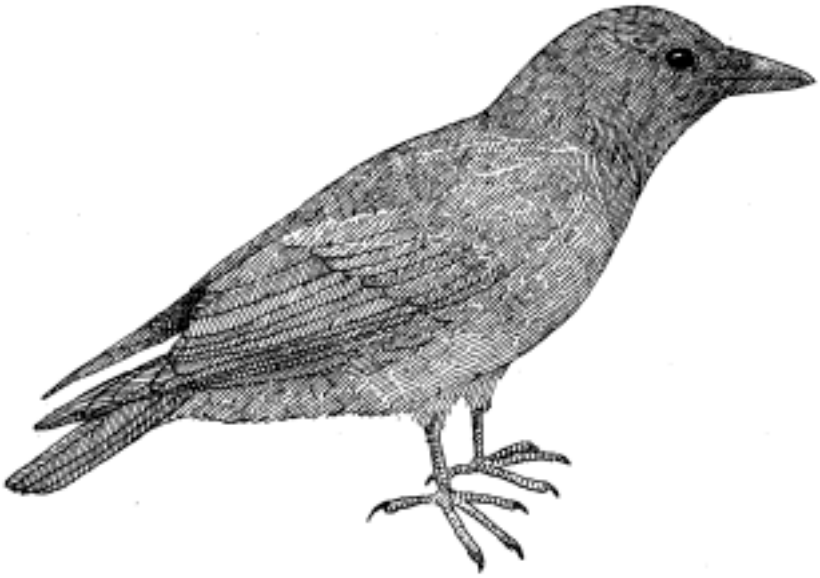
BREEDING: Breeds from late March to early July, with peak from early May to mid-June. Nests in trees, typically in crotch, from 10 to 60 ft (3.1 to 18 m) up. Clutch size from 2 to 6, with mean of 4.4.

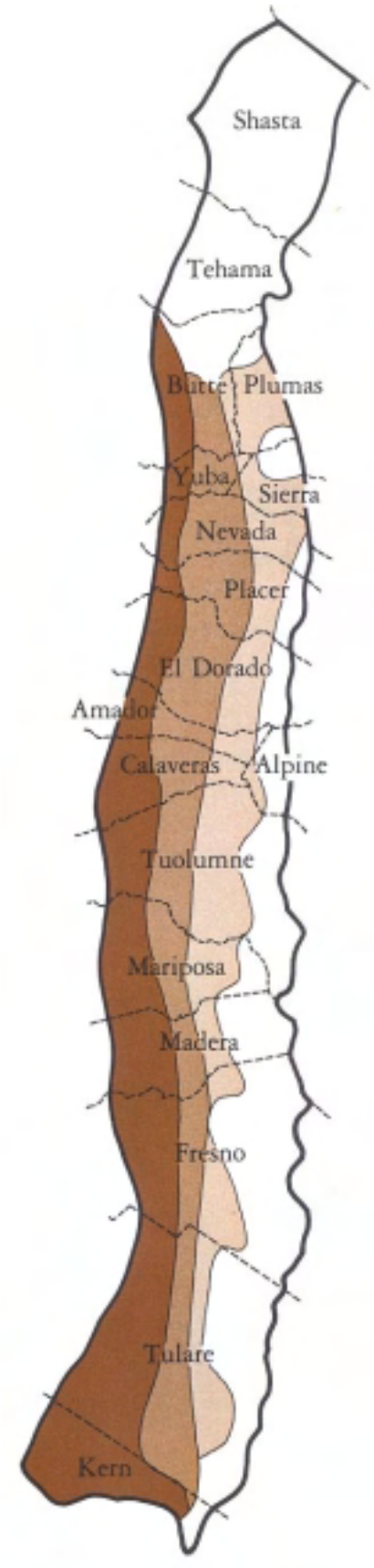
TERRITORY/HOME RANGE: No information available. Probably territorial during the breeding season (Emlen 1942). Several pairs sometimes nest in loose association.

FOOD HABITS: Eats seeds and nuts, fruits, insects, small vertebrates, carrion, and eggs. Obtains food from the ground, from vegetation, and from nests. Foraging techniques include gleaning and searching while in flight.

OTHER:

REFERENCES: Emlen 1940, 1942; Bent 1946.





Piñon Jay

B117 (*Gymnorhinus cyanocephalus*)

STATUS: No official listed status. Uncommon vagrant in late summer and fall; apparently comes to west slopes of the Sierra Nevada from east side localities.

DISTRIBUTION/HABITAT: Sporadic occurrence from Jeffrey pine forests down to blue oak savannah; prefers sites lacking high percent canopy cover.

SPECIAL HABITAT REQUIREMENTS: Openings.

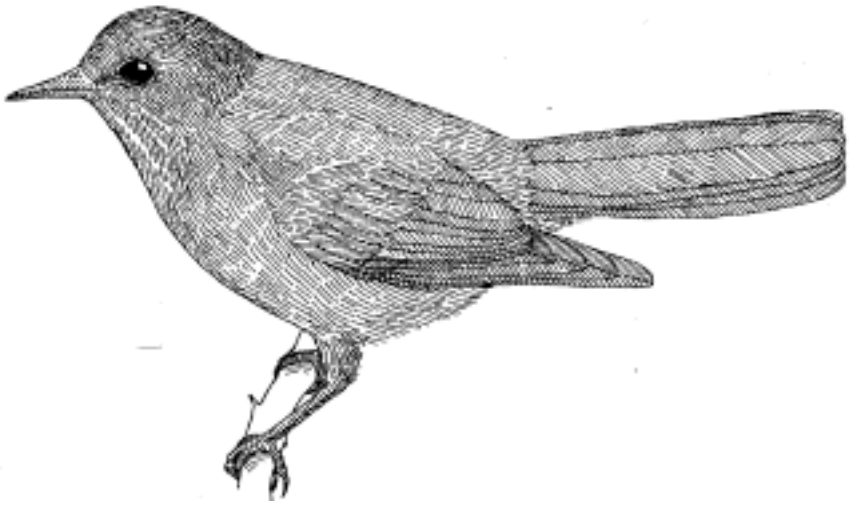
BREEDING: Does not breed in the western Sierra Nevada.

TERRITORY/HOME RANGE: One flock in New Mexico ranged over 11.2 mi^2 (29 km^2) (Ligon 1971); another in Arizona ranged over 8 mi^2 (21 km^2) (Balda and Bateman 1971).

FOOD HABITS: Pine seeds make up the majority of the diet; also eats insects, tender young pine cones, fruits, and birds' eggs and young. Feeds on the ground, on cones, foliage, and bark. Foraging techniques include gleaning, cone feeding, crevice picking, and bark flaking. Stores pine nuts.

OTHER: Flocks become nomadic when cone seed crop in home range poor. May wander hundreds of miles at such times.

REFERENCES: Balda and Bateman 1971, 1972; Balda *et al.* 1972.





Clark's Nutcracker

B118 (*Nucifraga columbiana*)

STATUS: No official listed status. Common resident; few breeding records in western Sierran zone. Probably breeds more commonly on east slope.

DISTRIBUTION/HABITAT: Breeds in variety of high altitude conifer habitats, most birds remaining above 8000 ft (2440 m) all year. Some descend to lower elevations in late summer and fall, feeding on seeds of Jeffrey, ponderosa, and sugar pines. Seldom descends below 4000 ft (1220 m). Prefers high-altitude rocky sites with sparse forest that includes pines.

SPECIAL HABITAT REQUIREMENTS: Pines.

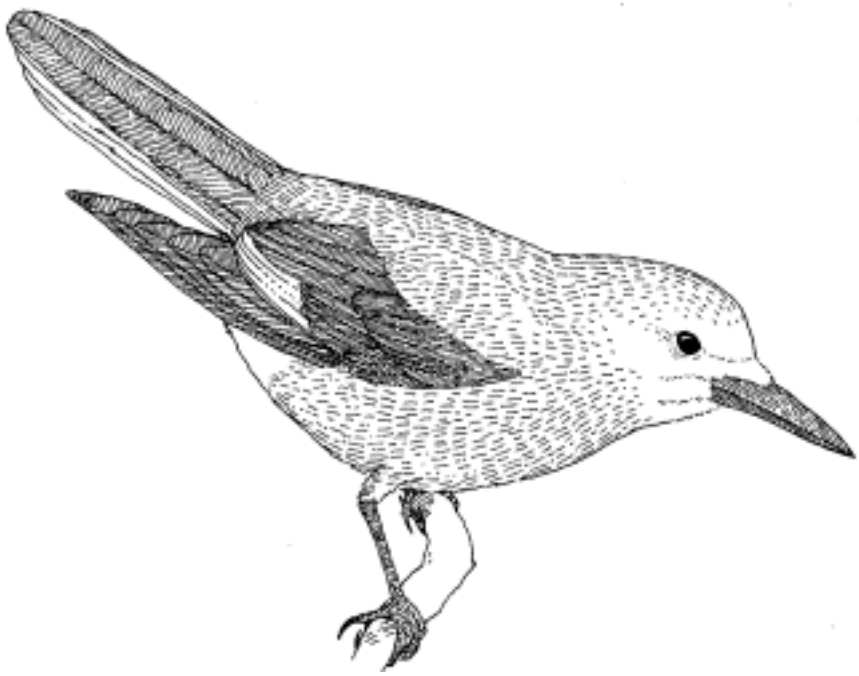
BREEDING: Breeds from late February to early August, with peak from early April to early June. Nests in a conifer, often small one, from 7 to 150 ft (2.1 to 46 m) up, though most below 50 ft (15 m). Clutch size from 2 to 6, with mode of 3.

TERRITORY/HOME RANGE: In Montana, a single breeding territory occupied 2.1 acres (0.9 ha) (Mewaldt 1956). In Mono County, Dixon (1934) reported foraging over 1.5 mi (2.4 km) from nest.

FOOD HABITS: Eats pine seeds and insects; also berries, birds' eggs and nestlings, and carrion. Obtains food from cones on trees or on ground, from foliage and bark, and from the air. Rips open cones, gleans and hawks insects.

OTHER:

REFERENCES: Dixon 1934, Mewaldt 1956, Tomback 1977.





Mountain Chickadee
B119 (*Parus gambeli*)

STATUS: No official listed status. Abundant resident.

DISTRIBUTION/HABITAT: Breeds from ponderosa pine and black oak woodland zone up through lodgepole pine forests; prefers stands with large trees and less than 70 percent canopy coverage. In fall, winter, and spring, ranges downslope into oak and pine/oak woodlands.

SPECIAL HABITAT REQUIREMENTS: Nest cavities.

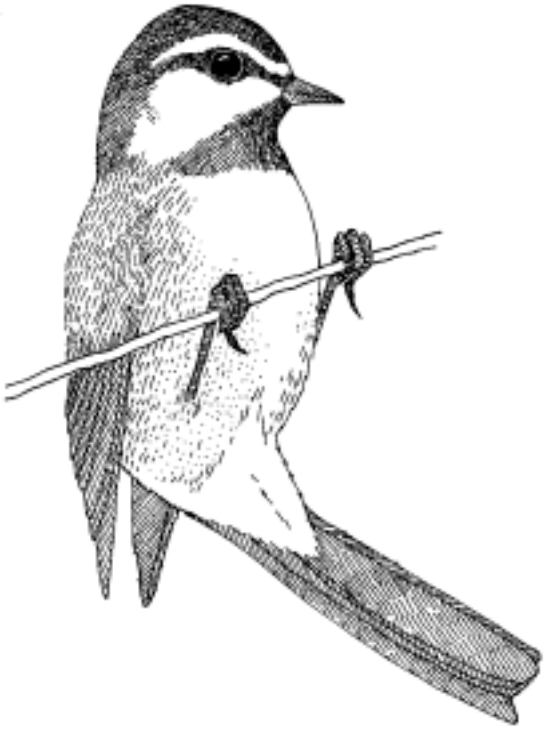
BREEDING: Breeds from early May to mid-August, with peak from late May to late July. Nests in small cavity in snag or stump, usually an abandoned woodpecker hole or, occasionally, a natural cavity. Clutch size from 5 to 9.

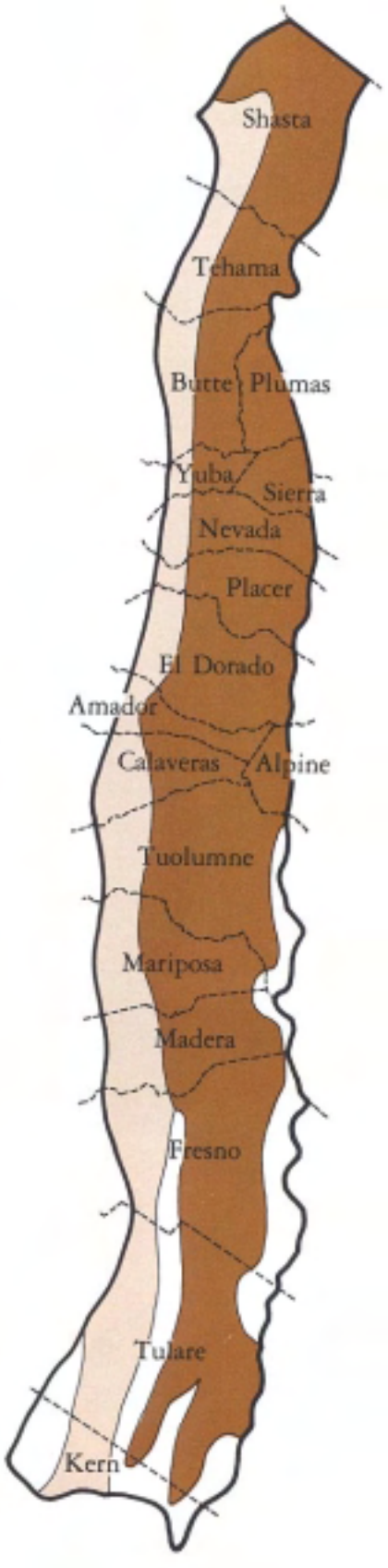
TERRITORY/HOME RANGE: In Utah, banded adults studied by Dixon and Gilbert (1964) formed winter flocks and remained in vicinity of breeding grounds; none noted to visit points more than about 0.8 mi (1.3 km) apart. In Arizona piñon-juniper-ponderosa pine ecotone, Laudenslayer and Balda (1976) indicate a mean breeding territory size of 3.7 acres (1.5 ha) while a single partial territory mapped by Minock (1971) in Utah covered at least 21 acres (8.5 ha). Discrepancy in size estimates suggests need for more field work.

FOOD HABITS: Feeds on small insects, gleaned from foliage and twigs of trees.

OTHER: Often most abundant species in winter in high elevation breeding range.

REFERENCES: Grinnell and Miller 1944, Bent 1946, Dixon and Gilbert 1964.





Chestnut-backed Chickadee

B120 (*Parus refescens*)

STATUS: No official listed status. Rare resident from the central Sierra Nevada northward.

DISTRIBUTION/HABITAT: Range extended only recently into the Sierra Nevada; now known to occur year-round. Prefers moist forests of mixed hardwoods and conifers; may be found in other habitats. Permanent resident in ponderosa pine, black oak woodland, and mixed-conifer types.

SPECIAL HABITAT REQUIREMENTS: Nest cavities.

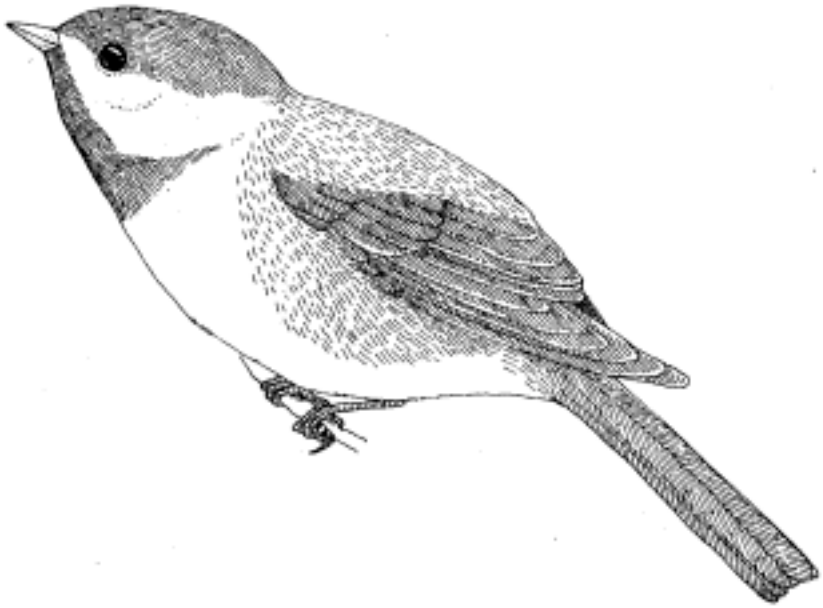
BREEDING: Breeds from late March to late July, with peak from early May to late June. Excavates own nest cavity in decaying wood in snag or stub, or uses abandoned woodpecker nest cavity. Nests usually within 10 ft (3.1 m) of ground; have been recorded as high as 80 ft (24 m). Lays from 5 to 9 eggs per clutch, usually 6 or 7.

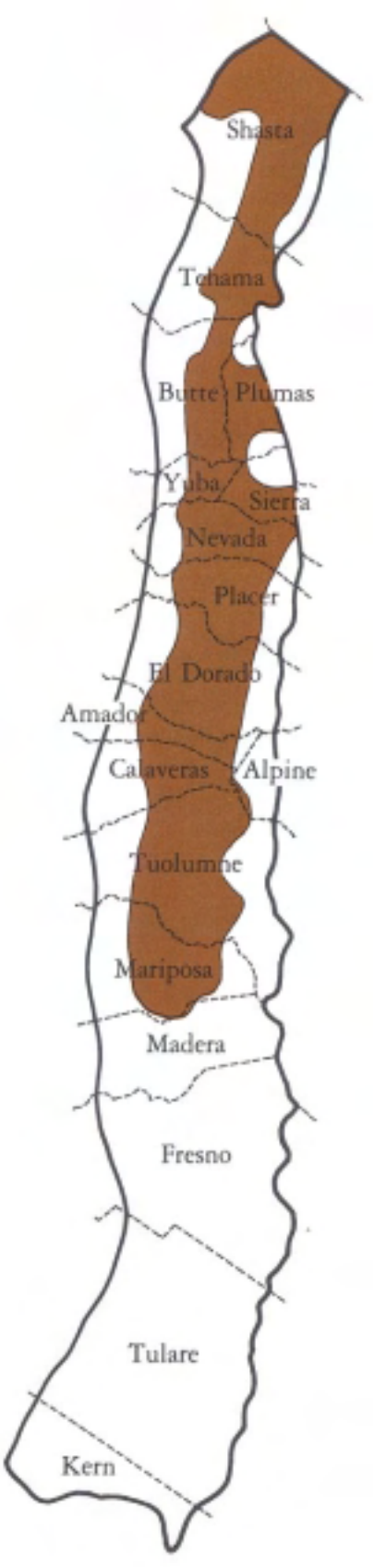
TERRITORY/HOME RANGE: No data on home range. In oak woodland in San Mateo County, Hertz *et al.* (1976) reported a mean breeding territory size of 3.3 acres (1.3 ha) (n = 2).

FOOD HABITS: Eats primarily small insects, also takes conifer seeds and fruits. Gleans food from outer foliage and twigs, preferably of conifers. Usually hovers while gleaning food.

OTHER:

REFERENCES: Sturman 1968a, 1968b; Crase 1976.





Plain Titmouse

B121 (*Parus inornatus*)

STATUS: Breeds in wooded sites from blue oak savannah up to ponderosa pine and black oak woodland types. Prefers stands with intermediate to high percentage canopy coverage and with blue live, and valley oaks.

DISTRIBUTION/HABITAT:

SPECIAL HABITAT REQUIREMENTS: Oaks; nest cavities.

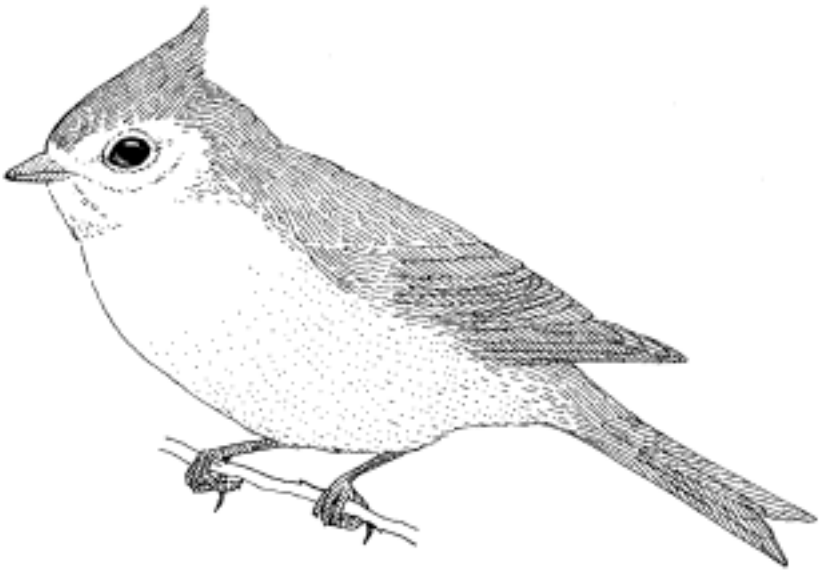
BREEDING: Breeds from mid-March to late July, with peak from early April to early June. Nests in natural cavity or old woodpecker hole; often partially excavates own cavity. Readily accepts nest boxes. Nest height ranges from 3 to 32 ft (0.9 to 9.8 m). From 3 to 9 eggs per clutch, with mode of 7.

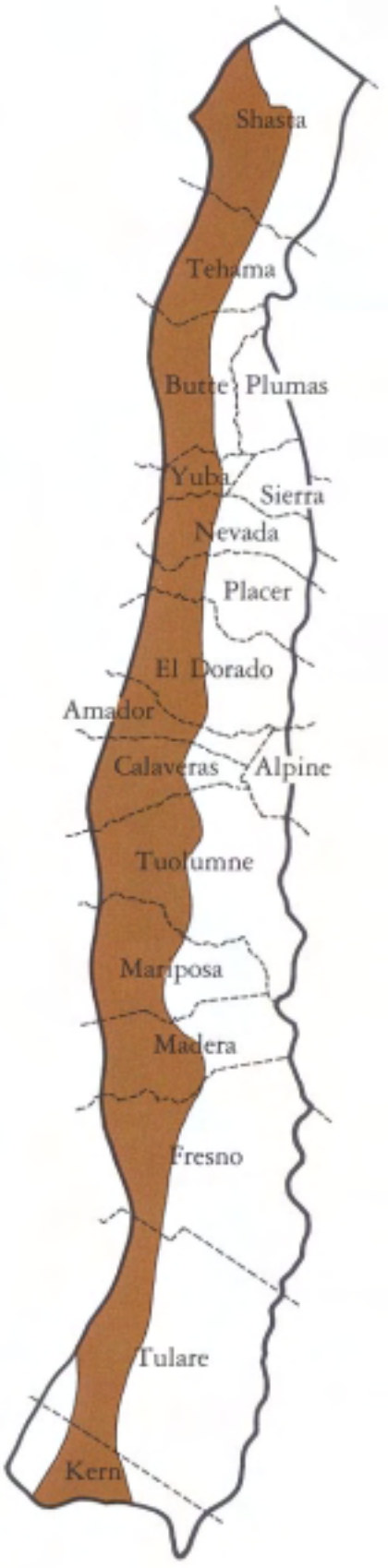
TERRITORY/HOME RANGE: Home range the same as territory. Adults permanently paired and defend territory year-round (Dixon 1949, 1956). In Alameda County, territory size ranged from 3.3 to 12.5 acres (1.3 to 5.1 ha), with mean of 6.3 acres (2.6 ha) (Dixon 1949); in another study in Alameda County live oak woodland, Dixon (1954) reported mean territory size of 5.7 acres (2.3 ha). In San Mateo County, Hertz *et al.* (1976) reported mean breeding territory size of 2.0 acres (0.8 ha) (n = 3) in oak woodlands. In Arizona, Laudenslayer and Balda (1976) found mean territory size of 3.0 acres (1.2 ha) in piñon-juniper-ponderosa pine ecotone.

FOOD HABITS: Eats small insects, fruits, and seeds. Gleans food mostly from tree foliage, twigs, and branches, also from the herb/grass layer. Sometimes pulls off bark and pries open galls, flowers, lichens, and others.

OTHER:

REFERENCES: Dixon 1949, 1954, 1956; Hertz *et al.* 1976.





Bushtit

B122 (*Psaltriparus minimus*)

STATUS: No official listed status. Common resident.

DISTRIBUTION/HABITAT: Breeds in blue oak savannahs and digger pine-oak woodlands; prefers stands of low percent canopy coverage. Also breeds in intermediate to high density chaparral stands. After breeding season, moves upslope in fairly large numbers into ponderosa pine and black oak types, remaining until early fall.

SPECIAL HABITAT REQUIREMENTS: Oaks; trees/shrubs.

BREEDING: Breeds from mid-February to early August, with peak from early April to early June. Nest has shape of long bag or pouch suspended from branch of tree or shrub, often not concealed by foliage. Nest height ranges from 4 to 50 ft (1.2 to 15 m); most nests within 15 ft (4.6 m) of ground. Clutch contains from 4 to 7, with mode of 6.

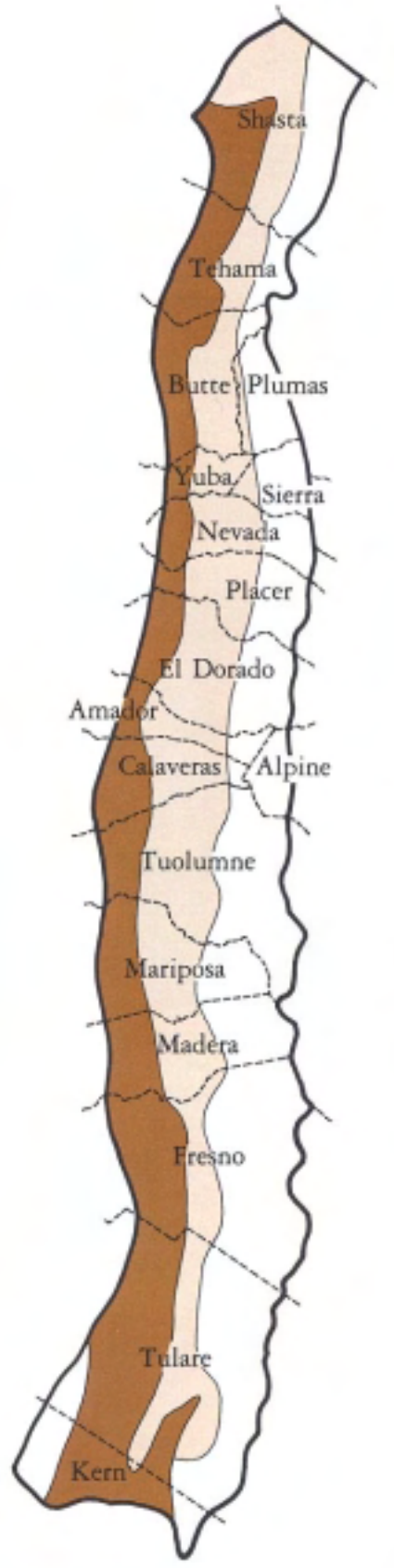
TERRITORY/HOME RANGE: In Santa Barbara County, Ervin (1974) shows maps of winter home ranges, but sizes not given. In a northern Arizona pinon-juniper-ponderosa pine ecotone, Laudenslayer and Balda (1976) reported an average territory size of about 3.5 acres (1.4 ha). In San Mateo County, Hertz *et al.* (1976) reported breeding territory sizes in oak woodland ranging from 0.7 to 1.3 acres (0.3 to 0.5 ha) with mean of 1.0 acre (0.4 ha) (n = 12).

FOOD HABITS: Feeds mainly on small insects; takes some seeds and even nectar. Gleans food from foliage and twigs of trees and shrubs. Forages in flocks from late summer until breeding season.

OTHER:

REFERENCES: Grinnell and Miller 1944, Bent 1946, Ervin 1974.





White-breasted Nuthatch

B123 (*Sitta carolinensis*)

STATUS: No official listed status. A common permanent resident in suitable habitat.

DISTRIBUTION/HABITAT: Prefers large oaks or other large-limbed, rough-barked species, especially ponderosa or Jeffrey pine, particularly with low to intermediate canopy cover, as breeding habitats. Also nests in conifer forests from ponderosa pine up to lodgepole pine type, again with preference for low to intermediate crown cover, and for stands with larger trees at higher elevations. No evidence of altitudinal migration.

SPECIAL HABITAT REQUIREMENTS: Nest cavities.

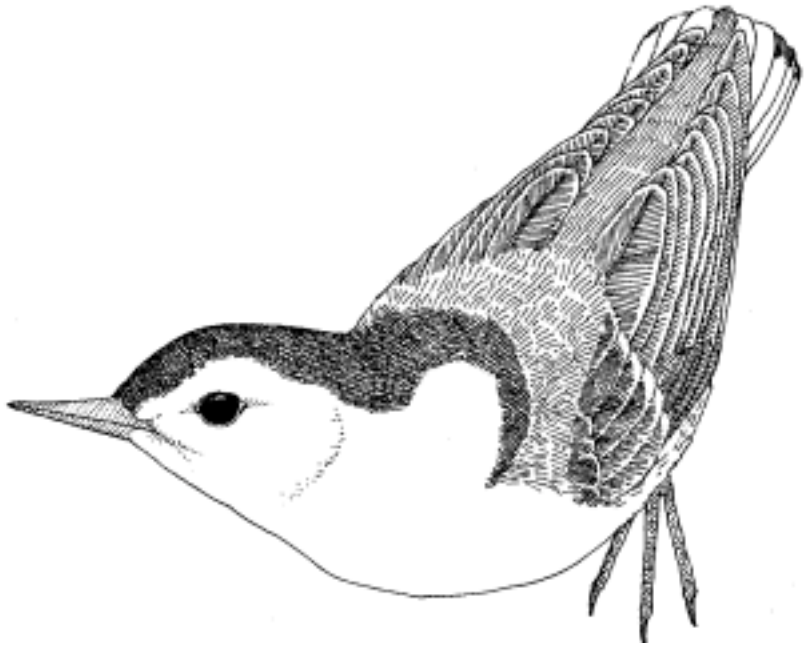
BREEDING: Breeds from mid-March to early August, with peak from early May to late June. Clutch size from 5 to 9, with mean of 7.5. Nests in natural cavity or woodpecker hole in dead or partly dead tree.

TERRITORY/HOME RANGE: In New Hampshire, Kilham (1972) reported that territories approximate 37 acres (15 ha), while in Colorado, Hering (1948) noted feeding territories of two breeding pairs of 1.7 and 2.3 acres (0.7 and 0.9 ha). In Kansas, Fitch (1958) reported home range of one bird as 37 acres (15 ha).

FOOD HABITS: Insects comprise the major food source during breeding season; at other times insects, acorns, and large seeds eaten. Gleans insects from bark of live and dead tree trunks and branches. Stores acorns and seeds for winter; food caches defended.

OTHER: Suffers when large conifers logged. Little field study done in recent decades.

REFERENCES: Kilham 1972.





Red-breasted Nuthatch

B124 (*Sitta canadensis*)

STATUS: No official listed status; abundant permanent resident in suitable habitat.

DISTRIBUTION/HABITAT: Widely distributed in conifer forest types from Ponderosa pine belt up to lodgepole forests; prefers breeding in areas with at least pole-sized trees and tight-foliaged types, such as firs. Some downslope migration in fall; may be found in fall, winter, and spring as low as blue oak savannahs.

SPECIAL HABITAT REQUIREMENTS: Snags or nest cavities.

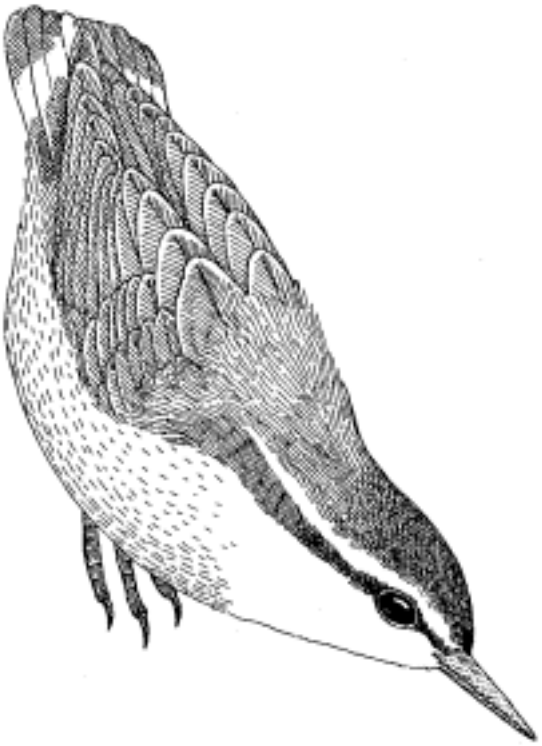
BREEDING: Breeds from late April to early August, with peak activity from early June to late July. Clutch size from 4 to 7, usually contains 5 or 6. Excavates own nest cavity, less often uses old woodpecker hole, from 2 to 120 ft (0.6 to 37 m) above ground, in dead tree or rotton stub on living tree. Pitch smeared at the nest opening.

TERRITORY/HOME RANGE: No information.

FOOD HABITS: Gleans insects from trunk and branches of trees, rarely from foliage. Also probes for insects in bark crevices. Eats conifer seeds in significant amounts.

OTHER:

REFERENCES: Kilham 1973.





Pygmy Nuthatch

B125 (*Sitta pygmaea*)

STATUS: No official listed status. Locally common permanent resident; may be somewhat erratic in occurrence.

DISTRIBUTION/HABITAT: More common in southern than in northern Sierra Nevada; confined to ponderosa pine, mixed-conifer, and Jeffrey pine forests with mature trees and less than 70 percent canopy coverage.

SPECIAL HABITAT REQUIREMENTS: Pines; snags or nest cavities.

BREEDING: Breeds from late April to mid-August, with peak between mid-June and late July. From 5 to 9 eggs (mean of 7) laid in cavity nest in dead, decayed tree trunk or stub. Excavates nest cavity or uses old cavity, from 10 to 50 ft (3.1 to 15 m) above ground (usually above 20 ft [6.1 m]).

TERRITORY/HOME RANGE: Territorial during the breeding period; apparently not during winter. No information available on home range, if different from territory. In a Marin County coastal pine forest, territory size ranged from 1.9 to 3.3 acres (0.8 to 1.3 ha) and averaged 2.7 acres (1.1 ha) (Norris 1958).

FOOD HABITS: Insectivorous in the breeding season, expands diet in nonbreeding period to include pine seeds. Food gleaned from terminal needle clusters, cones, and new shoots of pines, usually high in trees.

OTHER: Roosts in tree cavities, often communally, as many as 150 birds reported in one cavity (Knorr 1957); apparently a heat conservation adaptation practiced during cold periods.

REFERENCES: Norris 1958, Bock 1969.





Brown Creeper

B126 (*Certhia familiaris*)

STATUS: No official listed status. Common permanent resident in suitable habitat; more often heard than seen.

DISTRIBUTION/HABITAT: Found in all conifer types in the breeding season; prefers mature stands with at least 70 percent canopy coverage. In nonbreeding periods may be found at lower elevations, into blue oak savannahs.

SPECIAL HABITAT REQUIREMENTS:

BREEDING: Breeds from early April to mid-August, with peak activity from mid-June to mid-July. Clutch size from 4 to 8, most contain 5 or 6. Nests from 3 to 15 ft. (0.9 to 4.6 m) up, behind loose strips of bark on tree trunks. Prefers incense-cedar for nest sites, but uses other conifers in the western Sierra Nevada.

TERRITORY/HOME RANGE: No information.

FOOD HABITS: Exclusively insectivorous; gleans food from bark surface and probes bark crevices on tree trunks and large branches.

OTHER: No detailed life history available.

REFERENCES: Bent 1948.





Wrentit

B127 (*Chamaea fasciata*)

STATUS: No official listed status. Common permanent resident in suitable habitat.

DISTRIBUTION/HABITAT: A common chaparral species, breeds also in other habitat types with suitably dense stands of shrubs, up to ponderosa pine and black oak types. Adults sedentary; immatures may move upslope in late summer.

SPECIAL HABITAT REQUIREMENTS: Dense shrubs.

BREEDING: Breeds from late March to mid-September, with peak from late May to early July. Clutch size from 3 to 5, most contain 4. Nests well concealed within shrubbery, usually 1 to 4 ft (0.3 to 1.2 m) above ground, though sometimes as high as 7 ft (2.1 m).

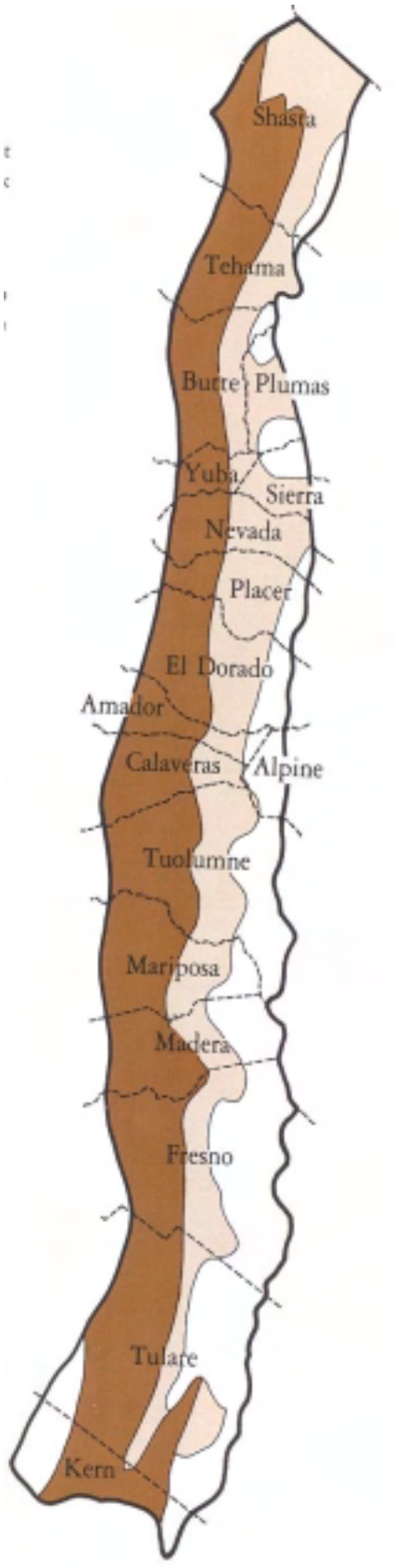
TERRITORY/HOME RANGE: In Alameda County, territory and home range the same, averaging 0.8 acre (0.32 ha), with a range from 0.5 to 2.7 acres (0.2 to 1.1 ha), based on a study of 40 territories where defended year-round (Erickson 1938). In Los Angeles County, Cogswell (1962) found territory size to average 1.3 acres (0.5 ha), with a .range of 0.5 to 3.0 acres (0.2 to 1.2 ha), based on 361 breeding territories.

FOOD HABITS: Eats primarily insects, spiders, and small fruits. Gleans from bark of twigs, from leaf surfaces, and from fruiting stems.

OTHER:

REFERENCES: Erickson 1938, Cogswell 1962.





Dipper
B128 (*Cinclus mexicanus*)

STATUS: No official listed status. Fairly common permanent resident in suitable habitats.

DISTRIBUTION/HABITAT: Almost totally confined to flowing, rocky streams and rivers, but occasionally forages along alpine lakeshores. Some move downslope as streams freeze in winter. Recorded at all elevations in the western Sierra Nevada up to 11,600 ft (3540 m).

SPECIAL HABITAT REQUIREMENTS: Clear, permanent streams or rivers.

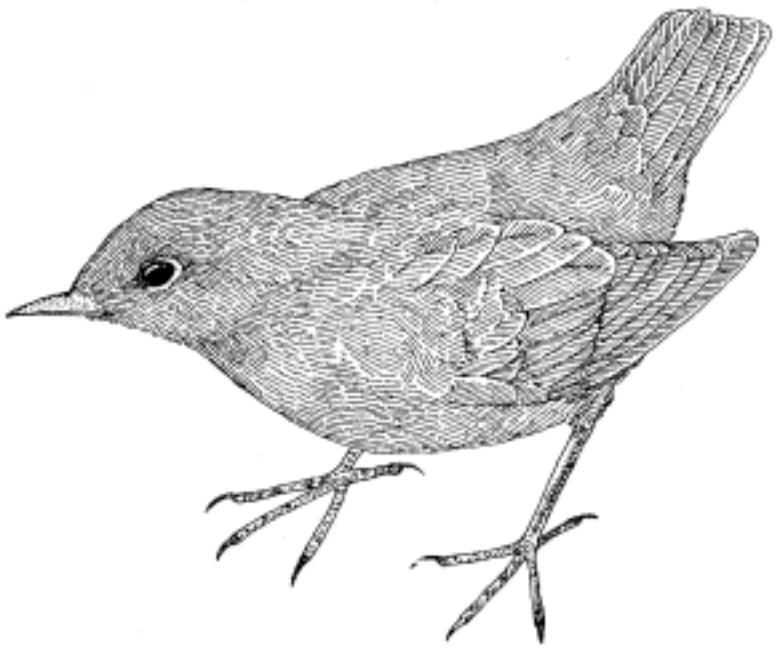
BREEDING: Breeds from early March to early August, with peak from early June to mid-July. Clutch size from 3 to 6; most contain 4 or 5. Nests in recess or on ledge, usually within 3 to 6 ft (1 to 2 m) of stream surface, on inaccessible rock wall, log, or other structure, such as a bridge.

TERRITORY/HOME RANGE: Defends certain length of stream, up to 1050 ft (320 m) in length in breeding season, and from 150 to 2700 ft (46 to 820 m) during nonbreeding period, based on a Montana study (Bakus 1959b). Territory and home range the same.

FOOD HABITS: Eats mainly aquatic insect larvae and adults, snails, and fish fry. Takes directly from water or gleans from rock surfaces under water. Captures some insects in the air by hawking.

OTHER: Stream diversion projects especially detrimental to species.

REFERENCES: Hann 1950; Bakus 1959a, 19596; Thut 1970.





Winter Wren

B129 (*Troglodytes troglodytes*)

STATUS: No official listed status. Uncommon permanent resident in suitable habitat; some upslope movement in fall.

DISTRIBUTION/HABITAT: Breeds usually near a stream in mature, relatively dense and well-shaded stands of ponderosa pine and mixed conifer, as well as in mid-elevation, deciduous riparian habitat. In fall, moves up into fairly dense stands of Jeffrey pine, red fir, and lodgepole pine; does not remain there over winter.

SPECIAL HABITAT REQUIREMENTS: Litter, logs in dense tangles; natural cavities.

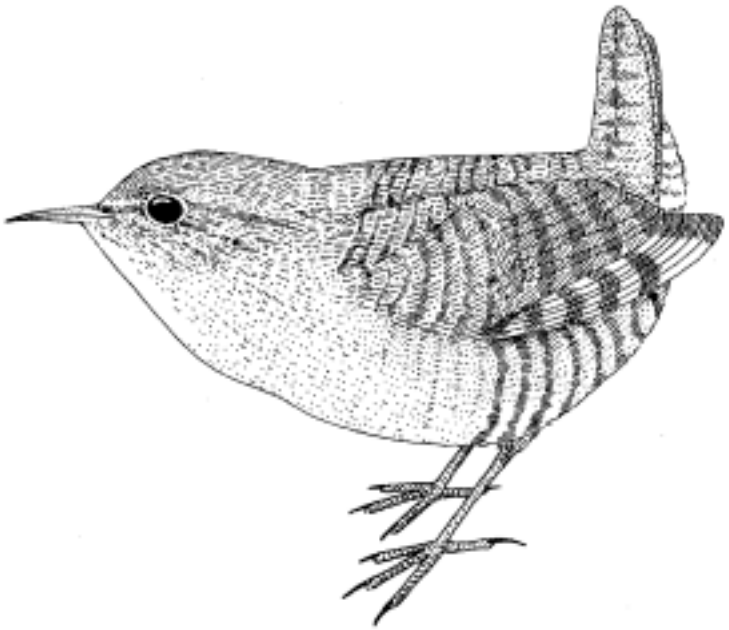
BREEDING: Breeds from early March to late August, with peak from mid-May to late July. May rear two broods per season. Clutch size from 4 to 7, usually 5 or 6. Nests in natural recess or cavity in or under log or in root tangle.

TERRITORY/HOME RANGE: Territory and home range the same, ranging year-round from 0.75 to 3.0 acres (0.3 to 1.2 ha), with average around 1.75 acres (0.7 ha), based on a study in Holland (Armstrong 1955).

FOOD HABITS: Gleans larval and adult insects from ground or near ground in tangled vegetation or downed .wood.

OTHER: North American forms not studied well in the field. Uncommon and inconspicuous in the western Sierra Nevada, and distribution not well defined. More common in fall and winter than during breeding season.

REFERENCES: Armstrong 1955.





House Wren

B130 (*Troglodytes aedon*)

STATUS: No official listed status. Fairly common summer visitor at lower elevations, moving upslope in late summer, apparently after breeding.

DISTRIBUTION/HABITAT: Nests in all successional stages except grass/forb and dense forest canopies from blue oak savannah up to ponderosa pine forests and black oak woodlands. Prefers areas with low percentage canopy coverage; generally requires trees. Often found at edges of forests, woodlands, or meadows. In late summer may be found in wet meadows and willow thickets almost up to timberline.

SPECIAL HABITAT REQUIREMENTS: Nest cavities; trees/shrubs.

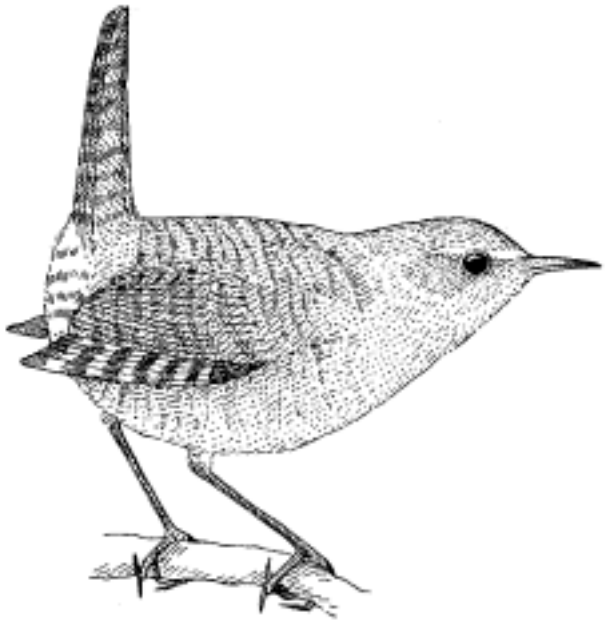
BREEDING: Breeds from early April to mid-August, with peak from late May to early July. Usually produces two broods per season. Clutch size from 3 to 9, with 5 or 6 most common. Nests in natural cavity or woodpecker hole in tree, or hole in building. Nests usually within 10 ft (3.1 m) of ground; may be as high as 30 ft (9.1 m).

TERRITORY/HOME RANGE: No information on home range size. In Oregon, territory size averaged 2.3 acres (0.9 ha), with range of 1.1 to 4.4 acres (0.5 to 1.8 ha) in 14 breeding territories (Kroodsma 1973). In Ohio, 178 breeding territories averaged 1.0 acre (0.4 ha), with range from 0.08 to 3.6 acres (0.03 to 1.5 ha) (Kendeigh 19416).

FOOD HABITS: Gleans insects from foliage and litter within and beneath shrubs.

OTHER: Males typcially fill unused nest cavities in territories with sticks.

REFERENCES: Kendeigh 1941b, Kroodsma 1973.





Bewick's Wren

B131 (*Thryomanes bewickii*)

STATUS: No official listed status; on the 1978 Audubon Society Blue List; apparently not declining in the western Sierran zone. A common permanent resident in suitable habitat.

DISTRIBUTION/HABITAT: Breeds in shrub and tree stages from blue oak savannah up to ponderosa pine and black oak types; prefers areas with low percent canopy coverage. Also nests in riparian deciduous habitats up to about 5000 ft (1520 m). Some occasionally move upslope in late summer.

SPECIAL HABITAT REQUIREMENTS: Natural tree cavity or rock crevice for nesting; trees/shrubs.

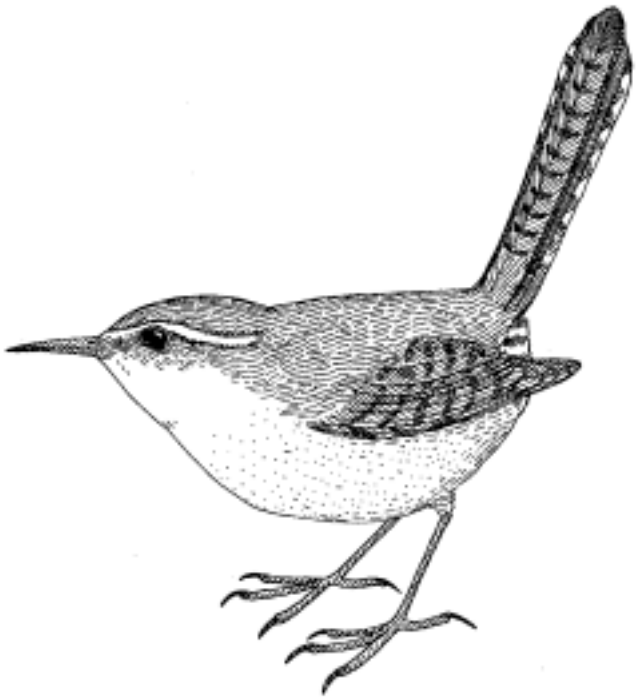
BREEDING: Breeds from mid-Feburary to early August, with peak from mid-May to late June. Clutch size from 4 to 11, most contain 7. Nests in cavities in ground or within a meter or so above it, in dead trees, rock crevices, manmade structures, and other places.

TERRITORY/HOME RANGE: Home range and territory the same. In Los Angeles County, 65 territories averaged 5.8 acres (2.4 ha), with range from 2.5 to 17 acres (1.0 to 6.9 ha) (Cogswell 1962). In an Oregon oak woodland, Kroodsma (1973) studied 34 territories, finding a range from 3.1 to 11.8 acres (1.3 to 4.8 ha) and an average of 5.7 acres (2.3 ha).

FOOD HABITS: Gleans small insects from low limbs and branches, under dense cover.

OTHER:

REFERENCES: Miller 1941, Cogswell 1962, Kroodsma 1973.





Long-billed Marsh Wren

B132 (*Cistothorus palustris*)

STATUS: No official listed status. Rare transient at lower altitudes in late summer and early fall. No breeding records above 1000 ft (305 m).

DISTRIBUTION/HABITAT: Prefers cattails, bulrushes, or other emergent wetland vegetation; sometimes feeds in drier upland sites near water during migration or winter periods. In the western Sierra Nevada, recorded in late summer to early fall in marsh or marsh-like habitats in all vegetation types from annual grasslands up to mixed-conifer zone.

SPECIAL HABITAT REQUIREMENTS: Marsh.

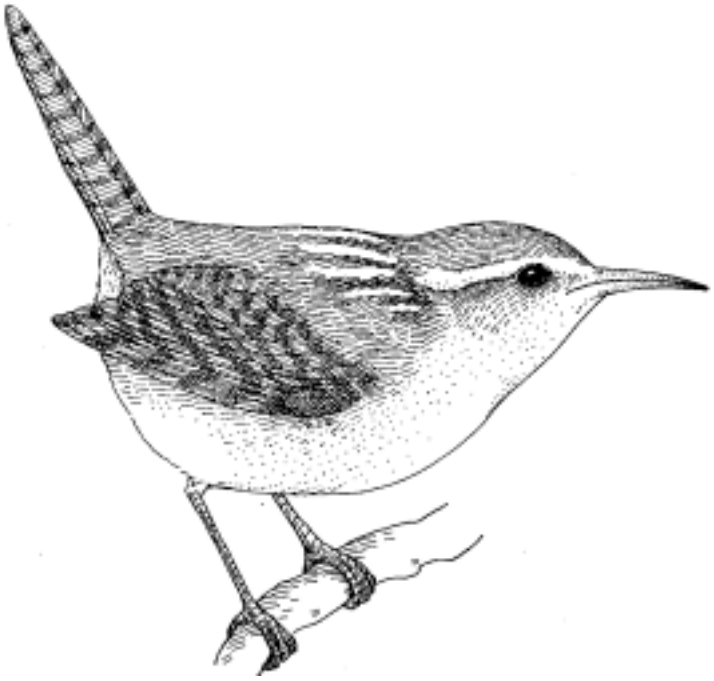
BREEDING: Does not breed in the western Sierra Nevada.

TERRITORY/HOME RANGE: Probably none established in the western Sierran zone.

FOOD HABITS: Eats insects, spiders, and other small invertebrates found in habitat. Gleans food from emergent vegetation, damp ground, and water surface. Sometimes hawks for aerial insects.

OTHER:

REFERENCES: Welter 1935, Kale 1965, Verner 1965.





Canon Wren

B133 (*Catherpes mexicanus*)

STATUS: No official listed status in our area. Uncommon resident in suitable habitat.

DISTRIBUTION/HABITAT: Prefers cool, shaded canyons with exposed rock outcrops. May be found in any habitat type from annual grasslands up to Jeffrey pine forests, but confined to canyons in all types and usually found in the vicinity of water. More common at lower elevations.

SPECIAL HABITAT REQUIREMENTS: Small cliffs, talus, or rock outcrops.

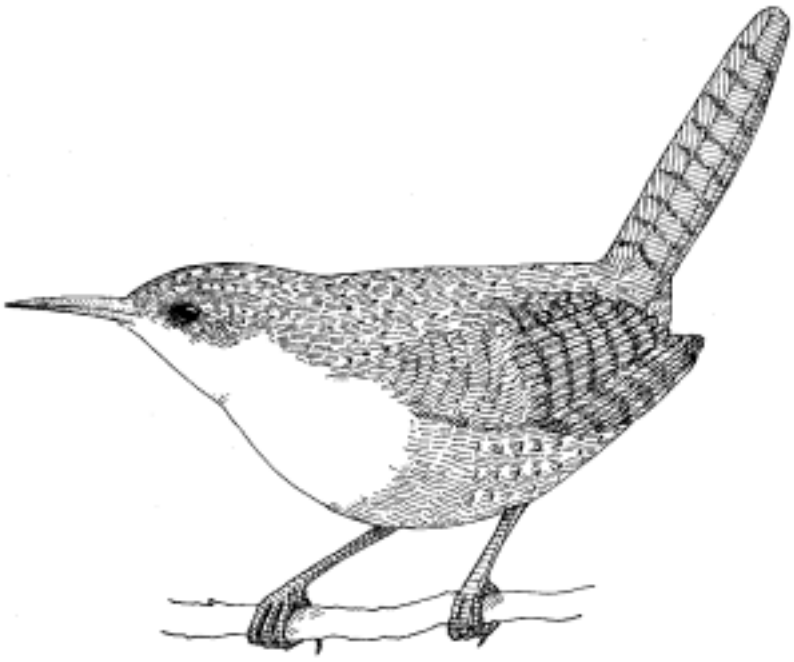
BREEDING: Breeds from mid-March to mid-August, with peak from early May to late June. Clutch size from 4 to 6, most contain 5 or 6. Nests on ledge in rock cavern, in crevice in cliff or bank, or attaches nest to rock face in cave or wide crevice.

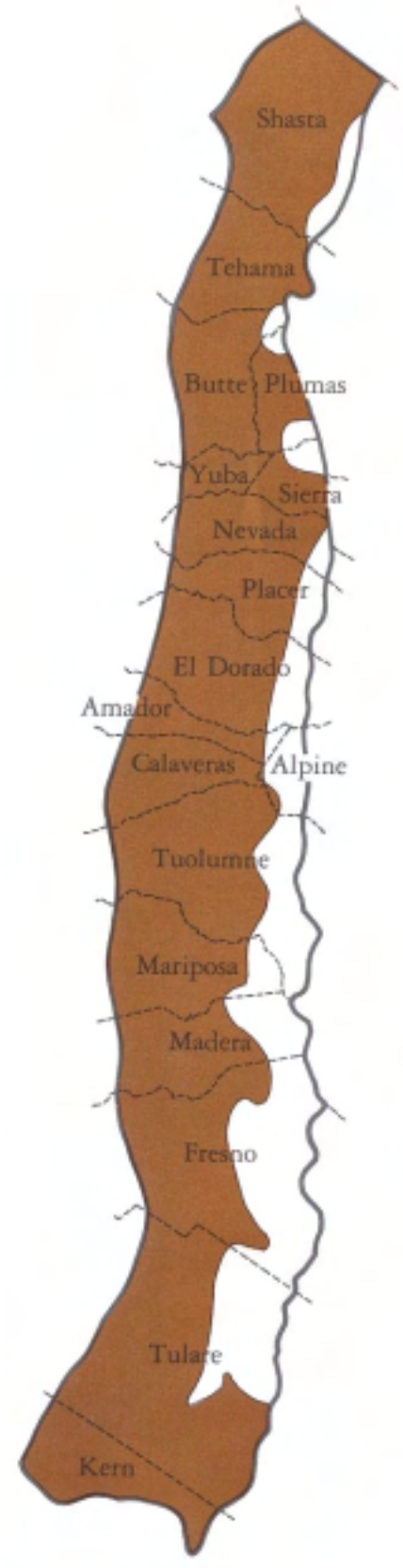
TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Gleans insects and spiders from surfaces of rock or earth, often in concealed situations. Hops or creeps while searching for food.

OTHER:

REFERENCES: Tramontano 1964.





Rock Wren

B134 (*Salpinctes obsoletus*)

STATUS: No official listed status. Fairly common resident in suitable habitat.

DISTRIBUTION/HABITAT: Inhabits rock outcrops, talus slopes, fractured cliff faces, and dry earth banks. Requires rough surface with crevices for foraging and cover. On west slopes of the Sierra Nevada, most common below montane coniferous forest and above timberline. Altitude of winter range unknown.

SPECIAL HABITAT REQUIREMENTS: Talus; rock outcrops.

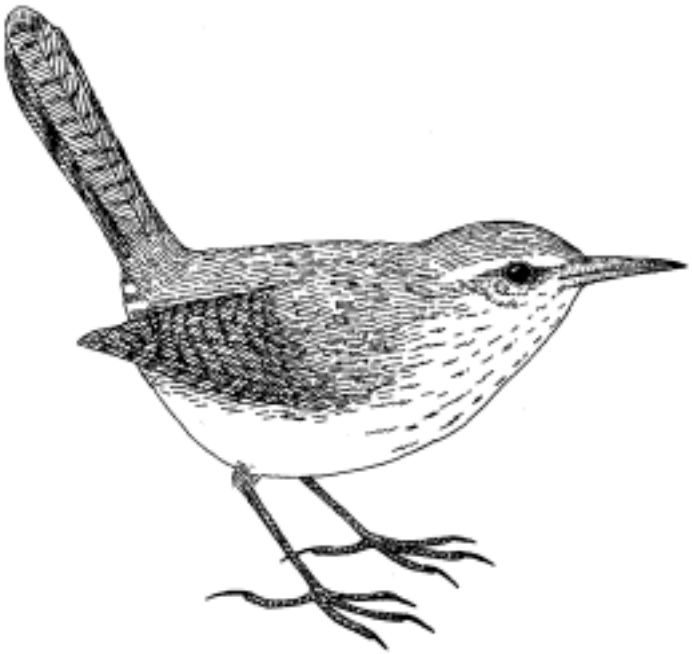
BREEDING: Breeds from early February to early September, with peak from early May to early July (may rear two broods per season). Clutch size from 4 to 10, most contain 5 or 6. Nests under large boulders, in rodent cavities in banks, or in cavities and crevices among loose rocks.

TERRITORY/HOME RANGE: Unknown, although Ainley (1971) reported a pair foraged from 16 to 164 ft (4.9 to 50 m) from nest on Farallone Islands.

FOOD HABITS: Gleans insects and spiders from boulders, rocks, barren ground, in the open or in crevices. Runs while searching for food.

OTHER: Tolerates extremely arid conditions.

REFERENCES: Tramontano 1964.





Mockingbird

B135 (*Mimus polyglottos*)

STATUS: No official listed status. Uncommon resident at lower elevations in the western Sierra Nevada.

DISTRIBUTION/HABITAT: Found in shrub and early tree stages of oak, digger pine-oak, and chaparral types. The upper altitudinal limit unclear from literature; probably resident locally but not common above 1000 ft (305 m). Often found in residential areas, agricultural areas, and edges of brushland and woodland.

SPECIAL HABITAT REQUIREMENTS: Trees/shrubs.

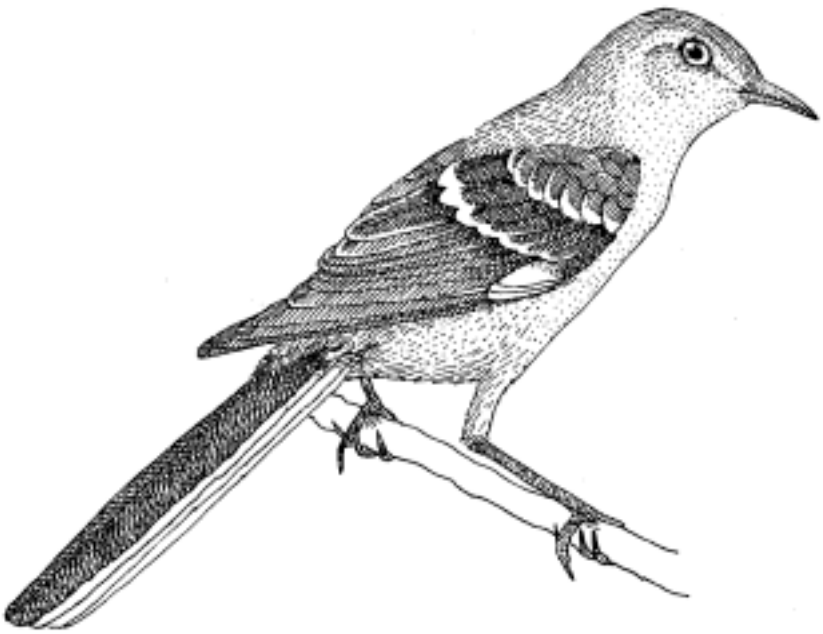
BREEDING: Breeds from early February to mid-September, with peak from early May to early July (usually two broods per season). Clutch size from 3 to 6, with 4 or 5 most common. Nests in variety of shrubs, small trees, or tangles of vines, usually below 6 ft (2 m), but occasionally as high as 40 ft (12 m).

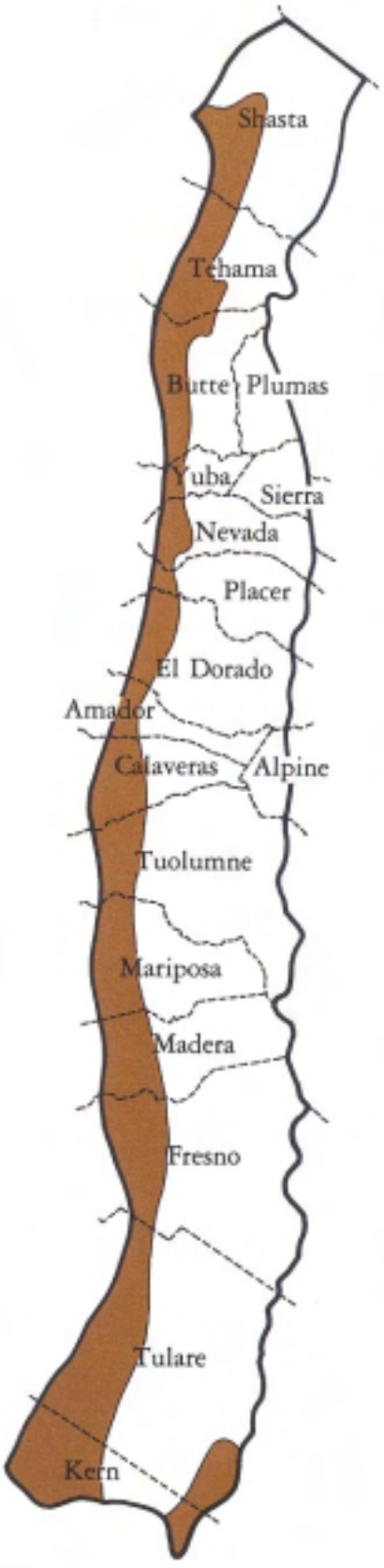
TERRITORY/HOME RANGE: Home range and territory the same. Five breeding territories studied in residential area in Pasadena averaged 1 acre (0.4 ha), with range from 0.6 to 1.4 acres (0.2 to 0.6 ha) (Michener and Michener 1935). In Arizona desert, Hensley (1954) reported two territories at 7.1 and 8.2 acres (2.9 and 3.3 ha), and in Texas, Howard (1974) found range among 10 territories of 1.5 to 6.2 acres (0.6 to 2.5 ha) with mean of 2.8 acres (1.1 ha).

FOOD HABITS: Eats mainly insects during breeding season and fruit and insects in nonbreeding period. Takes insects from ground by dropping from perch; gleans from foliage; and hawks from the air.

OTHER:

REFERENCES: Michener and Michener 1935, Laskey 1962, Adkisson 1966.





California Thrasher

B136 (*Toxostoma redivivum*)

STATUS: No official listed status. Fairly common permanent resident in suitable habitat.

DISTRIBUTION/HABITAT: Breeds in brush and early tree stages in blue oak savannah, digger pine-oak, chaparral, and riparian deciduous types. Avoids dense tree canopies.

SPECIAL HABITAT REQUIREMENTS: Dense shrubs.

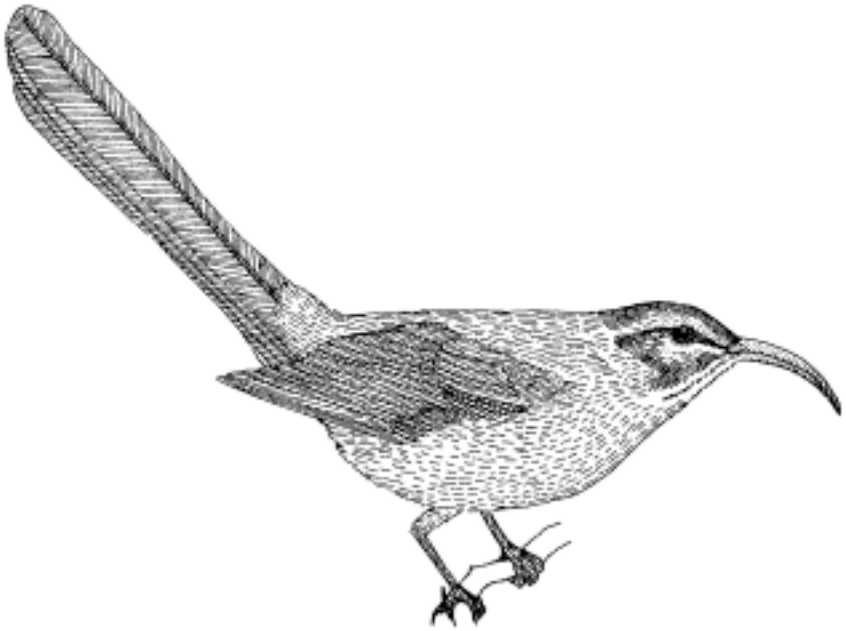
BREEDING: Breeds from early December to early August, with peak from mid-April to mid-June. Usually rears two broods per season. Clutch size from 2 to 4, most contain 3. Nests near ground, well inside large bush or scrubby tree, screened from outside view.

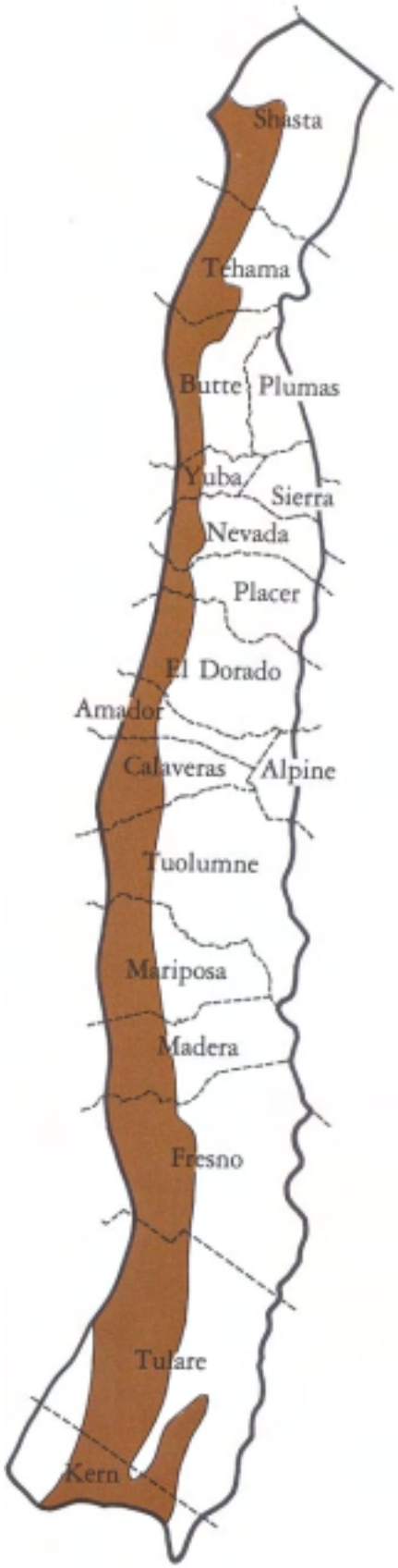
TERRITORY/HOME RANGE: Territory and home range the same. Four territories studied during breeding season in Santa Monica Mtns., Los Angeles County, in chaparral, averaged 3.5 acres (1.4 ha) (Kingery 1962).

FOOD HABITS: Takes insects, spiders, fruits, and seeds from plant litter and soft soil. Rakes away litter with bill, digs in litter or soil, and picks fruit from shrubs.

OTHER: No detailed, recent life history study.

REFERENCES: Sargent 1940, Kingery 1962.





American Robin

B137 (*Turdus migratorius*)

STATUS: No official listed status. Abundant year-round, with some seasonal absences at lower elevations in spring and summer and at higher elevations in winter.

DISTRIBUTION/HABITAT: Breeds in forested sites from ponderosa pine, black oak woodland zone up to lodgepole pine forests. Prefers areas with low percent canopy coverage. Congregates where ripening fruit abundant. Forms large flocks in nonbreeding period, and few may winter at high elevations, for example, Tuolumne Meadows, in Yosemite National Park (T. Hargis, pers. commun.).

SPECIAL HABITAT REQUIREMENTS: Water (for mud in nest building); openings.

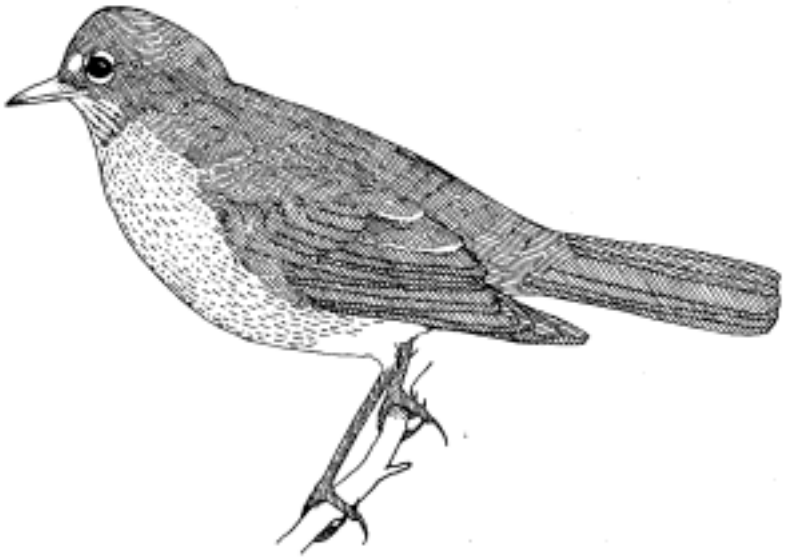
BREEDING: Breeds from early April to mid-July, with peak from mid-May to mid-June. Nests on limbs of conifers or broadleaved trees, or in large shrubs, usually in or near clearings. Nest height ranges from 1 to 75 ft (0.3 to 23 m); most between 10 and 15 ft (3.1 and 4.6 m). Clutch size from 3 to 4, with mean of 3.5.

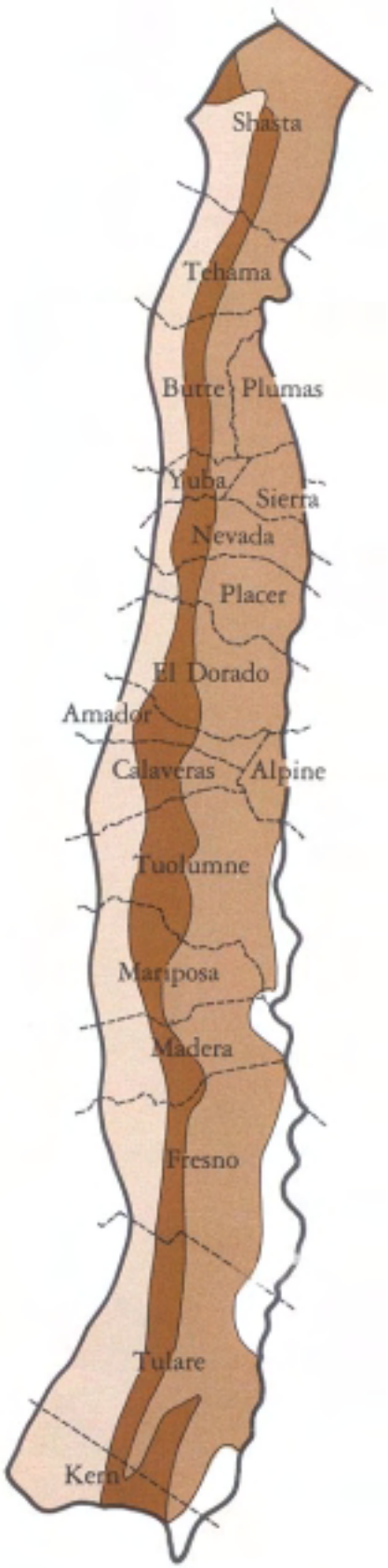
TERRITORY/HOME RANGE: In Massachusetts, home range averaged about 1320 ft (400 m) radius around nest (Hirth *et al.* 1969). In Wisconsin territories ranged from 4800 to 26,000 ft^2 (445 to 2420 m^2), with average of 13,000 ft^2 (1210 m^2) (Young 1951).

FOOD HABITS: Earthworms and insects (70 percent of diet); seeds, berries, fruit, stems, and grass blades (30 percent). Searches on the ground, probing and scratching for food; also picks berries.

OTHER:

REFERENCES: Grinnell and Storer 1924, Howell 1942, Bent 1949.





Varied Thrush

B138 (*Ixoreus naevius*)

STATUS: No official listed status. Irregular fall and winter visitor to low and middle elevations; fall migrant at higher elevations.

DISTRIBUTION/HABITAT: Found sparingly in fall from blue oak savannahs up to lodgepole pine forests, and in winter from ponderosa pine and black oak woodlands downward. Numbers fluctuate widely from year-to-year in response to berry production.

SPECIAL HABITAT REQUIREMENTS:

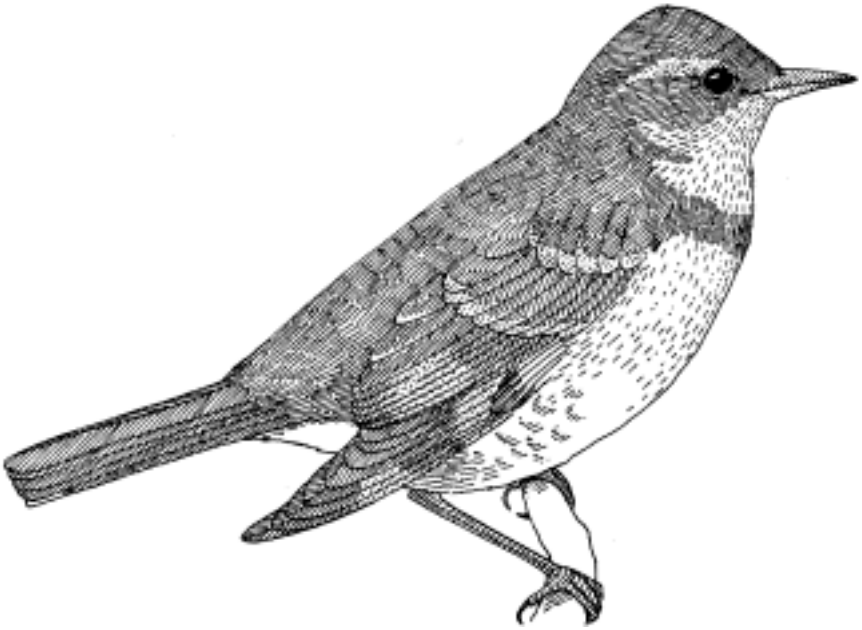
BREEDING: Does not breed in the western Sierra Nevada.

TERRITORY/HOME RANGE: No data on home range; not territorial in fall and winter.

FOOD HABITS: Takes berries (for example, toyon, manzanita), seeds, mast, insects, and spiders from the ground, from foliage by gleaning, and from fruiting stems.

OTHER:

REFERENCES: Grinnell and Miller 1944, Bent 1949, Martin 1970.





Hermit Thrush

B139 (*Catharus guttata*)

STATUS: No official listed status. Common summer resident at middle and high elevations; fall visitor at all elevations; and fairly common winter resident below snow level.

DISTRIBUTION/HABITAT: Breeds in forested sites from ponderosa pine and black oak woodland types up to lodgepole pine forests, especially at higher elevations and in forests with intermediate to high percent canopy coverage. In fall and winter, ranges downslope as far as blue oak savannahs. Absent in winter in mixed-conifer and higher forests.

SPECIAL HABITAT REQUIREMENTS:

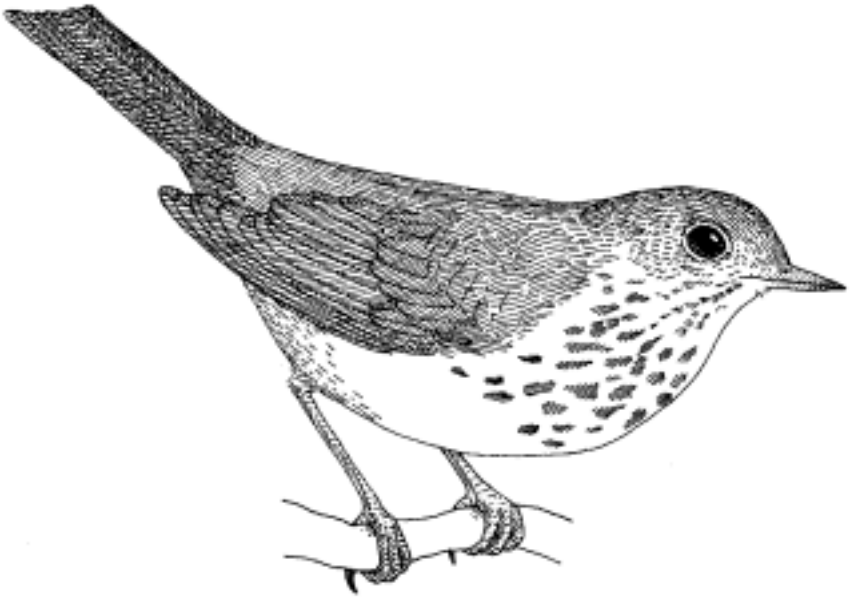
BREEDING: Breeds from mid-May to late July, with peak from late May to late June. Nests usually 2 to 15 ft (0.6 to 4.6 m) above ground in shaded groves of small trees with open views from nest. Occasionally nests on the ground. Clutch size from 3 to 5, with mean of 4.

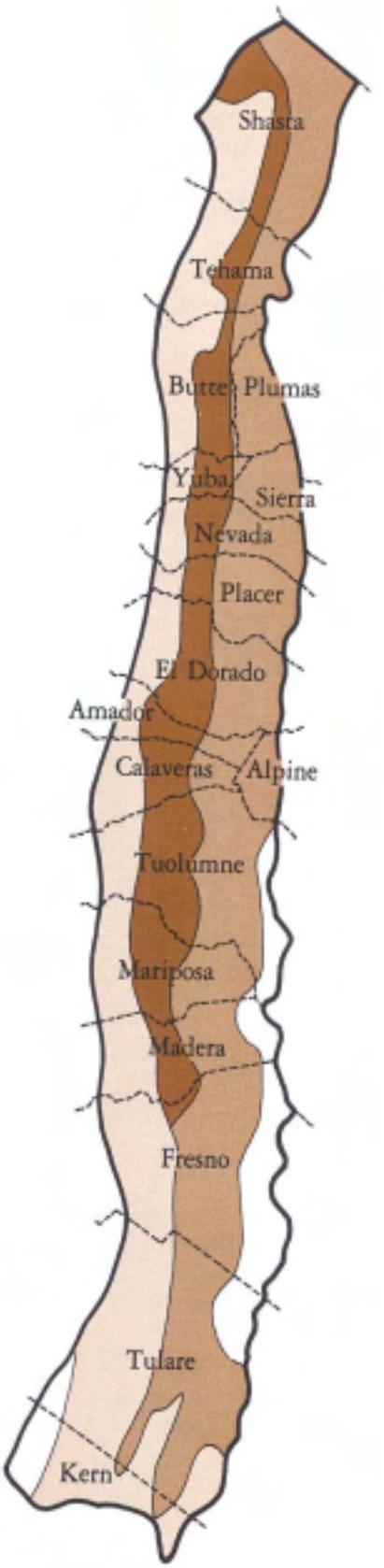
TERRITORY/HOME RANGE: No data on home range or territory size, but in burned-over area in Michigan, Pettingill (1930) reported breeding density of 6 nests/mi^2 (2.3 nests/km^2).

FOOD HABITS: Eats insects, spiders, fruit, berries, and seeds (especially those of poison oak). Searches for food on ground, without scratching, on dry slopes, around meadows, and on forest floor, seldom far from cover.

OTHER: Breeding hermit thrushes in the Sierra Nevada do not remain all year; replaced in fall and winter by migrants from the north.

REFERENCES: Grinnell and Storer 1924, Grinnell and Miller 1944, Bent 1949.





Swainson's Thrush

B140 (*Catharus ustulata*)

STATUS: No official listed status. Historically, locally common nesting species at low and middle elevations; presently rare and local. Reason for decline unknown (Gaines 1977).

DISTRIBUTION/HABITAT: Breeds locally in small numbers in timbered areas of ponderosa pine, black oak woodland, riparian deciduous, and mixed-conifer types. Prefers dense thickets near streams or wet meadows. Recorded rarely as nonbreeder in spring and summer in oak types at lower elevations.

SPECIAL HABITAT REQUIREMENTS: Trees/shrubs near water.

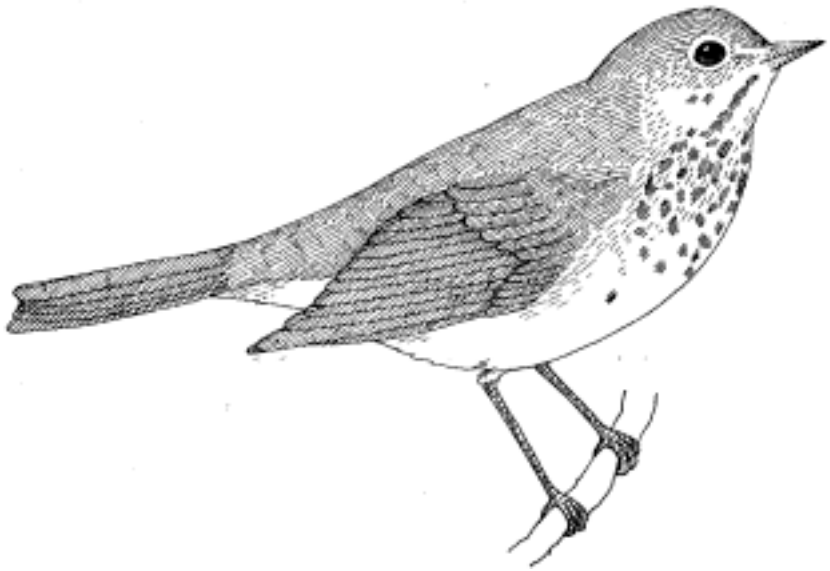
BREEDING: Breeds from mid-April to mid-July, with peak from early May to early June. Nests in shrub or small tree, usually in coniferous forest or low brushy thicket, near source of water. Nest height ranges from 2 to 8 ft (0.6 to 2.4 m) above ground. Clutch contains from 3 to 5 eggs, with mean of 4.

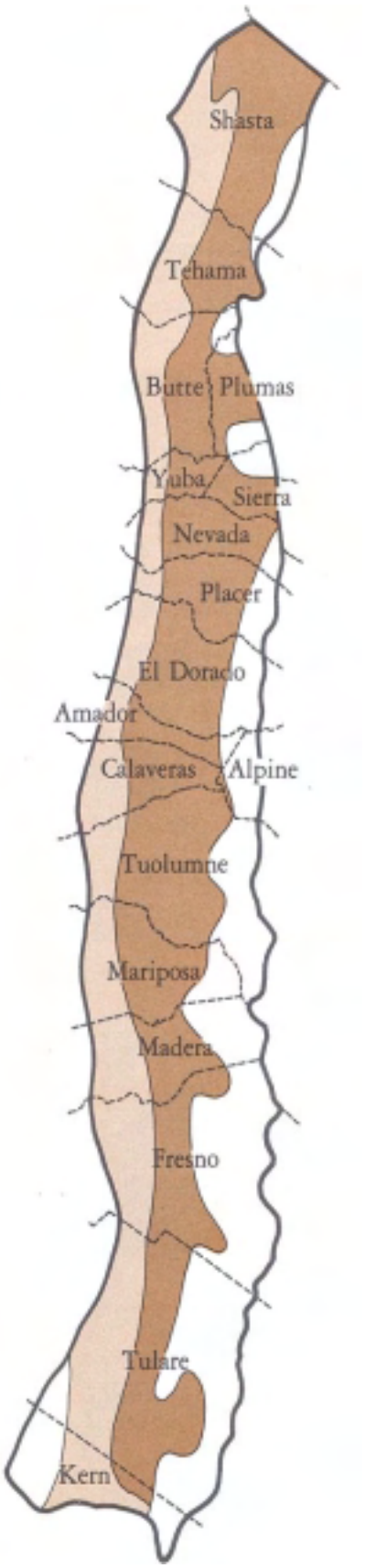
TERRITORY/HOME RANGE: No data available.

FOOD HABITS: Eats mostly insects and spiders, and some berries in breeding season. Searches and probes on the forest floor, especially in undisturbed conifer forests. Gleans foliage, and occasionally hawks aerial insects.

OTHER: Thought to be competitively excluded by hermit thrushes in Maine (Morse 1972) and British Columbia (Sealy 1974). May be a factor in decline in numbers in the Sierra Nevada, but not known.

REFERENCES: Grinnell and Storer 1924, Grinnell and Miller 1944, Bent 1949.





Western Bluebird

B141 (*Sialia mexicana*)

STATUS: No official listed status; on the 1978 Audubon Society Blue List. Common permanent resident at lower elevations, and summer-fall resident at higher elevations.

DISTRIBUTION/HABITAT: Breeds from blue oak savannahs up to Jeffrey pine forests; prefers stands with low percent canopy cover. Generally a bird of open country with standing dead trees available; edge situations ideal. At higher elevations, often nests in logged or burned areas; usually nests below 4000 ft (1220 m) elevation, though occasionally as high as 8000 ft (2440 m) (Gaines 1977). In fall, drifts upslope or migrates southward to higher elevation oak forests; feeds on mistletoe berries, sometimes in flocks numbering 50 or more birds.

SPECIAL HABITAT REQUIREMENTS: Nest cavities; medium to large openings.

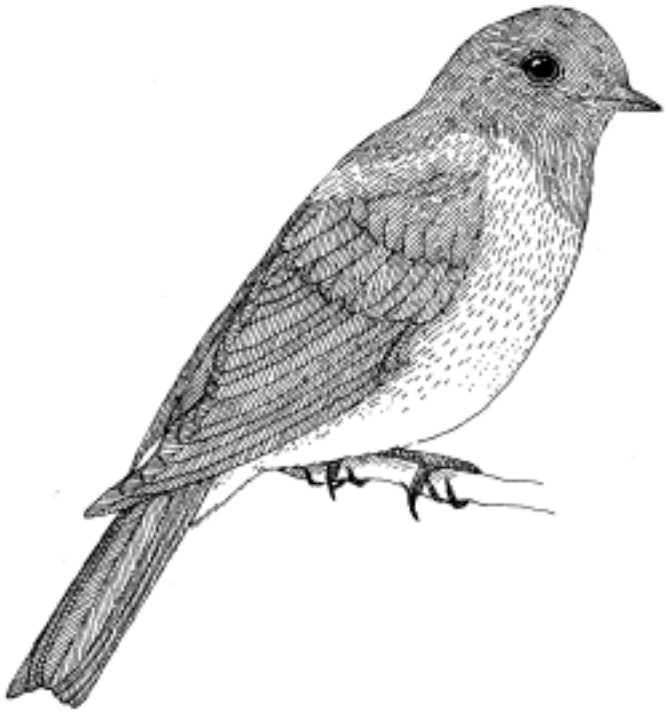
BREEDING: Breeds from late April to early July, with peak from mid-May to mid-June. Nests in holes in standing dead trees or stumps. Nest height varies from 5 to 40 ft (1.5 to 12 m). Clutch size from 3 to 8, with mean of 5.

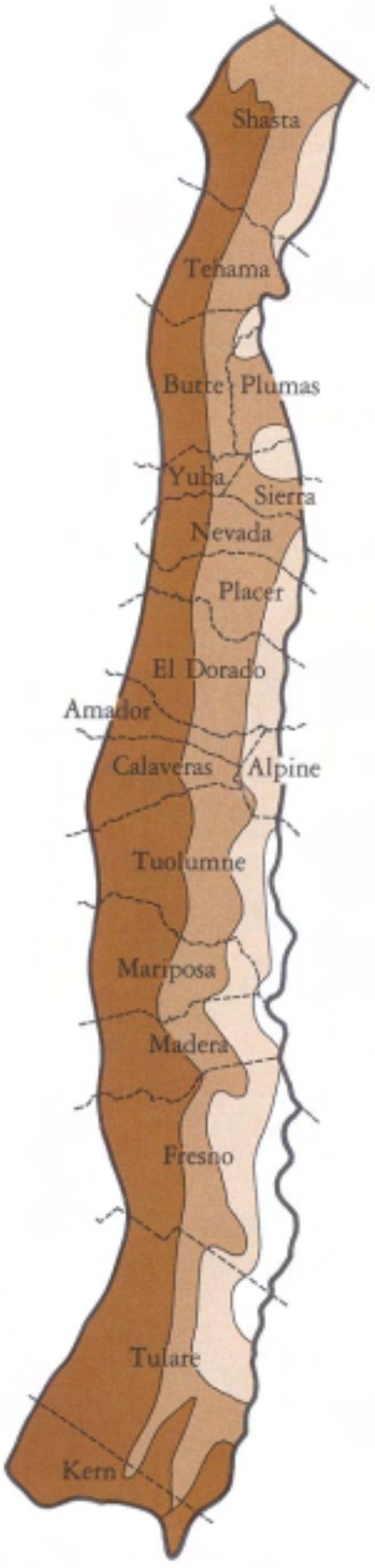
TERRITORY/HOME RANGE: No data available.

FOOD HABITS: Eats primarily insects; also eats berries of mistletoe, poison oak, and elderberry during nonbreeding period. Takes food from ground by sitting on slightly elevated perch and dropping down to pounce on insects. Also hawks aerial insects and picks berries from shrubs.

OTHER:

REFERENCES: Grinnell and Storer 1924, Bent 1949, Jackman and Scott 1975.





Mountain Bluebird

B142 (*Sialia currucoides*)

STATUS: No official listed status. Fairly common spring and summer resident at higher elevations, moving to foothills in fall.

DISTRIBUTION/HABITAT: Breeds in lodgepole pine forests, and sparingly down to mixed-conifer type; prefers open sites with low percent canopy coverage. Requires some brush in nesting territories; prefers open, treeless terrain of subalpine for foraging. Fire and logging activities at high elevations favor species. Spends most of nonbreeding period in foothill oak woodlands.

SPECIAL HABITAT REQUIREMENTS: Nest cavities; medium to large openings.

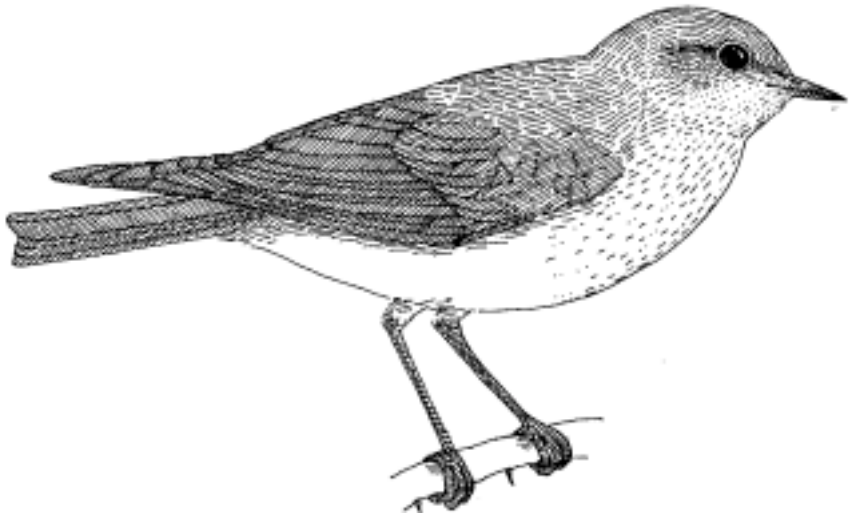
BREEDING: Breeds from mid-April to mid-July, with peak from mid-June to early July. Nests located in cavity, often abandoned woodpecker hole, in standing dead tree or stub. Clutch size from 4 to 8, with mean of 6.

TERRITORY/HOME RANGE: Insufficient data. A female feeding young on Mt. Rainier, Washington, reportedly foraged over circular area with diameter of about 600 ft (185 m) (Jewett *et al.* 1953). In his Montana study, Power (1966) noted that smallest "territory" was about 300 ft (91 m) wide, although some individuals foraged up to 1320 ft (400 m) from nest.

FOOD HABITS: Eats mostly insects, also fruit in late summer. Takes insects from foliage, from air, and occasionally from ground. Most foraging done from perch, hawking aerial insects and pouncing on items spotted on ground. Occasionally, hovers to search ground for food.

OTHER: Mountain and western bluebirds generally altitudinally separated in breeding ranges, with mountain at higher elevations and western at lower elevations. Observed nesting, however, in the same forest openings.

REFERENCES: Bent 1949, Power 1966, Jackman and Scott 1975.





Townsend's Solitaire

B143 (*Myadestes townsendi*)

STATUS: No official listed status. Fairly common summer resident to mid- and high-elevation forests, winters at lower elevations.

DISTRIBUTION/HABITAT: Breeds in coniferous forests from ponderosa pine type up to lodgepole pine forests, especially in mid-elevation types. Prefers stands with low percent canopy cover. In fall, disperses both up- and downslope in search of ripening fruit and other foods, descending into oak groves in fall, coincident with ripening of mistletoe berries.

SPECIAL HABITAT REQUIREMENTS:

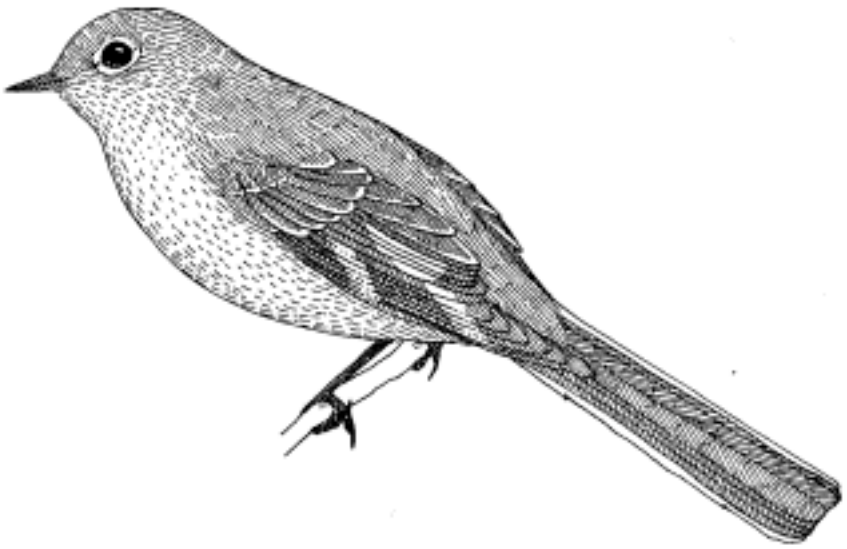
BREEDING: Breeds from early May to early August, with peak from late May to late June. Nests usually on or near ground, as in road cut, rock crevice, or at base of large tree; some type of overhanging shelter required. Clutch size from 3 to 5, with a mean of 4.

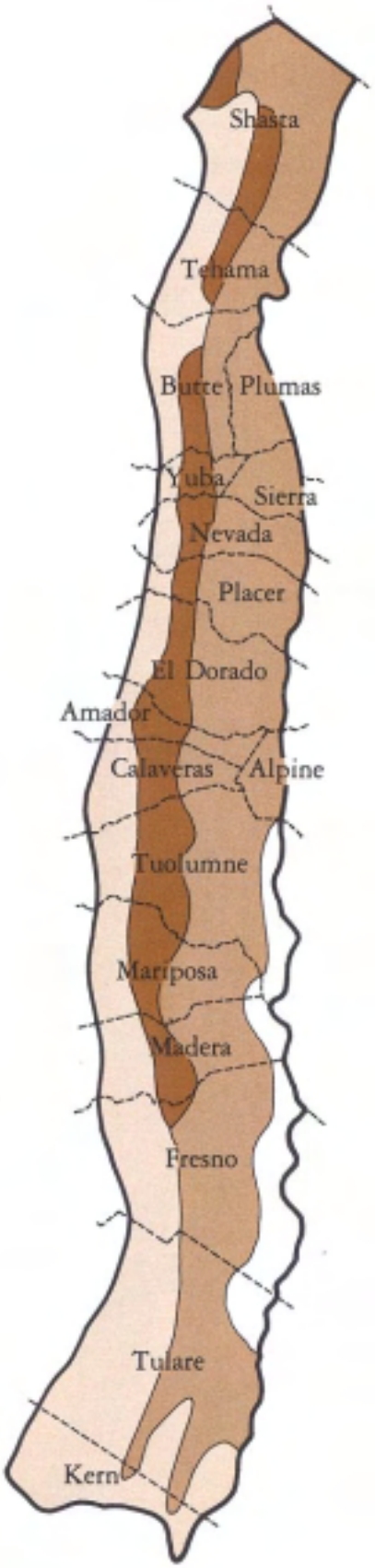
TERRITORY/HOME RANGE: No data on home range or size of breeding territory. In northern California, Dawson (1919) reported an approximate density of breeding territories of 4/mi^2 (1.54/km^2). In an Arizona piñon-juniper-ponderosa pine ecotone, Salomonson and Balda (1977) reported mean winter territory sizes of 1.75 acres (0.7 ha) (four territories) during winter 1973-74, and 9.5 acres (3.85 ha) (three territories) during winter 1974-75.

FOOD HABITS: Eats insects, fruits, mistletoe berries, and other foods. Takes food from air, ground, foliage, and fruiting stems. Usually from perch in shade, hawks for aerial insects or pounces on objects on ground.

OTHER: During nonbreeding period, solitaires commonly gather into moderate-sized flocks. Can be heard in full song throughout fall and into winter.

REFERENCES: Grinnell and Storer 1924, Grinnell and Miller 1944, Bent 1949.





Blue-gray Gnatcatcher

B144 (*Polioptila caerulea*)

STATUS: No official listed status. Common summer resident.

DISTRIBUTION/HABITAT: Breeds in blue oak savannah, digger pine-oak, chaparral edges where mingled with oak, and in riparian deciduous if adjacent to oak woodland or chaparral. Prefers stands with low to intermediate percent canopy cover. In late summer, moves upslope as far as mixed-conifer zone.

SPECIAL HABITAT REQUIREMENTS: Oaks in breeding season.

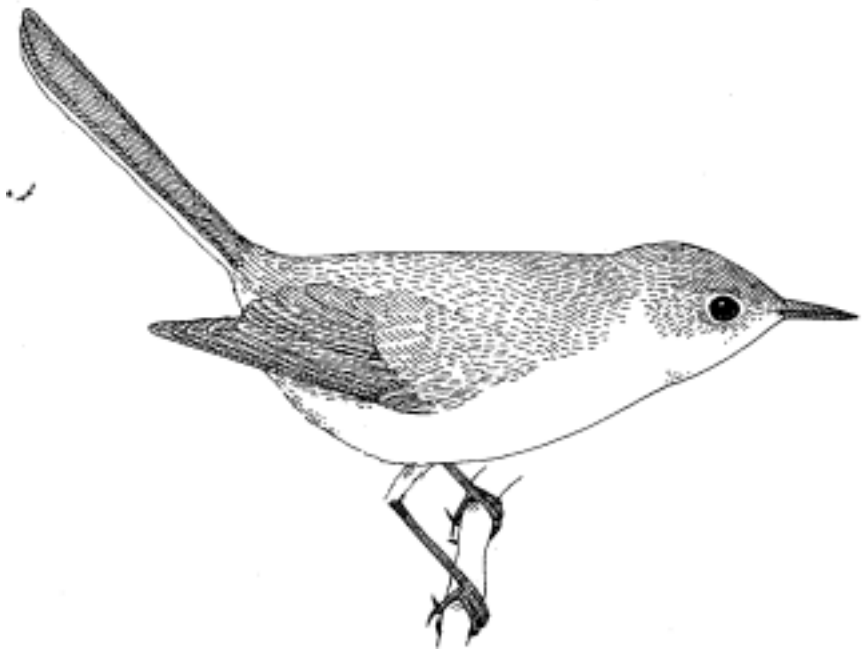
BREEDING: Breeds from early April to early August, with peak from mid-May to early July. Nests in live tree or shrub, usually near top, in fork between two branches. Nest height ranges from 3 to 45 ft (0.9 to 14 m) up. Clutch size from 3 to 5, with 4 most frequent.

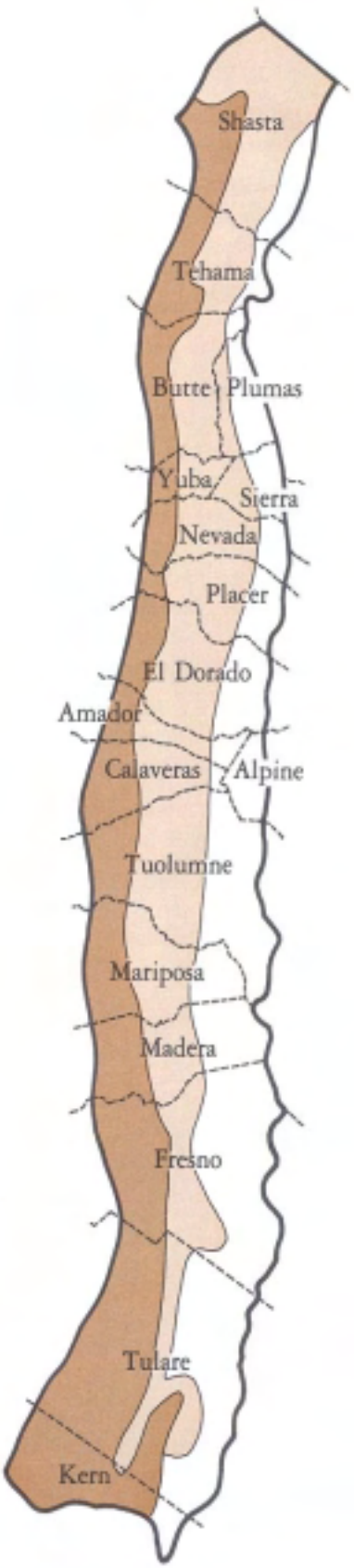
TERRITORY/HOME RANGE: Territory and home range the same. In Monterey County, breeding territories ranged from 2.2 to 7.4 acres (0.9 to 3 ha), with mean of 4.6 acres (1.9 ha) (Root 1969). In Arizona desert, winter home range appeared to be at least 22 acres (8.9 ha); in "an isolated screw-bean (*Prosopis pubescens)* woodland near Yuma, Arizona, at least nine gnatcatchers . . . were found within an area of 22 acres" (Root 1969). Each bird confined activities to area of about 3 acres (1.2 ha) or less.

FOOD HABITS: Feeds exclusively on small insects and spiders. Mostly gleans from foliage, twigs, and small branches of trees and shrubs; also from grasses and herbs. Also hovers to pick food from surfaces, and hawks for aerial insects.

OTHER:

REFERENCES: Bent 1949; Root 1967, 1969.





Golden-crowned Kinglet

B145 (*Regulus satrapa)*

STATUS: No official listed status. Abundant resident and breeder.

DISTRIBUTION/HABITAT: Breeds in conifer forests with intermediate to high percent canopy cover, from ponderosa pine to red fir forests. Some remain at high elevations all year; many move downslope into oak woodlands and riparian deciduous vegetation. Prefers dense, shaded forests, especially of red or white fir, or Douglas-fir.

SPECIAL HABITAT REQUIREMENTS:

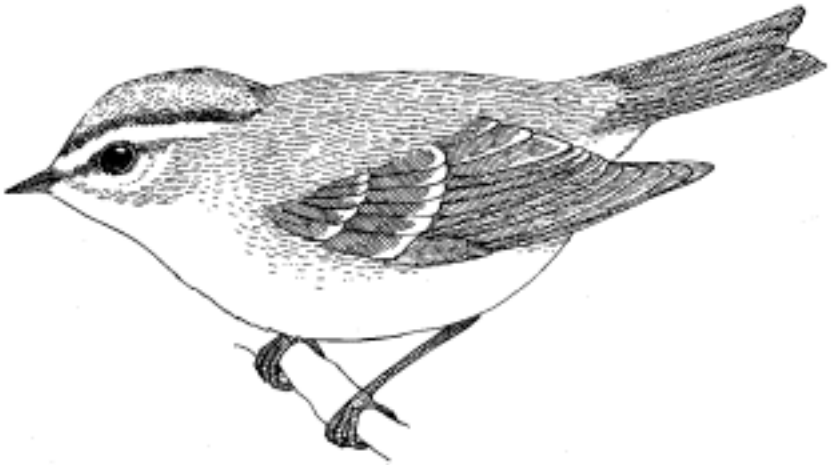
BREEDING: Breeds from early April to late July, with peak from late May to early July. Nests concealed in foliage of tips of branches or in clusters of live, hanging twigs. Recorded nest heights range from 5 to 50 ft (1.5 to 15 m), but probably nest much higher-the nests difficult to detect. Clutch size from 5 to 11, most contain 8 or 9.

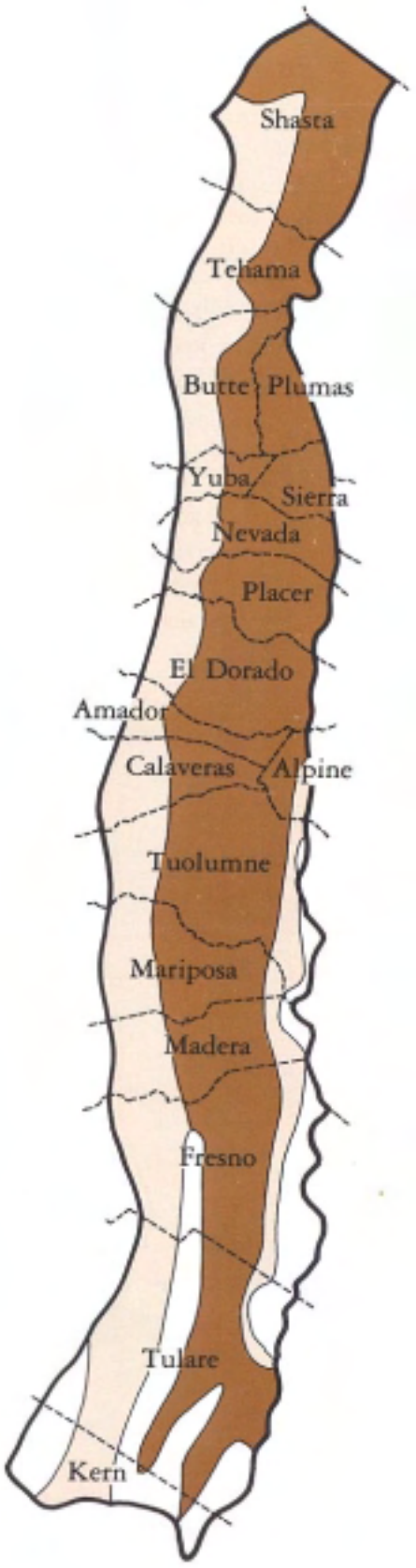
TERRITORY/HOME RANGE: No information available.

FOOD HABITS: Feeds on small insects, gleaned from foliage and small twigs, usually in well-shaded site. Usually hovers to glean items from vegetation.

OTHER:

REFERENCES: Grinnell and Miller 1944, Bent 1949, Gaines 1977.





Ruby-crowned Kinglet

B146 (*Regulus calendula*)

STATUS: No official listed status. Common summer resident and breeder; abundant winter visitor at lower elevations.

DISTRIBUTION/HABITAT: Breeds in timbered areas with low to intermediate percent canopy cover, from mixed-conifer up to lodgepole pine forests. Prefers lodgepole forest for breeding, especially in open stands or near edge, such as along stream or meadow. In late summer and early fall, migrants occur to treeline. In winter, present only at lower elevations in a variety of habitats.

SPECIAL HABITAT REQUIREMENTS:

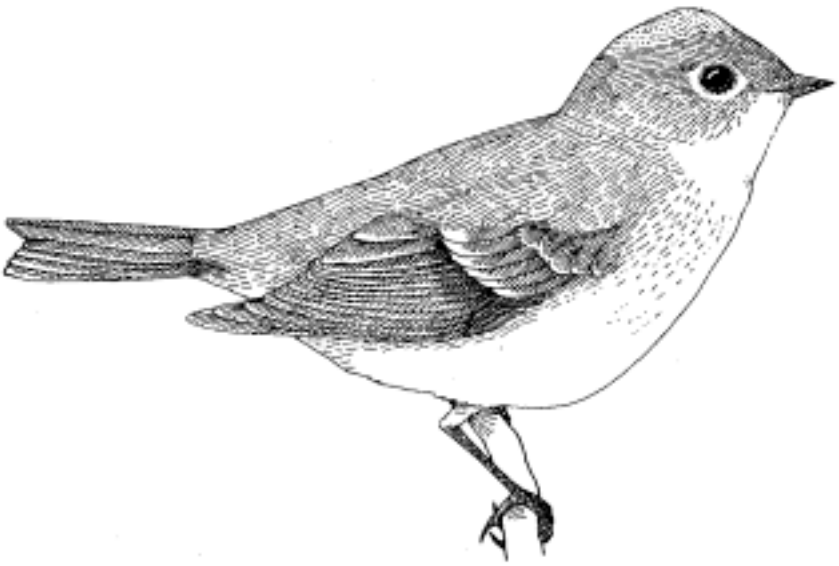
BREEDING: Breeds from mid-May to mid-August, with peak from mid-June to late July. Builds hanging nest attached to twigs of conifer foliage, usually near tip of branch far above the ground. Nest height ranges from 2 to 100 ft (0.6 to 31 m). Clutch size from 5 to 11, most contain 7 to 9.

TERRITORY/HOME RANGE: No information on home range. In San Diego County, two winter territories covered 0.5 and 1 acre (0.2 and 0.4 ha) (Rea 1970). Nonterritorial in winter in some localities.

FOOD HABITS: Obtains small arthropods by gleaning foliage and bark, often by hovering.

OTHER:

REFERENCES: Grinnell and Miller 1944, Bent 1949, Gaines 1977.





Water Pipit

B147 (*Anthus spinoletta*)

STATUS: No official listed status. Common winter visitor at low elevations; rare late summer and fall migrant at all elevations.

DISTRIBUTION/HABITAT: Found in open country at all elevations in late summer and fall. Sighted rarely in summer above treeline in the Sierra Nevada. First Sierra Nevada nests discovered in 1975 and 1976 east of the crest, near Yosemite National Park. May also breed sparingly above treeline on west side. Move to lower elevations for late fall, winter, and spring periods.

SPECIAL HABITAT REQUIREMENTS: Open terrain.

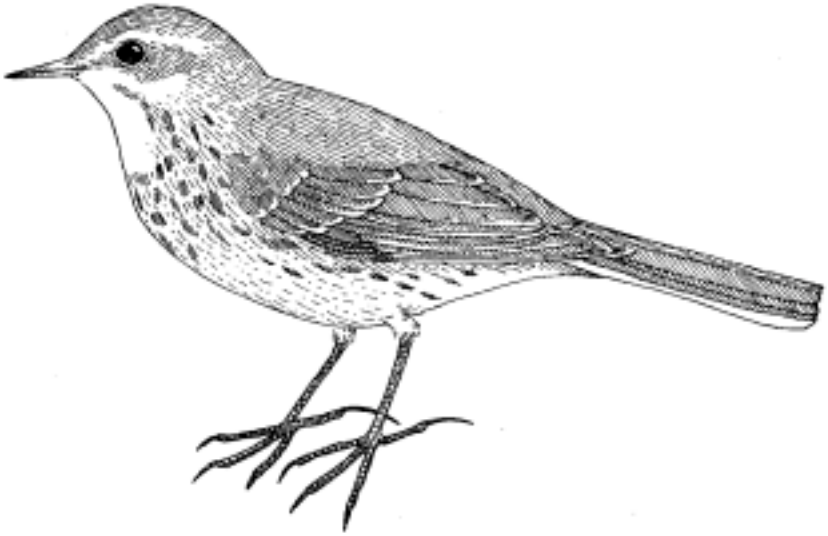
BREEDING: Breeds from late June to early September, with peak from mid-July to mid-August. Nests on ground, usually sheltered by overhang of rock, sod, or vegetation. Avoids wet areas for nest placement. Clutch size from 3 to 6, with mean of 4.7.

TERRITORY/HOME RANGE: No data on home range. In a Wyoming alpine tundra, sizes of breeding territories ranged from 0.39 to 0.83 acre (0.16 to 0.34 ha), with an average of 0.45 acre (0.2 ha).

FOOD HABITS: Eats insects, gleaned from low vegetation, bare ground, and snowbanks.

OTHER:

REFERENCES: Pickwell 1947, Bent 1950, Verbeek 1970.





Cedar Waxwing

B148 (*Bombycilla cedrorum*)

STATUS: No official listed status. Winter visitor at low elevations; numbers and local occurrence vary widely from year-to-year; stragglers present throughout year; rare breeder.

DISTRIBUTION/HABITAT: Permanent resident in ponderosa pine and black oak woodland types; found in lower elevation oak types in all seasons except summer, and on up to the Jeffrey pine type in all seasons except winter. Only one confirmed breeding record located for the western Sierra Nevada, at Buck's Lake, Plumas County, at 5153 ft (1570 m) (see star on range map). Midsummer records in Yosemite and elsewhere indicate possible breeding. Prefers timbered sites with low percent canopy coverage; more common at lower elevations.

SPECIAL HABITAT REQUIREMENTS: Fruit, berries.

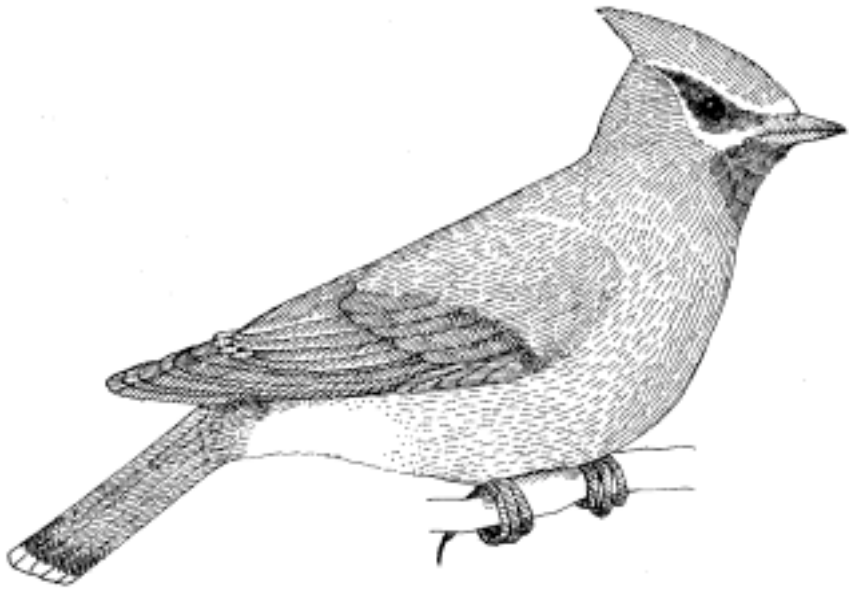
BREEDING: Breeds from early June to late August, with peak from late June to early August. Nests in tree or shrub, often at extreme end of branch. Nest height ranges from 5 to 50 ft (1.5 to 15 m) up, but usually below 20 ft (6.1 m). Clutch size from 3 to 6, with mean of about 4.

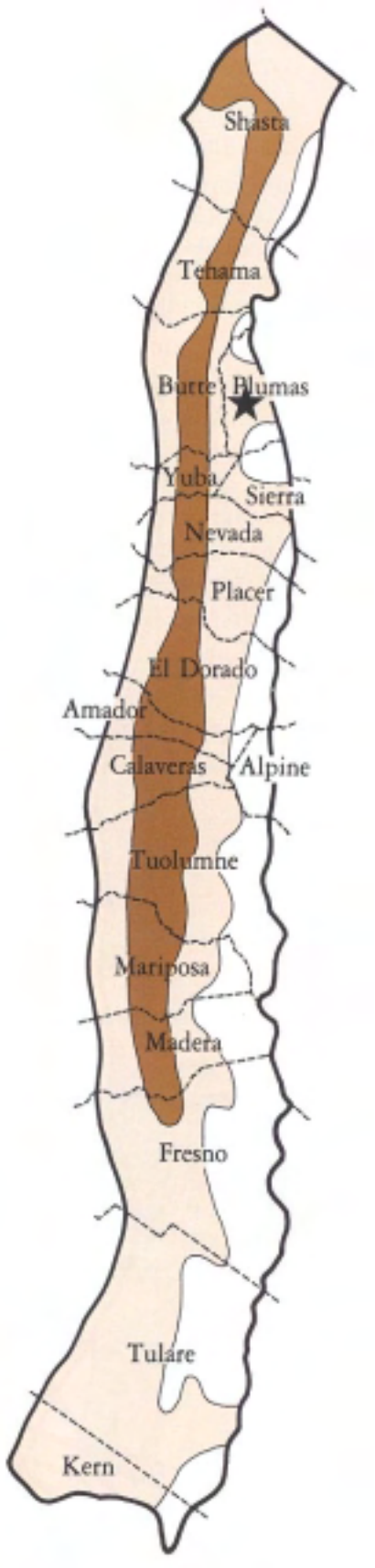
TERRITORY/HOME RANGE: No precise data on home range. In Ohio, three breeding territories ranged from 2025 to 9900 ft^2 (190 to 920 m^2), with average of 4770 ft^2 (440 m^2) (Putnam 1949).

FOOD HABITS: Fruit, berries, flowers, and buds, with some insects, comprise the diet. Picks and gleans food from living trees and shrubs, and often hawks insects.

OTHER: Nomadic, moving in flocks, and remaining only in areas with abundant food supply.

REFERENCES: Lea 1942, Putnam 1949, Bent 1950.





Phainopepla

B149 (*Phainopepla nitens*)

STATUS: No official listed status. Uncommon resident in foothills; rare in northern portion of the Sierra Nevada.

DISTRIBUTION/HABITAT: Breeds in blue oak savannahs, digger pine-oak woodlands, low elevation riparian deciduous, and chaparral types. Generally breeds in areas with scattered stands of small trees (usually oaks) surrounded by dense shrub understory. Recorded as high as 4000 ft (1220 m) in Yosemite Valley (Gaines 1977).

SPECIAL HABITAT REQUIREMENTS: Trees/shrubs; berries (especially mistletoe).

BREEDING: Breeds from late February to mid-July, with peak from late May to late July. Nests usually in dense foliage of shrubs, oaks, cottonwoods, willows, and others. Nest height ranges from 4 to 50 ft (1.2 to 15 m), most between 6 and 11 ft (1.8 and 3.4 m). Clutch size from 1 to 4, with mean of 2.5.

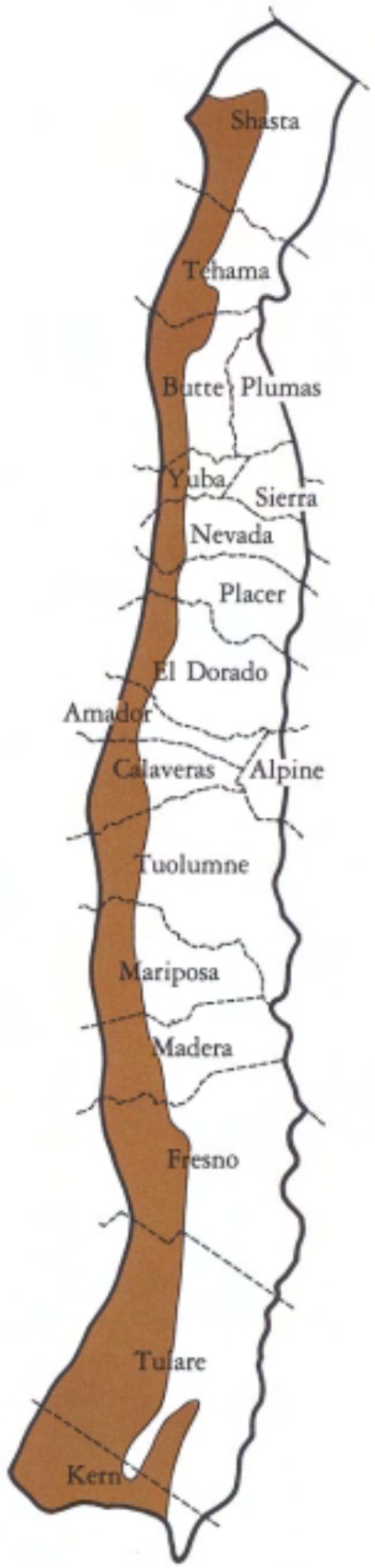
TERRITORY/HOME RANGE: No data on home range. Territory size in Imperial County ranged from 0.5 to 1.5 acres (0.2 to 0.6 ha), with mean of 1.0 acre (0.4 ha) (Walsberg 1977).

FOOD HABITS: Eats small insects and berries, including mistletoe, juniper, elderberry, *Rhus*, and others. Crops of mistletoe a staple for species; reported to defend fruiting mistletoe against nearly all other species that use it (Walsberg 1977). Captures insects in air; picks berries from stems, either by clinging to clusters or hovering about them.

OTHER:

REFERENCES: Grinnell and Storer 1924, Rand and Rand 1943, Bent 1950, Walsberg 1977.





Loggerhead Shrike
B150 (*Lanius ludovicianus*)

STATUS: No official listed status; on the 1978 Audubon Society Blue List, but apparently not because of problems in the western Sierra Nevada. Fairly common resident at low elevations.

DISTRIBUTION/HABITAT: Breeds in blue oak savannahs, digger pine-oak woodlands, and chaparral types; prefers stands with low percent canopy cover.

SPECIAL HABITAT REQUIREMENTS: Shrubs/grass-forbs.

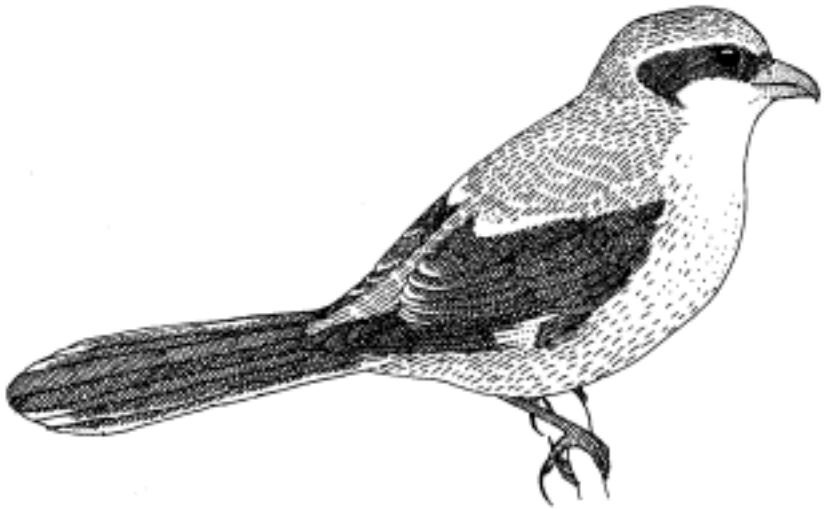
BREEDING: Breeds from late February to mid-June, with peak from late March to early May. Nests in variety of trees and shrubs, with stable supporting branches and screen of overhanging cover. Nest height ranges from 2 to 30 ft (0.6 to 9.1 m). Clutch size from 5 to 7, with mean of 6.

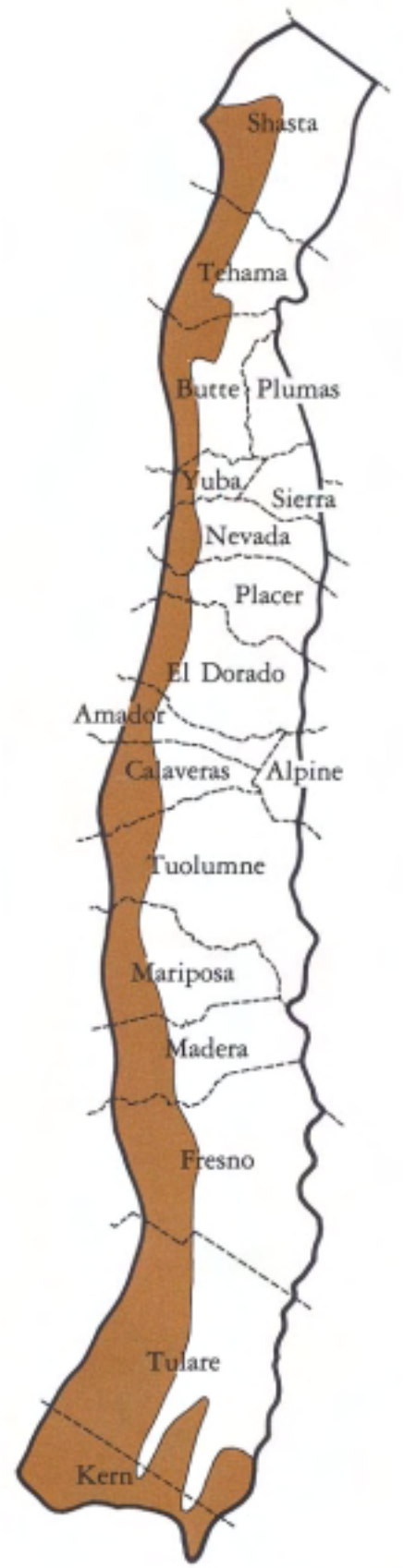
TERRITORY/HOME RANGE: Territory and home range the same, radius of 1300 to 1950 ft (400 to 595 m) in San Joaquin Valley (Miller 1931). Maintains territory year-round. A 'headquarters' area more vigorously defended, including good lookout perches, feeding facilities, and suitable shrub or tree cover for shelter at night.

FOOD HABITS: Indiscriminate carnivore, captures insects and other invertebrates, small reptiles, birds, and mammals. Dives to ground from elevated perch, and sometimes hawks for aerial insects. Frequently impales prey on thorns or barbed wire.

OTHER:

REFERENCES: Miller 1931, Linsdale 1938, Bent 1950.





Starling

B151 (*Sturnus vulgaris*)

STATUS: No official listed status. Introduced from Europe into New York more than 100 years ago; rapidly spread across continent. Reported as rare in California as recently as 30 years ago (Grinnell and Miller 1944); today a serious agricultural pest. In the Sierra Nevada, rare and generally confined to low elevations.

DISTRIBUTION/HABITAT: Breeds in low elevation riparian deciduous, blue oak savannahs, and digger pine-oak woodlands. Prefers stands with low percent canopy cover. More common in vicinity of human habitations. In nonbreeding periods, found in same habitats but usually forms flocks, sometimes enormous ones.

SPECIAL HABITAT REQUIREMENTS: Nest cavities; openings or open terrain.

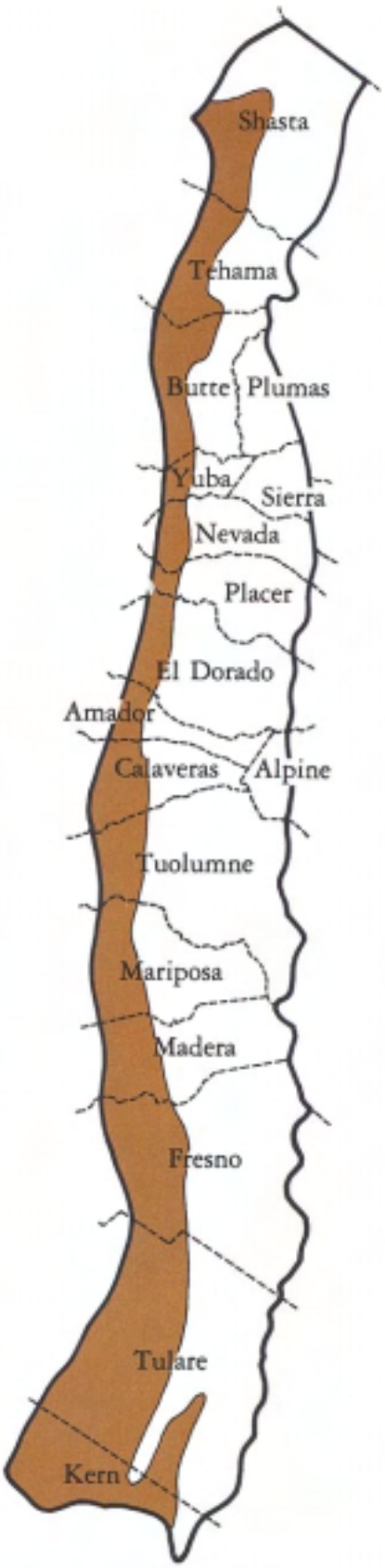
BREEDING: Breeds from early April to mid-June, with peak from mid-May to mid-June; often double-brooded. Nests in almost any suitably-sized natural or artificial cavity; in absence of cavities, known to nest on ground. Nest height ranges from 2 to 60 ft (0.6 to 18 m), usually from 10 to 25 ft (3.1 to 7.6 m). Clutch size from 3 to 6, with mean of 4.5.

TERRITORY/HOME RANGE: Travels great distances in search of food; no data on home range (Hamilton and Gilbert 1969). In New York, defended only area immediately around nest but ranged up to 0.75 mi (1.2 km) from nest (Kessel 1957).

FOOD HABITS: Omnivorous, taking grain, hay, weed seeds, insects, earthworms, waste food, and other foods. Feeds in pastures, tilled soil, trees, garbage dumps, lawns, and other places. Probes in soil, gleans, hawks insects, and captures aerial insects in swallow-like flight.
OTHER: Considered a serious competitor for nest cavities with other cavity nesting species.

REFERENCES: Kessel 1957, Howard 1959, Planck 1967.





Hutton's Vireo

B152 (*Vireo huttoni*)

STATUS: No official listed status. Fairly common permanent resident in foothills.

DISTRIBUTION/HABITAT: Breeds in blue oak savannahs, digger pine-oak woodlands, and low elevation riparian deciduous areas. Prefers stands with low percent canopy coverage. Found almost exclusively in live oaks most of year, but in late summer and fall, moves upslope into ponderosa pine and black oak woodland types.

SPECIAL HABITAT REQUIREMENTS: Live oaks; trees/shrubs.

BREEDING: Breeds from early March to late June, with peak from late April to early June. Nests usually well concealed in tall live oak, supported by forked twig; also nests in bay laurel, willow, or pine. Nest height ranges from 7 to 25 ft (2.1 to 7.6 m). Clutch size from 3 to 5, with mean of 4.

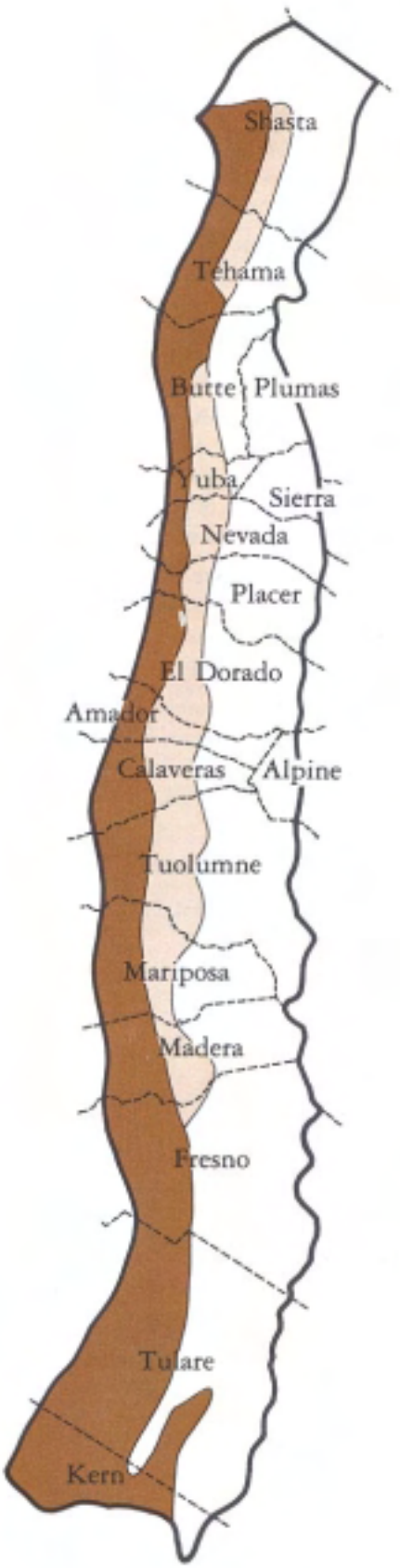
TERRITORY/HOME RANGE: No data on home range or territory size. In Sonoma County, Van Fleet (1919) reported breeding density of 100 pairs/mi^2 (39 pairs/km^2).

FOOD HABITS: Eats mostly insects and spiders, also some fruits and berries. Gleans food from foliage and small twigs in trees; also hawks aerial insects.

OTHER:

REFERENCES: Grinnell and Miller 1944, Bent 1950, Sumner and Dixon 1953.





Bell's Vireo

B153 (*Vireo bellii*)

STATUS: No official listed status; on the 1978 Audubon Society Blue List. Considered by some to be extinct in the Sierra Nevada and Central Valley habitats formerly occupied (R. Stallcup, pers. commun.).

DISTRIBUTION/HABITAT: Formerly nested in dense, low elevation riparian thickets in spring and summer.

SPECIAL HABITAT REQUIREMENTS: Dense riparian thickets.

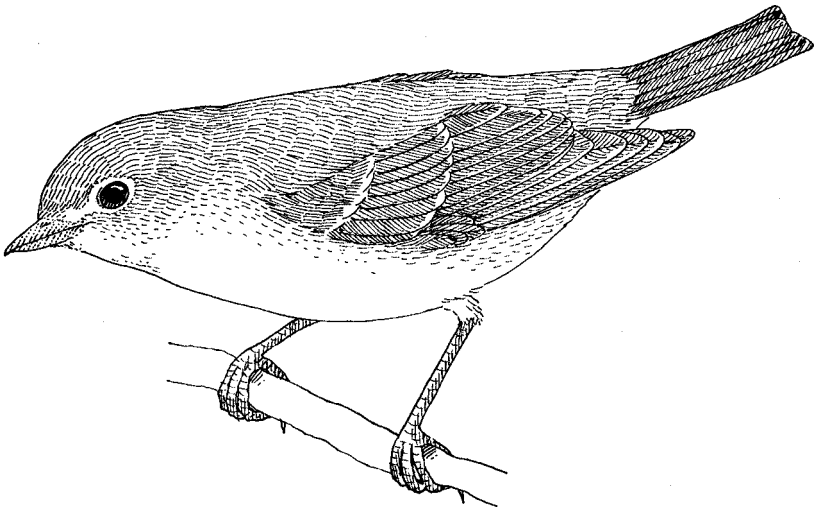
BREEDING: Breeds from early April to early July, with peak from mid-May to early June. Nests usually suspended from scrubby trees or low bushes-willow, *Baccharis*, blackberry, live oaks, poison oak, and others, always within 3 ft (0.9 m) of ground. Mean clutch size of 4.

TERRITORY/HOME RANGE: In southern Indiana, home range covers 2 to 3 acres (0.8 to 1.2 ha) per pair (Nolan 1960). Barlow et *al.* (1970) reported a breeding density of one pair per 2 acres (0.8 ha) in an Arizona mesquite thicket.

FOOD HABITS: Eats mostly insects, some fruits. Gleans from twigs and foliage, usually within 3 ft (0.9 m) of ground, primarily in riparian habitats, but some in live oak.

OTHER: Formerly a common summer resident at low elevations in the Sierra Nevada, even up to 4000 ft (1220 m) along the Tuolumne and Merced Rivers (Grinnell and Storer 1924). Apparently extinct in the western Sierra Nevada, partly because of reduction in suitable streamside vegetation and partly because of cowbird nest parasitism.

REFERENCES: Grinnell and Miller 1944, Bent 1950, Nolan 1960.





Solitary Vireo

B154 (*Vireo solitarius*)

STATUS: No official listed status. Fairly common migrant and summer resident in suitable habitat.

DISTRIBUTION/HABITAT: Breeds in ponderosa pine, black oak woodland, riparian deciduous, and mixed-conifer types; prefers drier sites with substantial shrub layer and low to intermediate percent canopy cover. Spring migrants pass through lower elevation oak and pine/oak types; in late summer and early fall usually moves upslope as high as lodgepole pine forests.

SPECIAL HABITAT REQUIREMENTS:

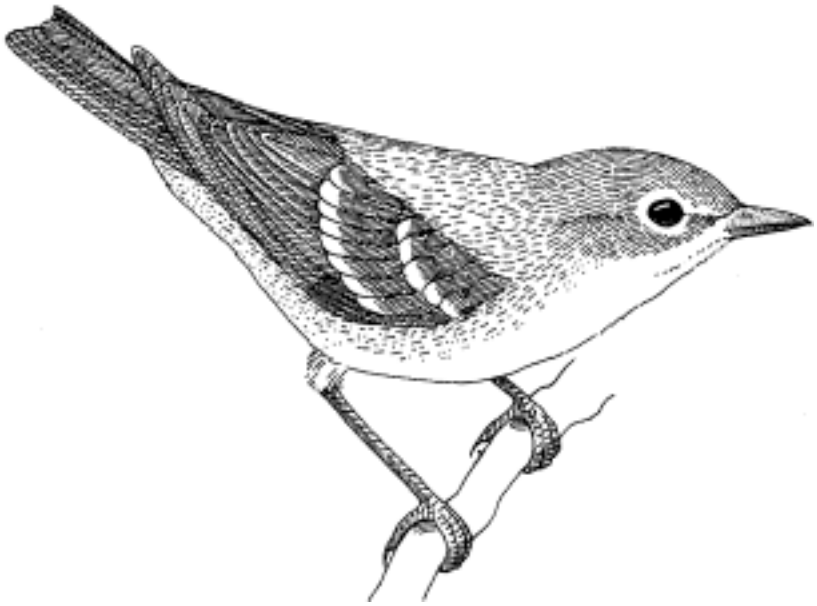
BREEDING: Breeds from late April to mid-July, with peak from late May to early July. Nests usually in low, dense foliage of shrubs and trees and typically shaded. Nest height ranges from 5 to 20 ft (1.5 to 6.1 m). Clutch size from 3 to 5, with mean of 4.

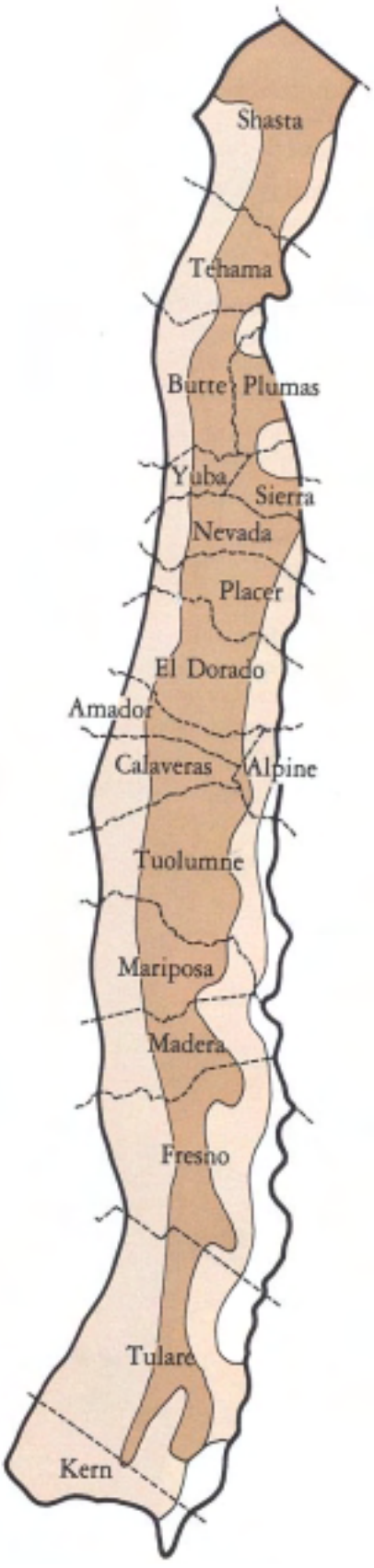
TERRITORY/HOME RANGE: No data available on home range. In an Arizona piñon-juniper-ponderosa pine ecotone, territory size averaged 4.2 acres (1.7 ha) (Laudenslayer and Balda 1976).

FOOD HABITS: Feeds mostly on insects, also eats some leaf galls and seeds. Gleans food from foliage of trees.

OTHER: Population declined in recent years, at least in part as result of increased nest parasitism by brown-headed cowbirds (Gaines 1977).

REFERENCES: Grinnell and Storer 1924, Grinnell and Miller 1944, Bent 1950.





Warbling Vireo

B155 (*Vireo gilvus*)

STATUS: No official listed status; on the 1978 Audubon Society Blue List. Common spring migrant and summer resident in most vegetation types.

DISTRIBUTION/HABITAT: Breeds in wooded sites from low elevation riparian deciduous up to red fir forests. Prefers areas with tall trees, a substantial shrub layer, and low to intermediate percent canopy cover. Generally gone from the western Sierra Nevada by late summer.

SPECIAL HABITAT REQUIREMENTS:

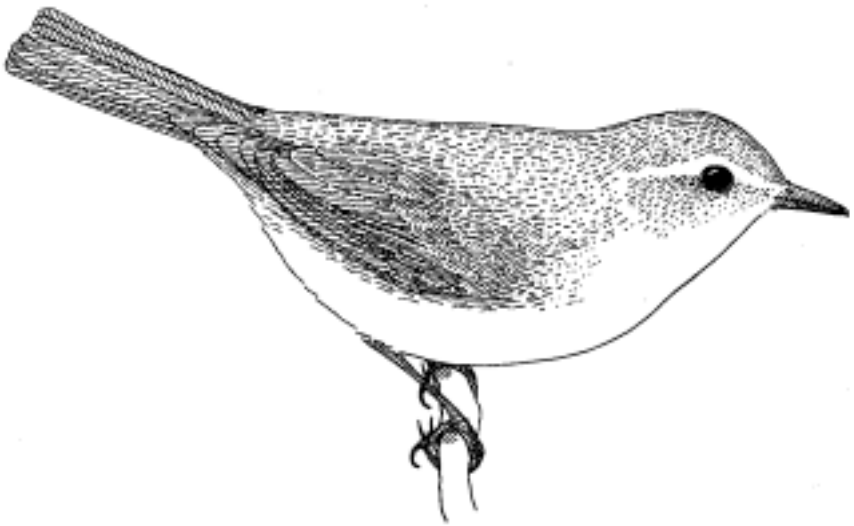
BREEDING: Breeds from late April to late July, with peak from late May to mid-July. Nests attached at upper rim, with cup hanging down, to terminal foliage of branches in tall trees (deciduous preferred). Nest height ranges from 4 to 40 ft (1.2 to 12 m) up, usually above 8 ft (2.4 m). Clutch size from 3 to 5, with mean of 4.

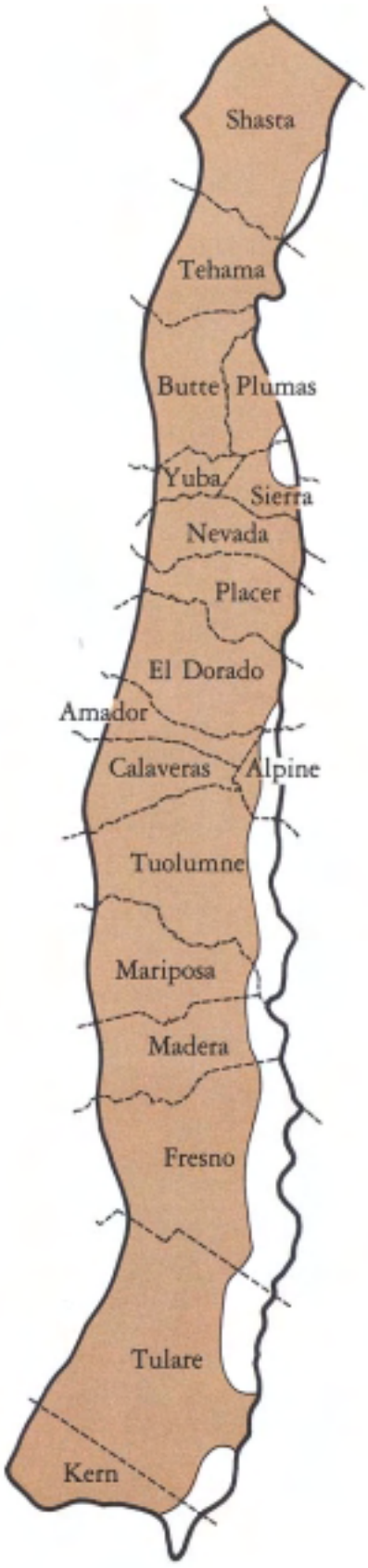
TERRITORY/HOME RANGE: No data on territory size. In Idaho, Rust (1920) reported a home range of 120 ft (37 m) radius around nest.

FOOD HABITS: Eats mostly insects and spiders, also some fruits and seeds. Gleans food from foliage of deciduous and coniferous trees, sometimes hovering to do so; also hawks for airborne insects.

OTHER: By far the most common breeding vireo in the Sierra Nevada. Gaines (1977) has nonetheless noted a significant decline in numbers in the Yosemite Valley since the 1930's. Again, nest parasitism by the brown-headed cowbird thought to be a reason for the decline.

REFERENCES: Grinnell and Storer 1924, Grinnell and Miller 1944, Bent 1950.





Orange-crowned Warbler

B156 (*Vermivora celata*)

STATUS: No official listed status. Common spring and summer visitor in suitable habitat.

DISTRIBUTION/HABITAT: Breeds at lower elevations from blue oak savannah to chaparral, and in low elevation riparian deciduous areas. Prefers sites with considerable shrub cover.

SPECIAL HABITAT REQUIREMENTS: Dense shrubs for nesting.

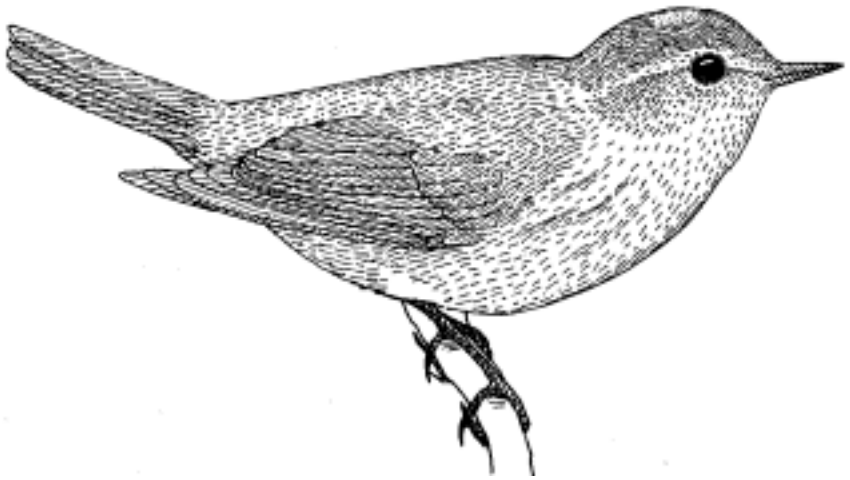
BREEDING: Breeds from late April to early June, with peak in mid-May. Nests on ground or occasionally in low, dense bushes. Nest height generally below 3 ft (1 m). Clutch size 3 to 6, with mean of 4.

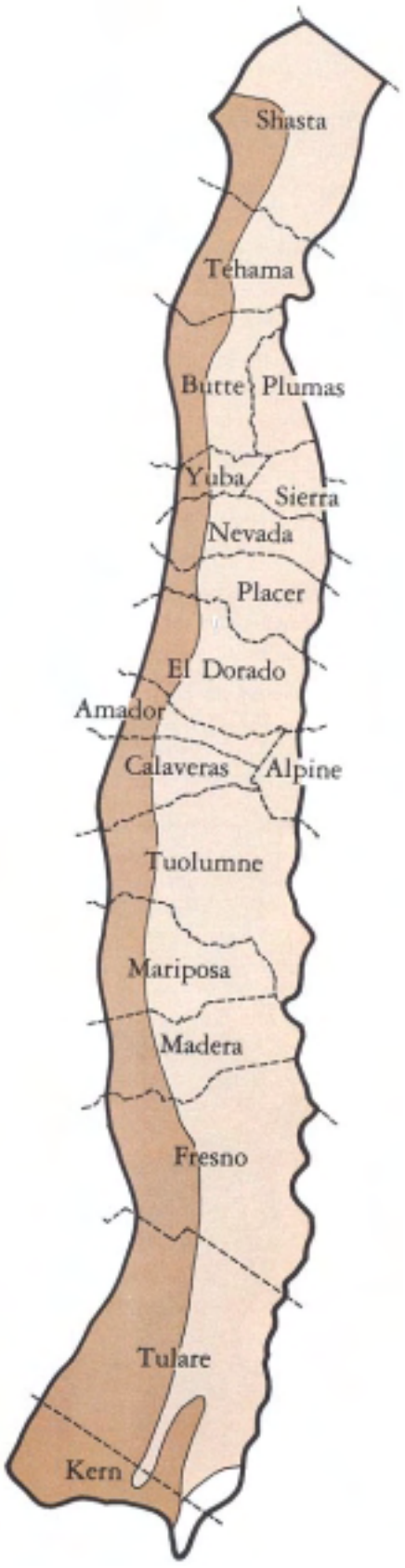
TERRITORY/HOME RANGE: Only meager data available. In California coastal chaparral, Mans (1961) reported a male patrolled an area of about 5 acres (2 ha).

FOOD HABITS: Feeds mostly on insects, also some seeds and fruit. Gleans insects from foliage in shrubs and small trees at heights ranging from 5 to 30 ft (1.5 to 9.1 m).

OTHER: Although Grinnell and Miller (1944) cite Transition Zone breeding localities, no confirmed nesting records at elevations above 1600 ft (490 m). Known to nest only in chaparral and shrubby oak woodlands of foothills. Upslope or southward movement to mixed-conifer belt begins as early as June. In late summer and early fall, relatively common in high elevation coniferous forests, but most belong to populations from distant localities that migrate through the Sierra Nevada.

REFERENCES: Griscom and Sprunt 1957, Gaines 1977.





Nashville Warbler

B157 (*Vermivora ruficapilla*)

STATUS: No official listed status. Fairly common spring and summer resident.

DISTRIBUTION/HABITAT: Breeds in mid-elevation conifer types, from ponderosa pine to mixed-conifer forests, in black oak woodland and, to some extent, in riparian deciduous. Prefers timbered areas with low percentage canopy cover, though brush-covered sites with no trees also used.

SPECIAL HABITAT REQUIREMENTS: Trees/shrubs.

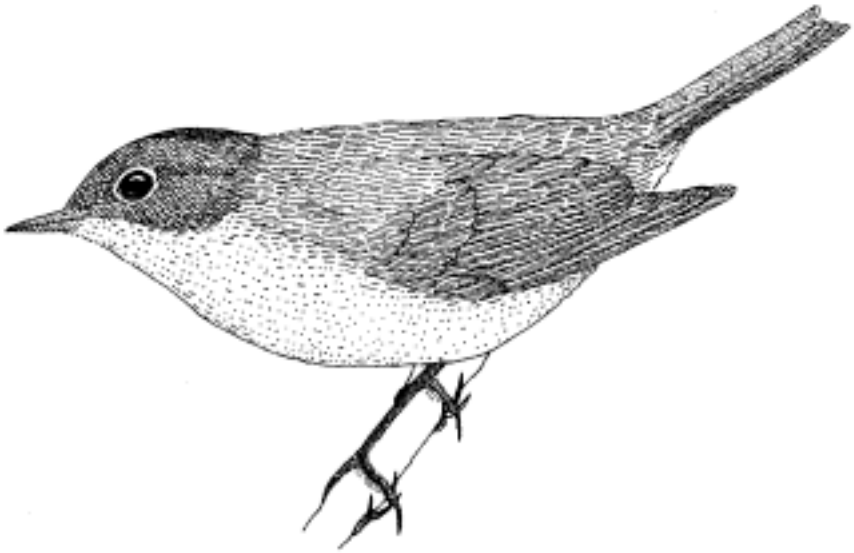
BREEDING: Breeds from mid-May to late July, with peak in mid-June. Nests on ground in areas with dense shrubs and sparse trees. Clutch size from 3 to 5, with mean of 4.

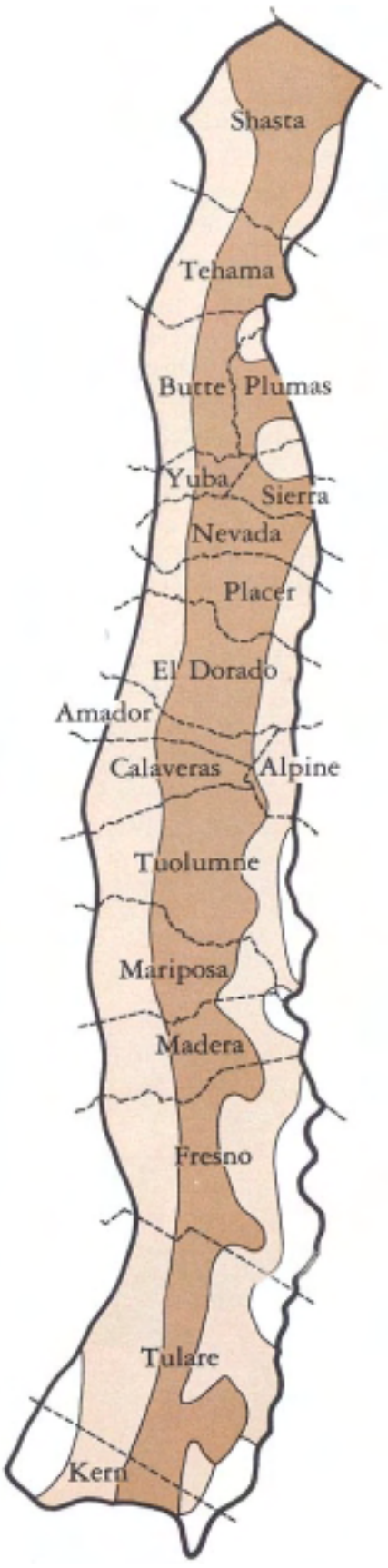
TERRITORY/HOME RANGE: No information on home range. In a deciduous/coniferous forest in Ontario, Lawrence (1948) reported mean territory size of about 0.5 acre (0.2 ha).

FOOD HABITS: Feeds almost entirely on insects gleaned from foliage or taken from air by hawking. Feeds in low shrubs and up into higher canopy.

OTHER: Late season wanderers recorded as high as 11,000 ft (3350 m) in Yosemite National Park. Nests frequently parasitized by brown-headed cowbirds.

REFERENCES: Lawrence 1948, Griscom and Sprunt 1957, Johnson 1976.





Yellow Warbler

B158 (*Dendroica petechia*)

STATUS: No official listed status; on the Audubon Society Blue List for 1978. Fairly common spring and summer resident in the western Sierran zone.

DISTRIBUTION/HABITAT: Breeds in riparian deciduous, lakeshore, or wet, shrubby meadows from blue oak savannahs up to mixed-conifer forest.

SPECIAL HABITAT REQUIREMENTS: Dense shrubs; usually nearby water for nesting.

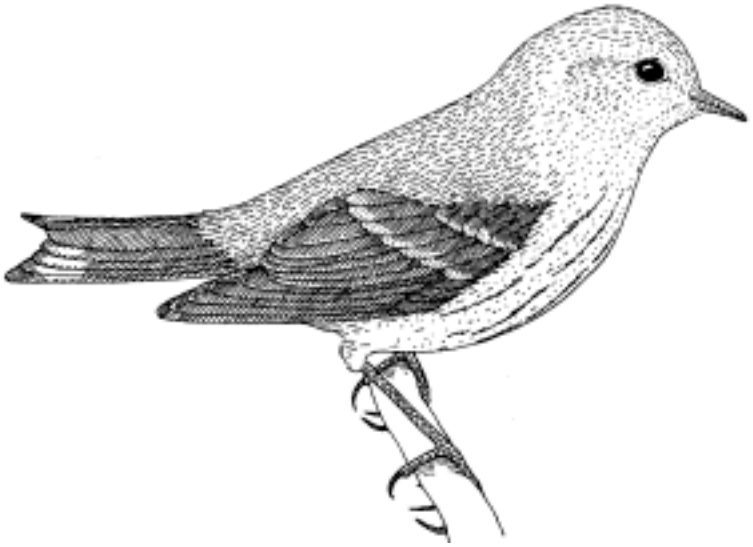
BREEDING: Breeds from mid-April to mid-July, with peak from early to late May. Nests in low bushes, usually in riparian sites but sometimes in open, moist forests. Nest height varies from 2 to 10 ft (0.6 to 3.1 m). Clutch size from 3 to 5, with 3 or 4 most frequent.

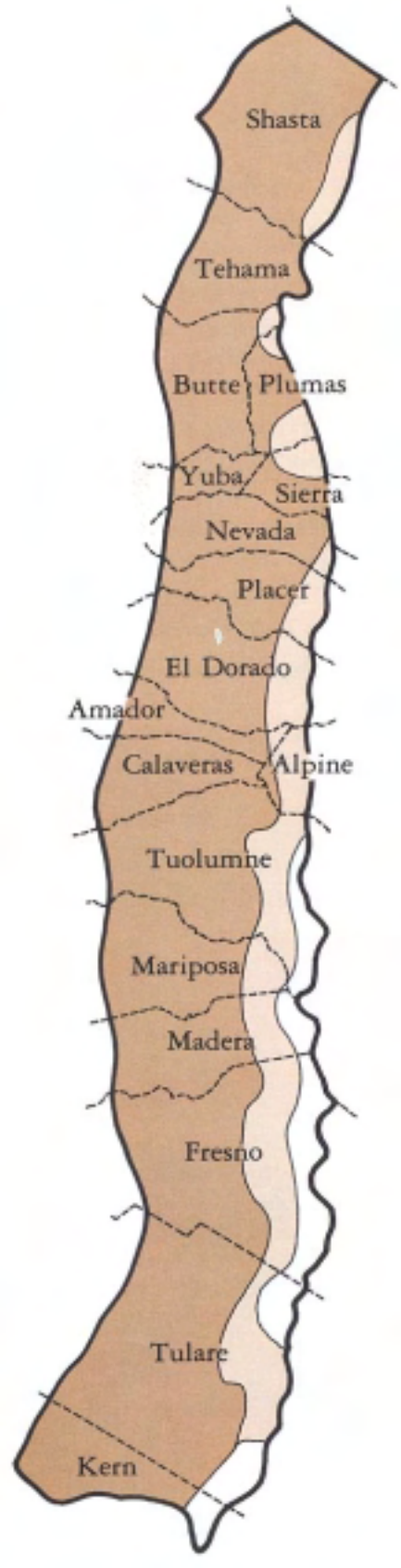
TERRITORY/HOME RANGE: In Illinois, breeding territory sizes reported in riparian woodland as ranging from 0.15 to 0.94 acre (0.06 to 0.4 ha), with mean of 0.42 acre (0.17 ha) (Brewer 1955); in riparian cover in Utah as ranging from 0.13 to 0.65 acre (0.05 to 0.26 ha) (Frydendall 1967); and on small islands in Minnesota to be as small as 0.08 acre (0.03 ha) (Beer et al. 1956). Feeds mostly outside territory, usually to distances of 400 to 600 ft (120 to 185 m) and some birds regularly to as far as 1600 ft (490 m) (Kendeigh 1941a).

FOOD HABITS: Diet consists almost entirely of insects, with some spiders. Gleans food from foliage of coniferous and deciduous trees.

OTHER: Although normally associated with low-elevation, streamside forests, frequently observed foraging in mid-elevation coniferous forests during postnesting season (Hebard 1961, Beedy 1975).

REFERENCES: Schranz 1943, Griscom and Sprunt 1957.





Yellow-rumped Warbler

B159 (*Dendroica coronata*)

STATUS: No official listed status. Abundant resident in the State; spring, summer, and fall visitor to middle and high elevations of the Sierra Nevada forests.

DISTRIBUTION/HABITAT: Widespread; found at lower elevations in all seasons, except summer. Breeds from ponderosa pine and black oak types up to lodgepole pine forests; prefers timbered sites of low percentage canopy cover and forest edges, as around meadows or lakes.

SPECIAL HABITAT REQUIREMENTS:

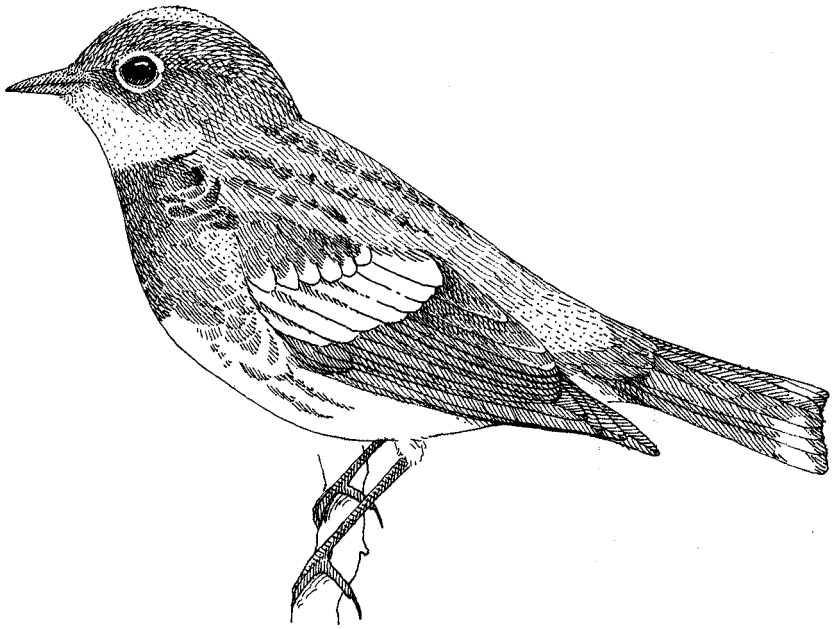
BREEDING: Breeds from mid-May to late July, with peak from middle to late June. Nests in conifers, in deciduous trees, or in shrubs, from 3 to 100 ft (0.9 to 3.1 m) up. Clutch size from 3 to 5, with a mean of 4.

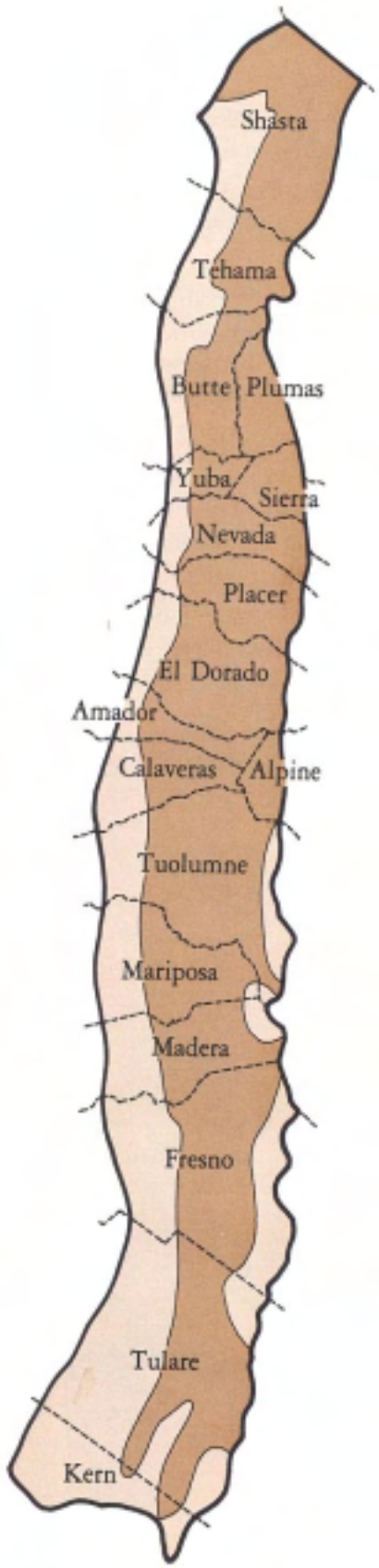
TERRITORY/HOME RANGE: No information on home range or territory size. Beedy (1975) reported a density of 40.4 birds per 100 acres (40 ha) in mixed-conifer forest in the Sierra Nevada.

FOOD HABITS: Eats 85 percent insects and spiders and 15 percent vegetable matter. Hawks for flying insects, gleans insects from foliage, and searches for food on ground.

OTHER:

REFERENCES: Griscom and Sprunt 1957, Gaines 1977.





Black-throated Gray Warbler

B160 (*Dendroica nigrescens*)

STATUS: No official listed status. Uncommon to fairly common spring and summer visitor to oak-conifer belt.

DISTRIBUTION/HABITAT: Breeds in all oak types and in ponderosa pine forests, if some oaks present. Exhibits some preference for sites with low percentage canopy coverage.

SPECIAL HABITAT REQUIREMENTS: Oaks; trees/shrubs.

BREEDING: Breeds from early May to early July, with peak from mid-May to mid-June. Nests on horizontal branches from ground level up to 50 ft (15 m), but usually from 3 to 10 ft (0.9 to 3.1 m) up. Clutch size from 3 to 5, with mean of 4.

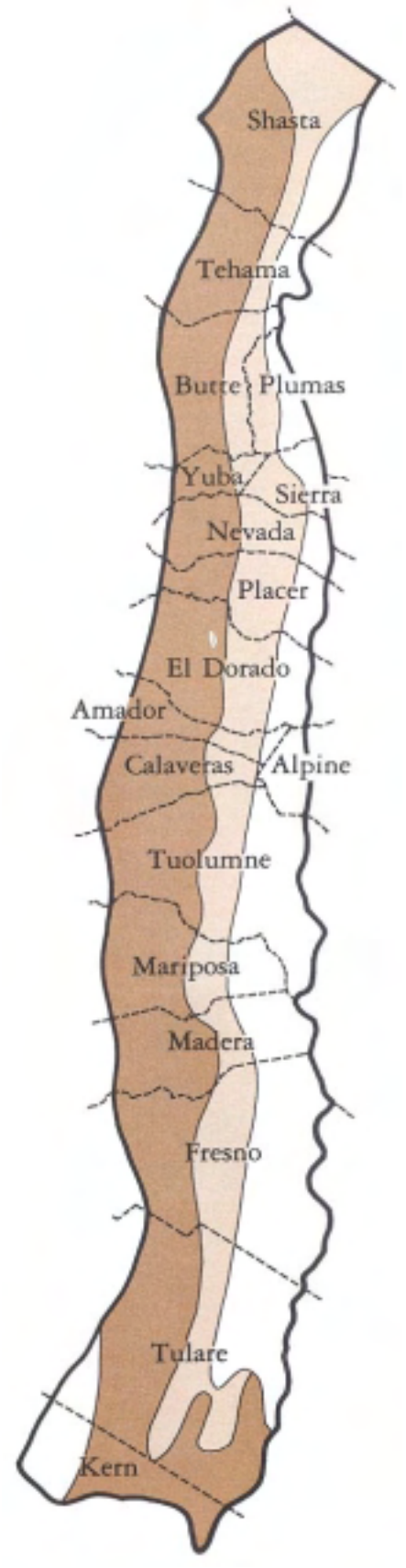
TERRITORY/HOME RANGE: No information available.

FOOD HABITS: Insects generally comprise the diet, with oak worms and caterpillars favored. Hawks flying insects and gleans insects from foliage from low to moderate heights in tree canopy.

OTHER Rarely observed at elevations greater than 6000 ft (1830 m); in some regions largely restricted to golden oak habitat (Grinnell and Storer 1924).

REFERENCES: Grinnell and Storer 1924, Griscom and Sprunt 1957.





Townsend's Warbler

B161 (*Dendroica townsendi*)

STATUS: No official listed status. Uncommon to fairly common fall migrant; rarely observed in the Sierra Nevada during spring migration.

DISTRIBUTION/HABITAT: Frequents timbered stands from black oak woodland up to lodgepole pine forests; prefers low to intermediate canopy cover.

SPECIAL HABITAT REQUIREMENTS:

BREEDING: Does not breed in the western Sierra Nevada.

TERRITORY/HOME RANGE: None established in the western Sierran zone.

FOOD HABITS: Food consists of insects obtained by gleaning foliage of dense conifers.

OTHER: Fall migrants found primarily at higher elevations, usually associated with migratory flocks of yellow-rumped warblers.

REFERENCES: Griscom and Sprunt 1957, Gaines 1977.





Hermit Warbler

B162 (*Dendroica occidentalis*)

STATUS: No official listed status. Fairly common to common spring and/or summer resident in mid-elevation conifer forests.

DISTRIBUTION/HABITAT: Breeds in ponderosa pine, black oak woodlands, and mixed-conifer forests, prefers stands with large trees and low to intermediate percentage canopy cover. By July and August, after breeding season, spreads upslope through red fir forests.

SPECIAL HABITAT REQUIREMENTS: Large trees.

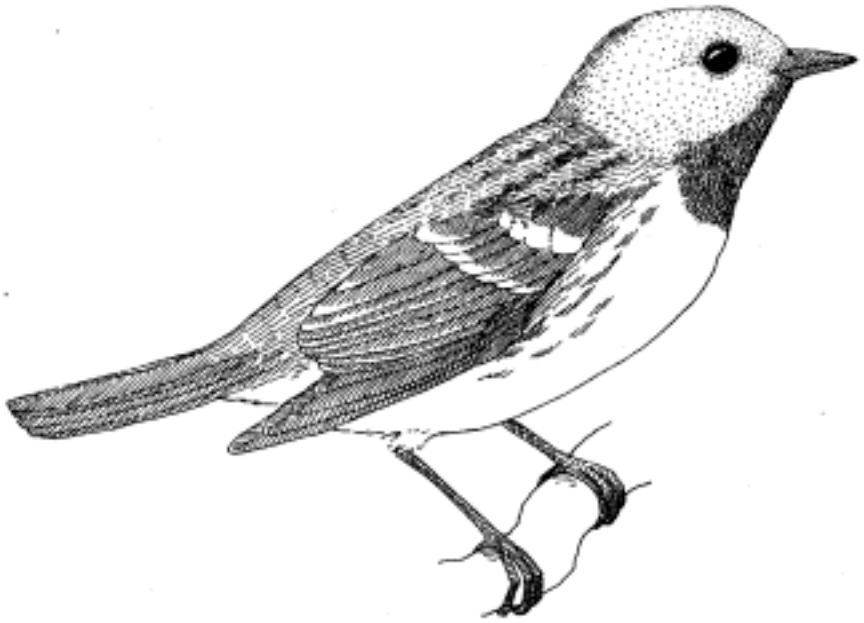
BREEDING: Breeds from late April to late June, with peak from early to mid-June. Nests on horizontal branches in relatively tall conifers, from 2 to 50 ft (0.6 to 15 m) above ground. Clutch size from 3 to 5, with mean of 4.

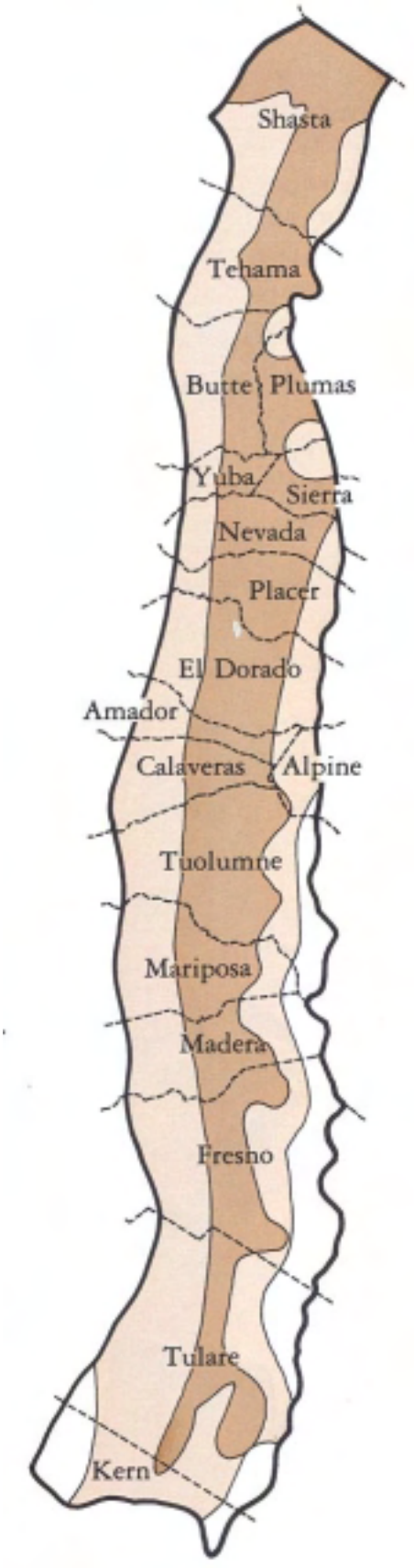
TERRITORY/HOME RANGE: No data on either. Breeding density in mixed-conifer forest in the Sierra Nevada averaged 6.5 birds per 100 acres (40 ha) (Beedy 1975).

FOOD HABITS: Insects and spiders comprise the diet, with aerial insects hawked and other prey gleaned from foliage.

OTHER: When nesting in low to middle canopy, usually forage and sing in tallest trees. In general, the biology of species poorly known.

REFERENCES: Barlow 1899, Griscom and Sprunt 1957.





MacGillivray's Warbler

B163 (*Oporornis tolmiei*)

STATUS: No official listed status. Fairly common summer resident in suitable habitat.

DISTRIBUTION/HABITAT: Breeds in rather dense shrubbery and thickets, especially near water, from ponderosa pine zone upslope into mixed-conifer zone. Often found in mid-elevation wet meadows with low shrubs, such as willows. In postnesting period, small numbers travel through meadows and willow thickets to treeline.

SPECIAL HABITAT REQUIREMENTS: Dense shrubs near water for nesting.

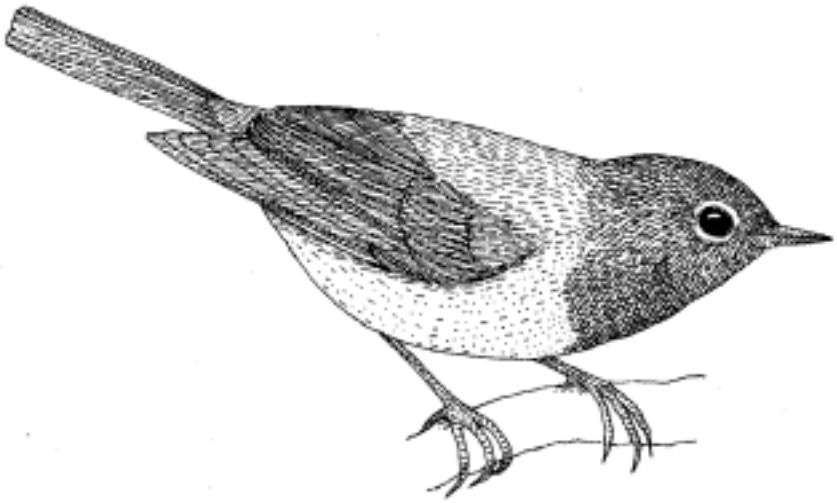
BREEDING: Breeds from early May to early July, with peak from early to mid-June. Nests usually from 2 to 6 ft (0.6 to 1.8 m) up in shrub in moist thicket, usually with tall herbs, grasses, or ferns. Clutch size from 3 to 6, with mean of 4.

TERRITORY/HOME RANGE: No data on territory or home range sizes. Salt (1957) reported a mean density of 30 birds per 100 acres (40 ha) in aspen habitat in Wyoming.

FOOD HABITS: Insects, taken in dense shrubs or on ground, by foliage gleaning or probing in ground litter, make up majority of diet.

OTHER:

REFERENCES: Griscom, and Sprunt 1957, Gaines 1977.





Common Yellowthroat

B164 (*Geothlypis trichas*)

STATUS: No official listed status. Fairly common summer resident, and spring and fall migrant in suitable areas. Substantially reduced in numbers in recent years because of drainage of essential aquatic habitat.

DISTRIBUTION/HABITAT: Breeds in marshy vegetation around ponds and along slow-moving streams or rivers, and in dense, mesic vegetation in wet meadows or in deciduous riparian habitat. Largely restricted to low elevations, observed on numerous occasions in Yosemite Valley and probably has nested there. Observed at elevations of 6000 ft (1830 m) in wet meadows in late summer.

SPECIAL HABITAT REQUIREMENTS: Marsh or dense shrubs near water for nesting.

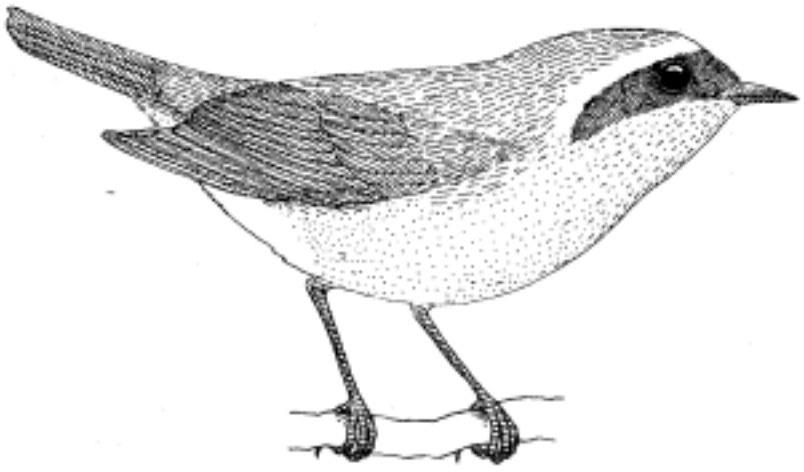
BREEDING: Breeds from early April to mid-July, with peak from mid-May to early June. Nests mostly on ground or supported by aquatic vegetation near or over water. Clutch size from 3 to 5, with mean of 4.6.

TERRITORY/HOME RANGE: Territory and home range probably the same. Reported sizes: average in marsh and riparian habitat in Michigan 1.3 acres (0.5 ha), with range from 0.8 to 1.8 acres (0.3 to 0.7 ha) (Stewart 1953); a mean of 0.6 acre (0.2 ha) in Illinois swamp, with range from 0.2 to 1.1 acres (0.1 to 0.5 ha) (Brewer 1955), and means of 0.7 acre (0.3 ha) in Minnesota and 1.7 acres (0.7 ha) in Michigan (Hofslund 1960).

FOOD HABITS: Large insects, especially caterpillars and other insect larvae, comprise majority of diet. Gleans from aquatic and marsh vegetation or foliage of shrubs in wet sites. Sometimes probes for food in ground.

OTHER:

REFERENCES: Stewart 1953, Griscom and Sprunt 1957.





Yellow-breasted Chat

B165 (*Icteria virens*)

STATUS: No official listed status; on the 1978 Audubon Society Blue List. Fairly common spring migrant and summer resident in suitable habitat.

DISTRIBUTION/HABITAT: Breeds in low elevation riparian deciduous habitats; breeding above 1000 ft (305 m) not confirmed. May not be a breeding species in western Sierran zone. Usually wanders upslope after breeding season, in late summer and early autumn. Recorded in riparian deciduous, habitats as high as 4000 ft (1220 m).

SPECIAL HABITAT REQUIREMENTS: Dense riparian shrubs.

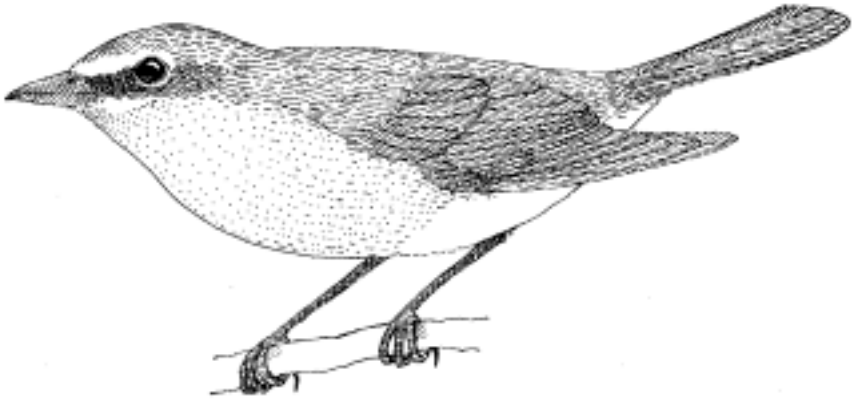
BREEDING: Breeds from early May to mid-July, with peak from early to mid-June. Nests usually at heights of 2 to 3 ft (0.6 to 0.9 m) in dense shrubs along stream courses. Clutch size from 3 to 6, with mean of 3.5.

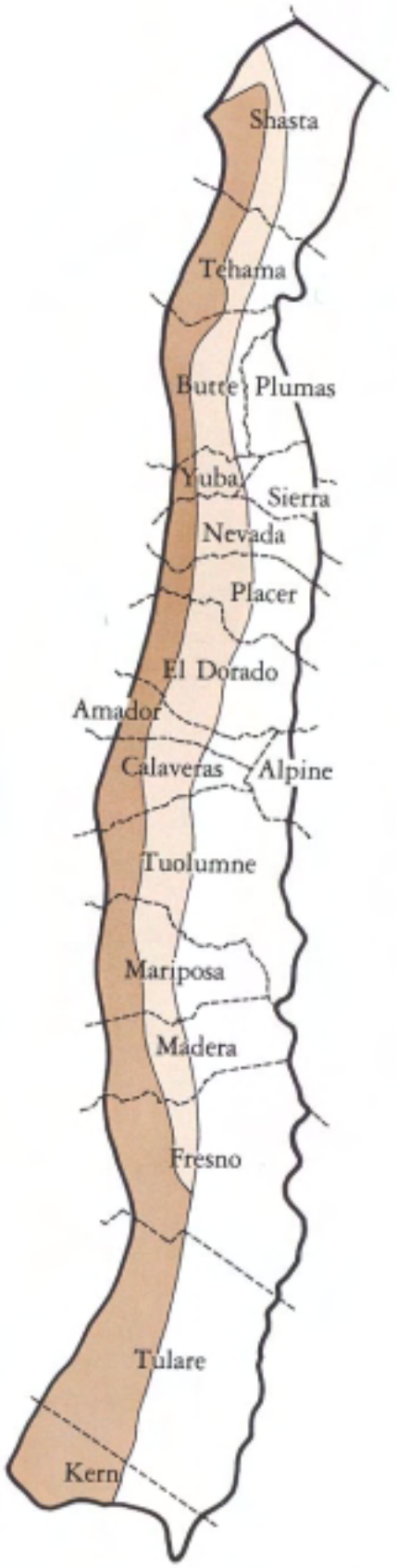
TERRITORY/HOME RANGE: In Illinois, Brewer (1955) reported home range sizes from 0.14 to 0.71 acre (0.06 to 0.3 ha), with mean of 0.33 acre (0.1 ha) in marsh and riparian habitat. In upland deciduous scrub habitat in Indiana, Thompson and Nolan (1973) found mean territory sizes ranging from a low of 2.8 acres (1.1 ha) in 1967 to high of 3.9 acres (1.6 ha) in 1970; pooled mean for all years: 3.1 acres (1.24 ha). In variously wooded and brushy habitat near a stream in Virginia, Dennis (1958) noted a range in territory size from 1.25 to 2.50 acres (0.5 to 1.0 ha).

FOOD HABITS: Insects make up bulk of diet; fruits also eaten. Most food obtained by gleaning foliage of shrubs and small trees.

OTHER: Numbers reduced in the Sierra Nevada through habitat destruction.

REFERENCES: Griscom and Sprunt 1957, Dennis 1958, Thompson and Nolan 1973.





Wilson's Warbler

B166 (*Wilsonia pusilla*)

STATUS: No official listed status. Common summer resident.

DISTRIBUTION/HABITAT: Breeds in riparian sites, around some lakeshore habitat, or in wet meadows in middle to high elevations. Also forages along forest edges and within dense coniferous forests during postnesting season (Beedy 1975).

SPECIAL HABITAT REQUIREMENTS: Dense shrubs near water for breeding.

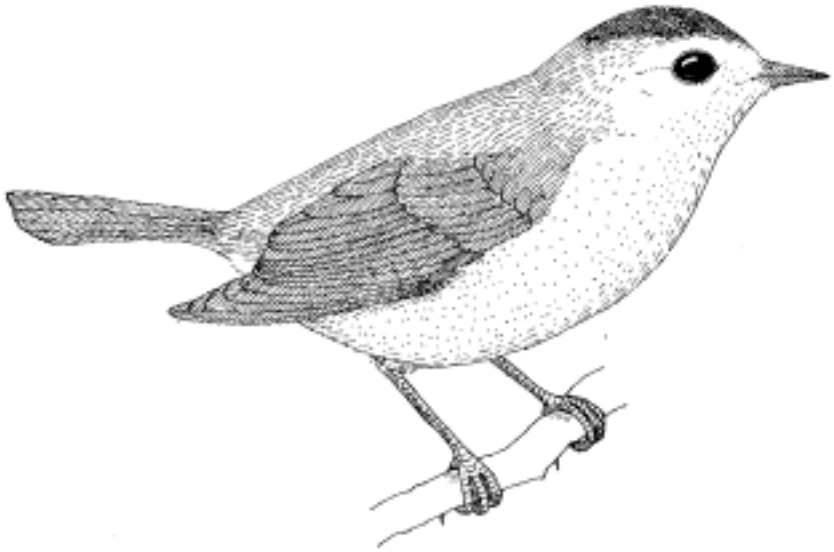
BREEDING: Breeds from late April to early July, with peak from mid-May to mid-July. Nests usually on ground among mosses and grasses, often at base of small tree or shrub, and typically located within dense shrubs. Clutch size from 4 to 6, with mean of 5.

TERRITORY/HOME RANGE: In a study in bay-laurel habitat in Marin County, Stewart (1973) reported that they ranged from 410 to 984 ft (125 to 300 m) from their nest. He reported territory sizes from 0.5 to 3.2 acres (0.2 to 1.3 ha), with mean of 1.2 acres (0.5 ha) in same area.

FOOD HABITS: Insects make up 90 percent of diet, seeds and berries 10 percent. Gleans foliage near ground and hawks for flying insects.

OTHER:

REFERENCES: Harrison 1951, Griscom and Sprunt 1957, Stewart 1973.





House Sparrow

B167 (*Passer domesticus*)

STATUS: No official listed status. Common permanent resident.

DISTRIBUTION/HABITAT: Breeds in all types and successional stages from annual grasslands up to ponderosa pine and black oak woodlands; established only in areas inhabited by humans, especially where livestock occur.

SPECIAL HABITAT REQUIREMENTS: Human habitations.

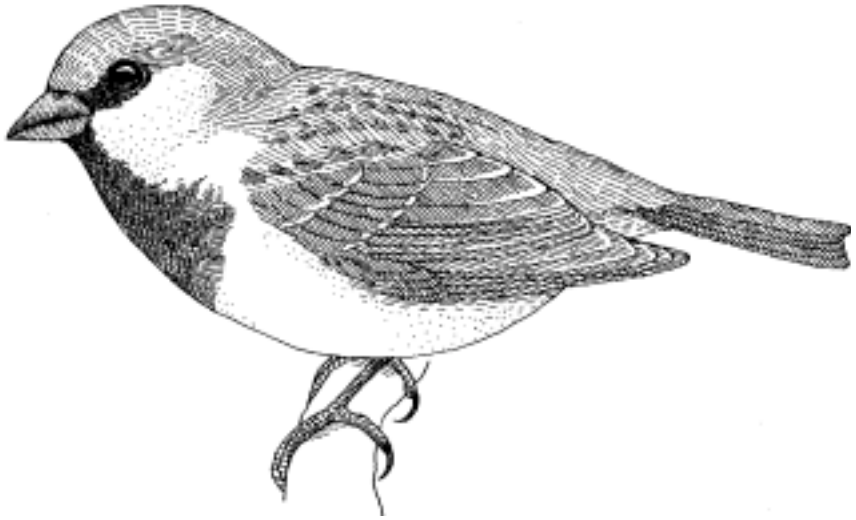
BREEDING: Breeds from early March to early August, with peak from early May to late June. Highly versatile in selection of nest sites, which may be almost any cavity, crevice or dense branchwork; often in buildings, under eaves, or in decorative grillwork. Nest height ranges from 5 to 50 ft (1.5 to 15 m). Three to 7 eggs per clutch, with mode of 5.

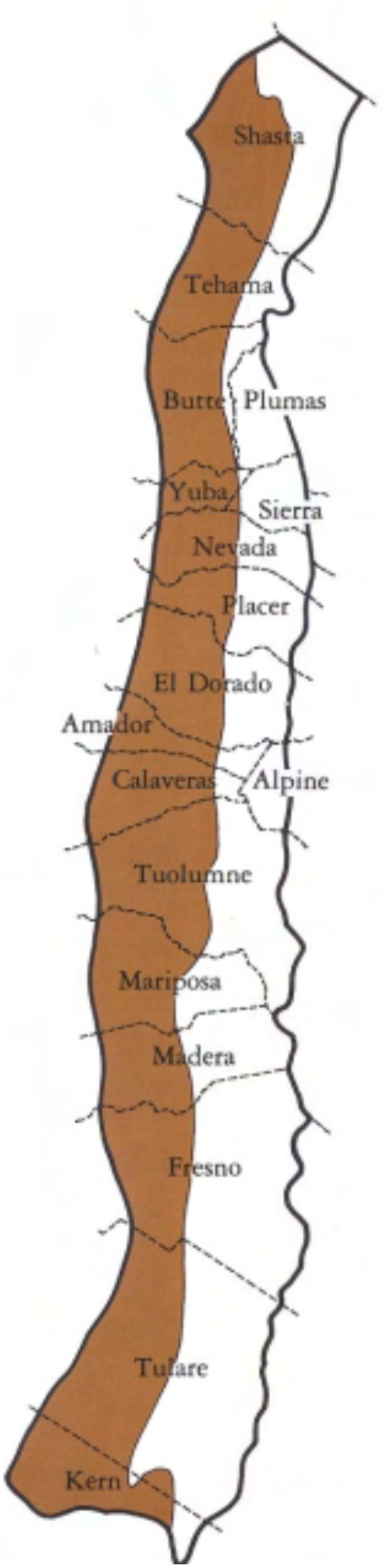
TERRITORY/HOME RANGE: In Illinois and Wisconsin, Owen (1957) reported that an area ranging in diameter from 1.5 to 20 ft (0.5 to 6.1 m) around the nest defended. Average area 158 ft^2 (14.7 m^2). Nonbreeders reported traveling up to 2 mi (3.2 km) from roost sites to foraging sites in Oklahoma (North 1973) and New York (Weaver 1939).

FOOD HABITS: Adults eat mostly seeds and other vegetable matter; nestlings fed insects and seeds. Gleans most of food from ground, also from foliage. The common "garbage" bird of city streets.

OTHER: Introduced into Eastern United States from Europe during middle of last century; successfully spread throughout the country. More abundant during pre-automobile period, usually foraged in horse manure. Aggressive; frequently evicts other cavity nesting species from nest sites.

REFERENCES: Summers-Smith 1963, Kendeigh 1973, North 1973.





Western Meadowlark

B168 (*Sturnella neglecter*)

STATUS: No official listed status. Common resident at low elevations; late summer and fall transient at higher elevations.

DISTRIBUTION/HABITAT: Breeds in grasslands and pastureland from annual grassland up to chaparral zone, with or without moderate shrub cover, and generally in drier sites. Some upslope movement in late summer and fall.

SPECIAL HABITAT REQUIREMENTS: Open terrain.

BREEDING: Breeds from early February to late July, with peak from late April to late June. Nests in depression on ground, among grasses or other low vegetation. Clutch size from 3 to 7, with mode of 5.

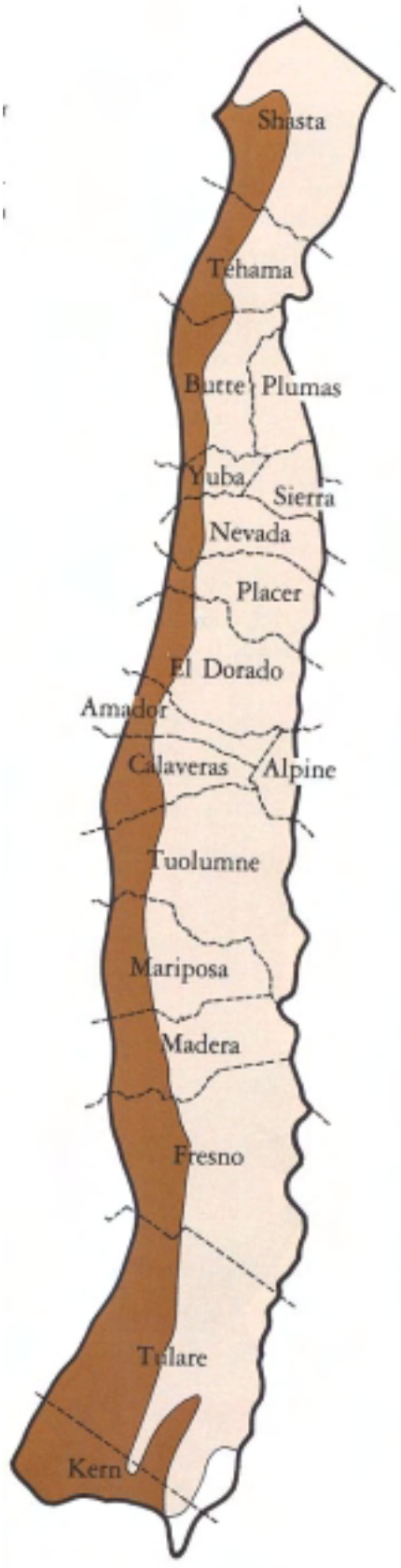
TERRITORY/HOME RANGE: Home range same as territory. In Wisconsin, breeding territories ranged from 3 to 15 acres (1.2 to 6.1 ha), with mean of about 7.5 acres (3 ha) (Lanyon 1956).

FOOD HABITS: Insects and seeds, gleaned from grasses and live or dead annuals, or from the ground, make up the majority of the diet. Turns over clods and digs in soft earth.

OTHER:

REFERENCES: Bryant 1914, Grinnell and Miller 1944, Lanyon 1957.





Yellow-headed Blackbird

B169 (*Xanthocephalus xanthocephalus*)

STATUS: No official listed status. Rare spring and fall migrant.

DISTRIBUTION/HABITAT: Prefers large, marshy areas with water of considerable depth and patches of open water. Forages in moist, open areas and in marshes; requires marshes only during breeding season.

SPECIAL HABITAT REQUIREMENTS: Marshes for nesting; open terrain.

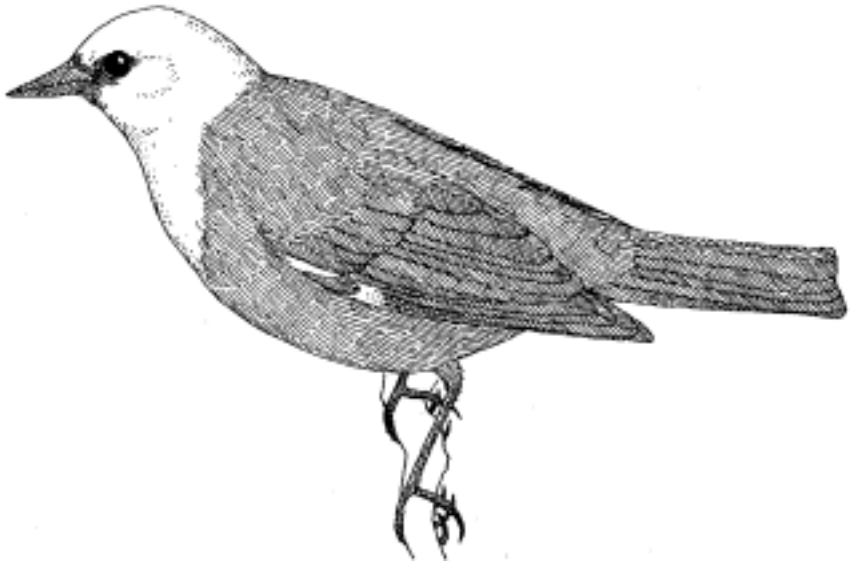
BREEDING: Possibly breeds in the western Sierran zone at low elevations from mid-April to late July, with peak from late May to mid-July. Nests in emergent vegetation, usually cattails or bulrush, from 0.5 to 3 ft (0.2 to 0.9 m) above water, usually near edge of vegetation farthest from shore. Clutch size from 2 to 5, with mode of 4.

TERRITORY/HOME RANGE: Near Westmoreland, Imperial County, Willson (1966) reported 24 territories averaging 1250 ft^2 (116 m^2) in scattered cattail and 75 territories averaging about 350 ft^2 (33 m^2) (actually reported as 300 to 400 ft^2). In Washington, she found territories much larger, ranging from average of 4900 ft^2 (455 m^2) in bulrush to 43,830 ft^2 (4072m^2) in scattered cattail. Breeding birds foraged at least up to 1 mi (1.6 km) from their territories (Willson 1966).

FOOD HABITS: Seeds, insects, and gastropods comprise bulk of diet; newly emergent dragonflies and damselflies the predominant food for nestlings. Food gleaned or hawked from emergent vegetation, wet meadows or grassland, moist earth, or air.

OTHER:

REFERENCES: Bent 1958, Willson and Orians 1963, Willson 1966.





Red-winged Blackbird

B170 (*Agelaius phoeniceus*)

STATUS: No official listed status. Probably permanent resident at lower elevations; summer resident and breeder at higher elevations, usually below 6000 ft (1830 m) but rarely to as high as 8600 ft (2620 m).

DISTRIBUTION/HABITAT: Breeds preferentially in marsh habitat, but also in grasslands, agricultural fields, low shrubs, and small trees. Most common as breeders at lower elevations (annual grasslands up to digger pine-oak type); less common with increasing elevation.

SPECIAL HABITAT REQUIREMENTS: Marshes or shrubs near water for nesting; open terrain.

BREEDING: Breeds from mid-March to late July, with peak from early May to late June. Nests usually in marsh vegetation, especially cattails; also in low tufts of grass around ponds, in shrubs, or small trees, most often near water. Nest height varies from 0.5 to 6 ft (0.2 to 1.8 m) above water or ground. Clutch size from 2 to 6, with mean of 3.6.

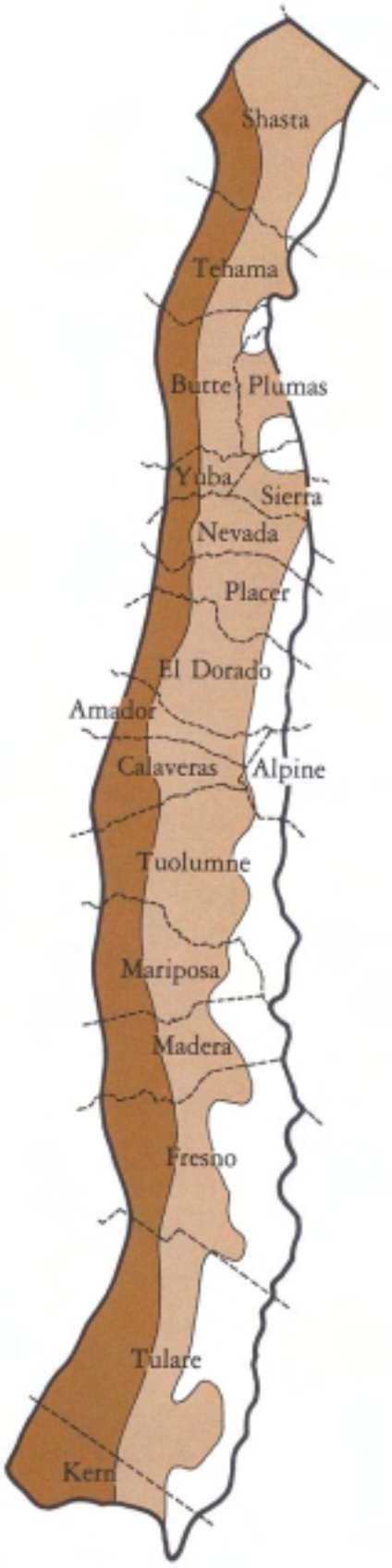
TERRITORY/HOME RANGE: Home range large. For example, in Texas, Meanly (1965) reported nonbreeding birds foraging up to 52 mi (83 km) from roosts. In northern California, 69 breeding territories averaged 0.16 acre (0.06 ha) (Orians 1961).

FOOD HABITS: Seeds, insects, and other arthropods comprise most of diet. Usually feeds in moist places, on ground or in low marsh vegetation, but sometimes in shrubs and trees. Turns over objects in search of food, gleans items from ground or foliage, picks seeds, and hawks aerial insects.

OTHER:

REFERENCES: Orians 1961, Payne 1969, Holm 1973.





Tricolored Blackbird

B171 (*Agelaius tricolor*)

STATUS: No official listed status. Uncommon to rare as breeding species in the western Sierran zone, though breeds regularly in large colonies in the Central Valley. Probably found only as rare vagrant in fall and winter in the western Sierra Nevada.

DISTRIBUTION/HABITAT: Breeds usually in marsh vegetation, sometimes in other very wet situations, such as irrigated fields. Confined to low elevation sites in the western Sierra Nevada. Although fall breeding common in the Central Valley, no such records from west slopes of the Sierra Nevada. Most flocks move toward Sacramento-San Joaquin Delta region in fall and winter.

SPECIAL HABITAT REQUIREMENTS: Typically marshes for nesting; open terrain.

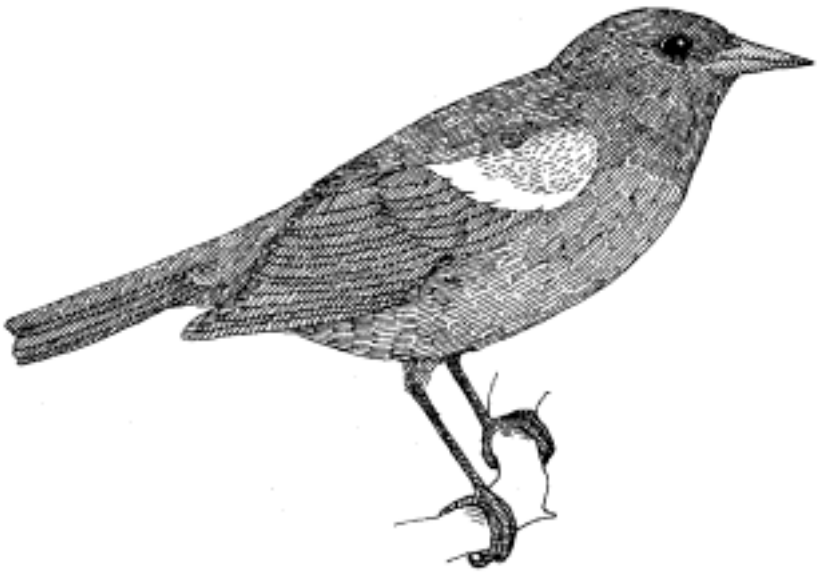
BREEDING: Breeds from early April to mid-July, with peak from early May to late June. May breed from late September to late November, depending upon weather conditions conducive to abundant insect production. Nests usually in dense growths of cattails or other emergent vegetation, sometimes in other low vegetation (willows, blackberries, grain fields, and thistles) in wet areas. Nest height from 1 to 12 ft (0.3 to 3.7 m) over water or ground. Clutch size from 2 to 6, with mean of 3.2.

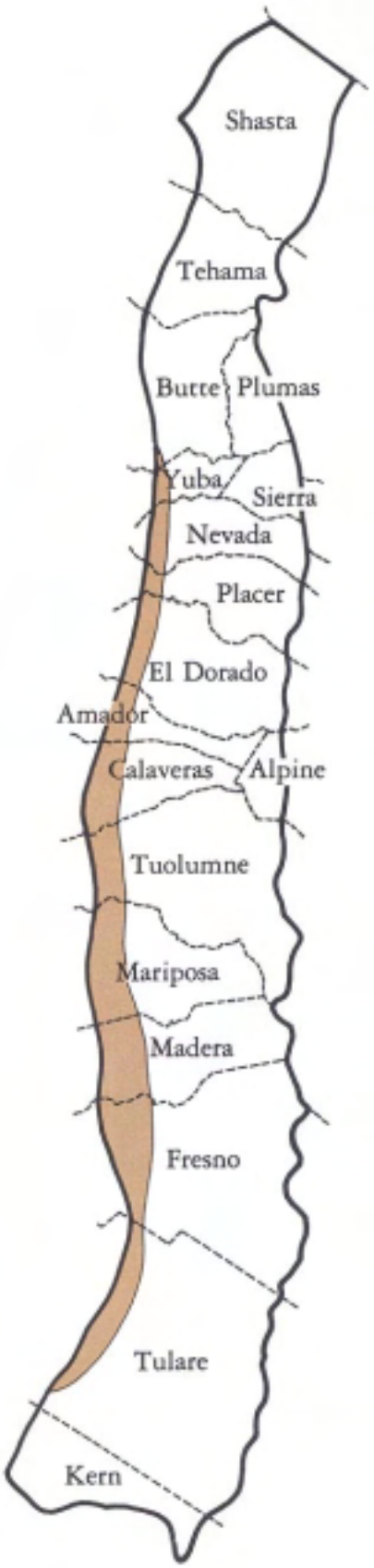
TERRITORY/HOME RANGE: Orians (1961) reported territory confined to about 35 ft^2 (3.3 m^2) around nest. Individual birds studied by Orians in Colusa and Yuba Counties traveled as far as 4 mi (6.4 km) from nest sites to foraging areas; colony as a whole ranged for foraging over about 30 mi^2 (78 km^2).

FOOD HABITS: Insects and seeds comprise diet. Feeds in large flocks, gleaning food from ground and low vegetation in flooded lands, pond margins, or grasslands.

OTHER: Highly gregarious year-round and nests synchronously in large colonies near abundant insect supply.

REFERENCES: Orians 1961, Payne 1969, Dehaven *et al.* 1975.





Northern Oriole

B172 (*Icterus galbula*)

STATUS: No official listed status. Fairly common summer resident and breeder.

DISTRIBUTION/HABITAT: Breeds from blue oak savannahs up to ponderosa pine and black oak types, generally in stands with low percent canopy coverage. Prefers breeding habitat in riparian deciduous sites, generally below 5000 ft (1520 m).

SPECIAL HABITAT REQUIREMENTS:

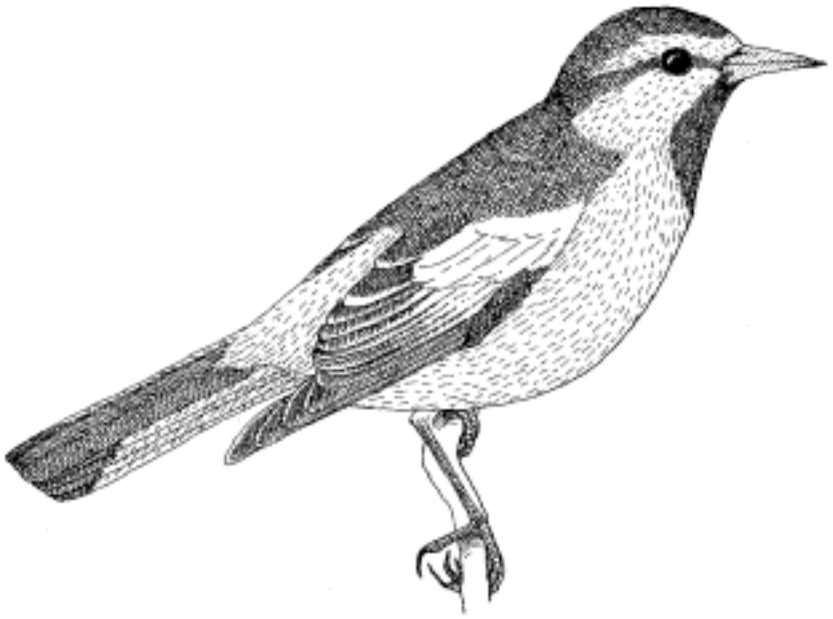
BREEDING: Breeds from early April to late July, with peak from mid-May to early July. Builds hanging nest attached to terminal twigs of riparian deciduous trees and deciduous oaks (occasionally live oaks, orchard trees, or even conifers), from 6 to 50 ft (1.8 to 15 m) up. Clutch size from 3 to 6, with 4 or 5 most common.

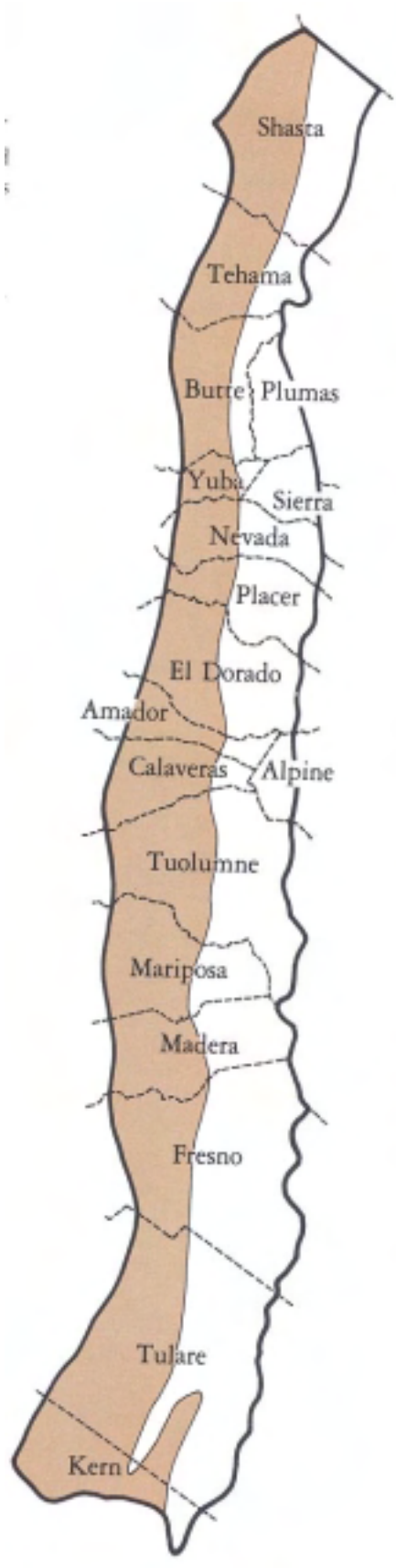
TERRITORY/HOME RANGE: In Kansas, for the Baltimore race of species, Fitch (1958) reported a single territory of 10.5 acres (4.3 ha). In a Montana riparian cottonwood stand, Walcheck (1970) reported a breeding density of 13 pairs per 100 acres (40 ha).

FOOD HABITS: Insects comprise bulk of diet, though some fruit also eaten. Gleans insects from foliage of trees, shrubs, grasses, and forbs; also hawks aerial insects.

OTHER: Water preferred, but nor required, in breeding habitat.

REFERENCES: Grinnell and Storer 1924, Grinnell and Miller 1944, Bent 1958.





Brewer's Blackbird

B173 (*Euphagus cyanocephalus*)

STATUS: No official listed status. Common resident; leaves higher mountains in fall and winter.

DISTRIBUTION/HABITAT: Breeds in all habitat types in the western Sierran zone, except alpine meadow; prefers early successional stages and avoids stands with moderate to high percent canopy cover. Adults and young move upslope in summer, after breeding, but leave higher mountains by late September. Less common at high elevations except around campgrounds, picnic areas, stables, and other areas of human disturbance. In winter, generally remain below ponderosa pine belt.

SPECIAL HABITAT REQUIREMENTS:

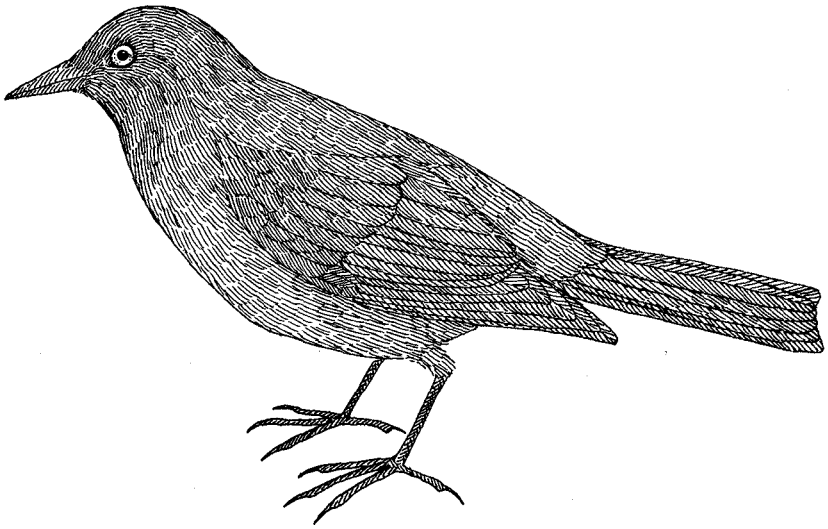
BREEDING: Breeds from mid-March to early August, with peak from early May to early July. Nest sites highly varied. Prefers dense foliage, especially of conifers, but also of other trees, bushes, herbs, and grasses. Also nests in crevices in stumps and occasionally on ground. Nest height ranges from 0 to as high as 150 ft (46 m), though most not above 40 ft (12 m). Clutch size from 3 to 7, with mode of 5.

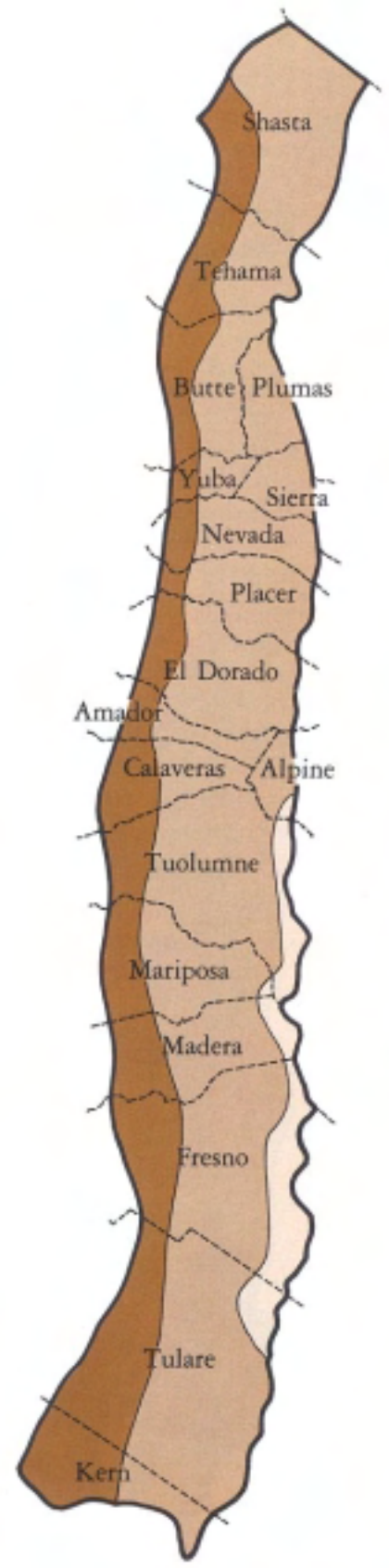
TERRITORY/HOME RANGE: During breeding season, in eastern Washington, ranged up to 1 mi (1.6 km) from nest (Horn 1968), and Williams (1952) found banded birds up to 6 mi (9.6 km) from nests in Monterey County. Defended territory includes only the nest site (Horn 1968, eastern Washington; Williams 1952, Monterey County).

FOOD HABITS: Food consists mainly of insects, though seeds also eaten, particularly in winter. Usually feeds on ground, digging, turning over objects, and gleaning food uncovered. Gleans from foliage of conifers, shrubs, and emergent vegetation in shallow water. Also hawks aerial insects.

OTHER: Uses drier sites than red-winged blackbirds.

REFERENCES: Williams 1952, Hansen and Carter 1963, Orians and Horn 1969.





Brown-headed Cowbird

B174 (*Molothrus ater*)

STATUS: No official listed status. Common to abundant resident. Irrigation of farmland, mosaic logging, livestock grazing, and urban development contributed to dramatic increase in distribution and abundance of cowbirds into the high Sierra Nevada (Gaines 1977).

DISTRIBUTION/HABITAT: Breeds in all habitat types. Lays its eggs in nests of other species; flexible regarding habitats in which it breeds. Forages most often in open areas, prefers moist sites with short grass. Found most often in and near riparian deciduous woodland or in vicinity of stables, livestock, campgrounds, or picnic areas. In fall and winter, generally found below ponderosa pine belt.

SPECIAL HABITAT REQUIREMENTS: Openings for feeding; trees for roosting.

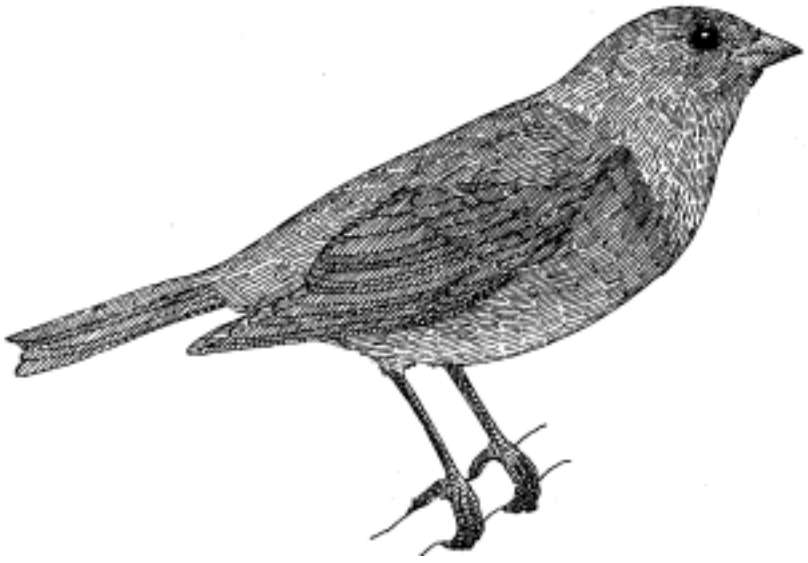
BREEDING: Breeds from early April to late July, with peak in June. Builds no nest, so nest site requirements correspond to those of species it parasitizes (probably all songbirds in range except largest species or cavity nesting forms). Usually one egg laid in each host nest, with each female laying about 30 eggs per season, generally in four groups of 6 to 8 eggs each.

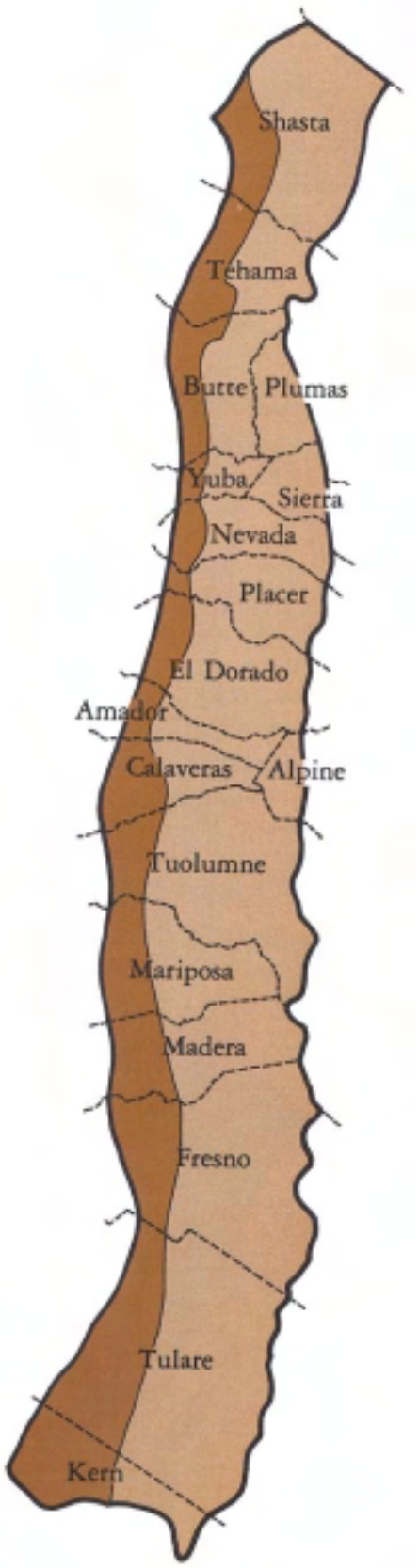
TERRITORY/HOME RANGE: In Michigan, home range size of females ranged from 12 to 40 acres (4.9 to 16 ha), with mean of 24 acres (9.7 ha) (McGeen and McGeen 1968). In Ohio, males had breeding season home ranges generally from 18 to 20 acres (7.3 to 8.1 ha), though some as large as 30 acres (12 ha) (Nice 1937). In Michigan, apparently nonterritorial (Payne 1965), though may defend territories early in morning (S.I. Rothstein, pers. commun.).

FOOD HABITS: Feeds mostly on seeds, also eats insects and spiders. Food usually gleaned from ground and occasionally from backs of livestock.

OTHER: May be responsible for serious population declines of some songbirds in the Sierra Nevada.

REFERENCES: Friedman 1929, Payne 1973, Friedman *et al.* 1977.





Western Tanager

B175 (*Piranga ludoviciana*)

STATUS: No official listed status. Fairly common spring migrant and summer resident.

DISTRIBUTION/HABITAT: Breeds in all coniferous forest types. Prefers stands with mature trees having intermediate percent canopy cover. In spring, migrates through some lower elevation types, down as far as blue oak savannah.

SPECIAL HABITAT REQUIREMENTS:

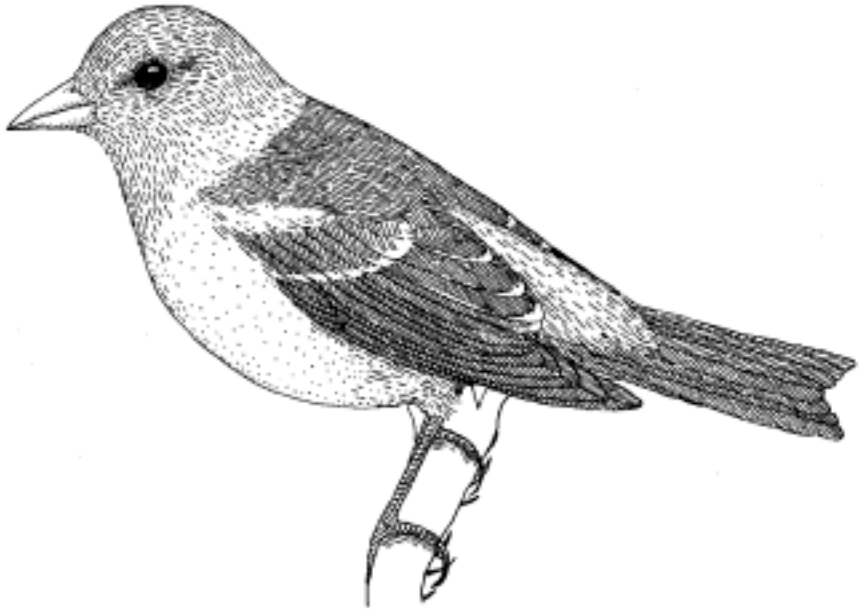
BREEDING: Breeds from early May to mid-August, with peak from early June to late July. Nests toward end of horizontal branch, from 6 to 50 ft (1.8 to 15 m) up. Clutch size from 3 to 5, with mode of 3.

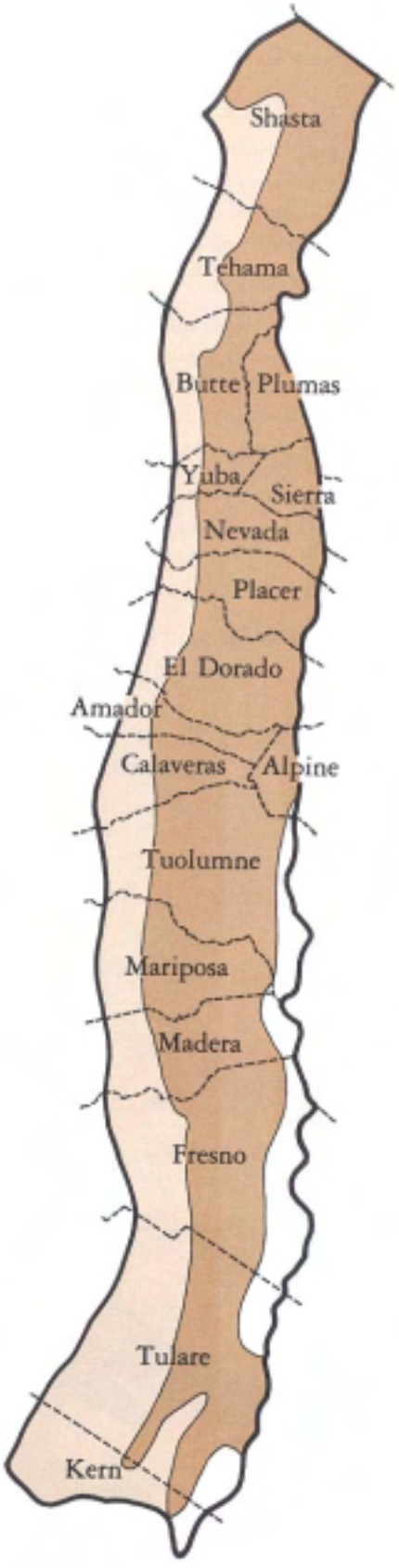
TERRITORY/HOME RANGE: No data available.

FOOD HABITS: Insects and fruits make up bulk of diet. Picks fruit, gleans insects from large twigs, branches, foliage, and ground, and also hawks for aerial insects.

OTHER: Very little research on this species.

REFERENCES: Grinnell and Miller 1944, Bent 1958, Gaines 1977.





Black-headed Grosbeak

B176 (*Pheucticus melanocephalus*)

STATUS: No official listed status. Common summer resident.

DISTRIBUTION/HABITAT: Breeds in wooded sites with some preference for areas with low percent canopy cover, from blue oak savannah up to mixed-conifer zone, usually near water source, occasionally in dry, open woodland. Optimum habitat riparian deciduous. Leaves the western Sierran zone by late summer.

SPECIAL HABITAT REQUIREMENTS:

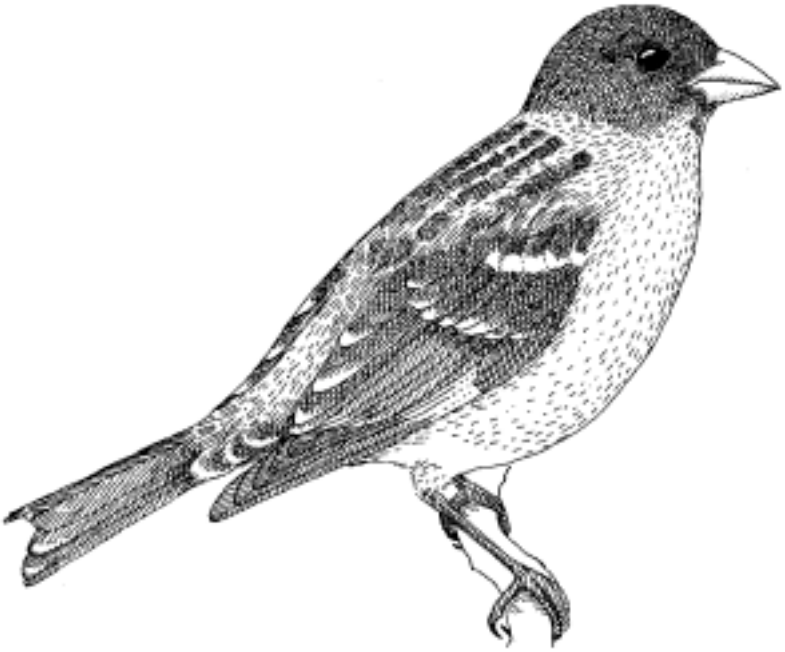
BREEDING: Breeds from late April to early August, with peak from late May to mid-July. Nests usually in deciduous tree or shrub, often near water. Nest height ranges from 3 to 30 ft (0.9 to 9.1 m), though most nests from 6 to 12 ft (1.8 to 3.7 m) up. Clutch size from 2 to 5, with mean of 3.3.

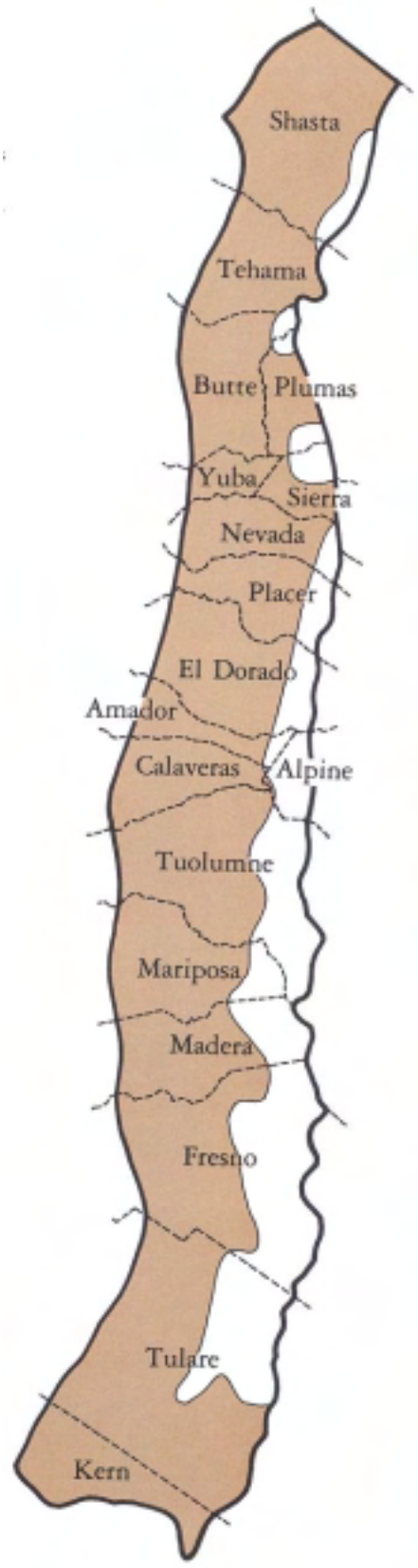
TERRITORY/HOME RANGE: No information available.

FOOD HABITS: Feeds on insects, spiders, fruits, seeds, and buds. Picks fruit and buds from trees and shrubs or from ground; gleans insects from foliage, especially deciduous.

OTHER:

REFERENCES: Grinnell and Miller 1944, Weston 1947, Bent 1968.





Blue Grosbeak

B177 (*Guiraca caerulea*)

STATUS: No official listed status. Rare summer resident.

DISTRIBUTION/HABITAT: Breeds in few sites above 1000 ft (305 m) in the western Sierran foothills, as along Kern River above Lake Isabella; also one record at 1700 ft (520 m) in Mariposa County. Otherwise, no other breeding localities found yet (breeding distribution shown on range map considered potential only; documented sites indicated by stars). Found near water while nesting, foraging in vegetation along water or in open areas nearby. Riparian deciduous type optimum for breeding. Decidely not confined to moist habitats during migration and after breeding.

SPECIAL HABITAT REQUIREMENTS: Dense shrubs near water.

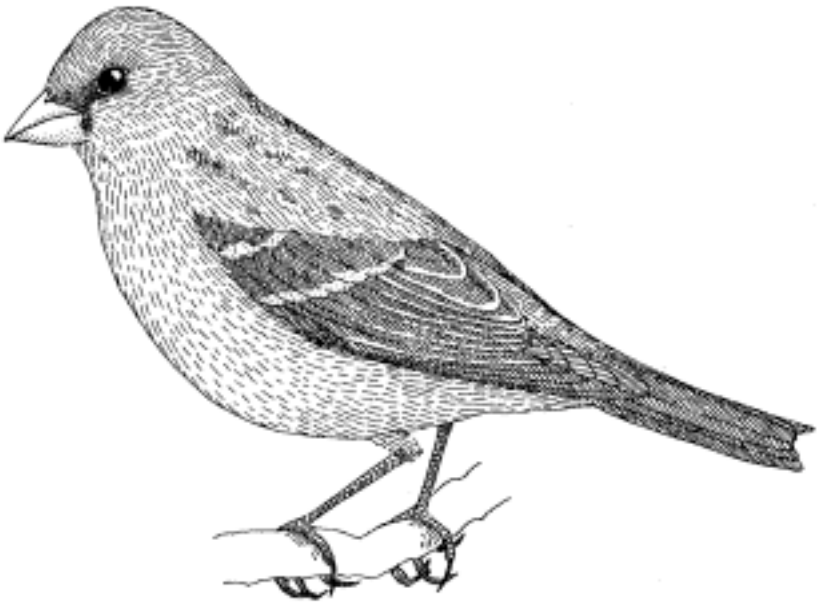
BREEDING: Breeds from late April to late July, with peak from early June to early July. Nests in low, thick vegetation near water, as in willows, cottonwoods, and nettle patches. Nests range from 0.5 to 20 ft (0.15 to 6.1 m) up, most between 2 to 10 ft (0.6 to 3.1 m) above ground. Clutch size from 2 to 5, with mode of 4.

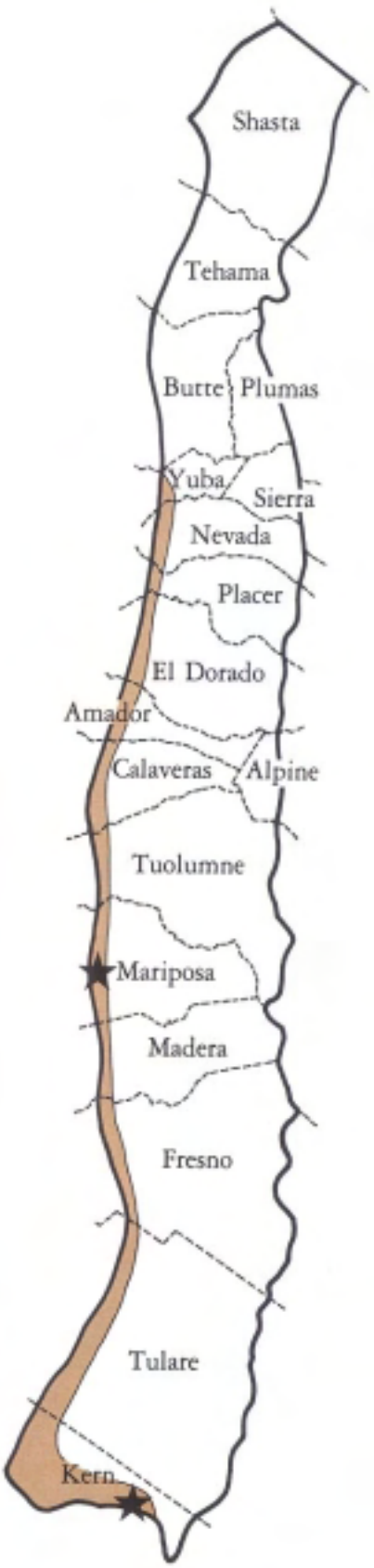
TERRITORY/HOME RANGE: No information on home range size. One breeding territory in South Carolina occupied 15.3 acres (6.2 ha) (Odum and Kuenzler 1955).

FOOD HABITS: Insects and seeds, gleaned mostly from ground, make up diet.

OTHER:

REFERENCES: Grinnell and Storer 1924, Grinnell and Miller 1944, Bent 1968.





Lazuli Bunting

B178 (*Passerina amoena*)

STATUS: No official listed status. Uncommon summer resident and spring migrant.

DISTRIBUTION/HABITAT: Breeds in open areas, shrub lands, and timbered areas with low percent canopy cover, from annual grasslands up to mixed-conifer type. Prefers dense, low vegetation along streams and boggy meadows. Small numbers usually move upslope after breeding, rarely to as high as 10,000 ft (3050 m).

SPECIAL HABITAT REQUIREMENTS: Shrubs/grass-forbs.

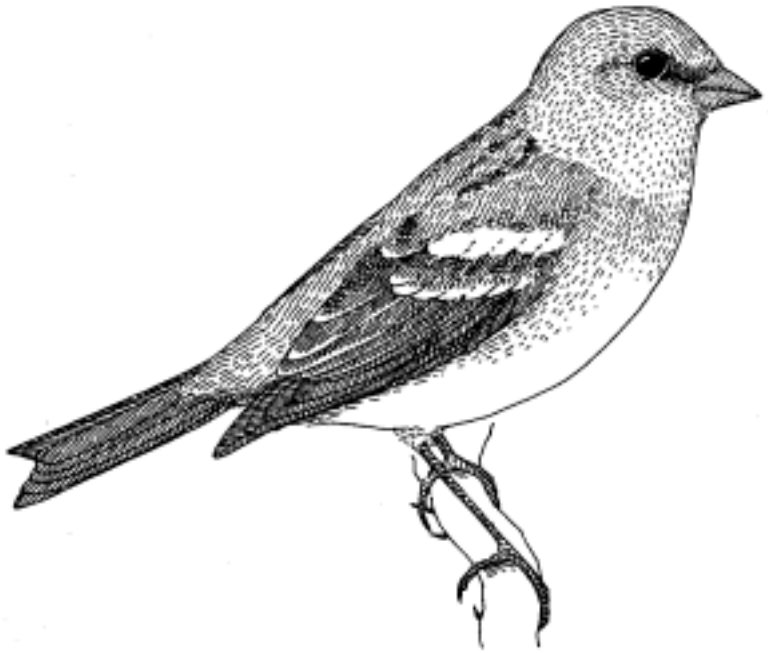
BREEDING: Breeds from late March to mid-August, with peak from early June to late July. Nests in thick growth of brush, forbs, vines, willows, or other low vegetation, usually from 1.5 to 4 ft (0.5 to 1.2 m) up, and usually near water but not over damp ground. Clutch size from 3 to 5, with mode of 4.

TERRITORY/HOME RANGE: Territorial during breeding season; no data available on size of territory or home range.

FOOD HABITS: Feeds on insects and seeds, on the ground, and in low foliage of grasses, forbs, shrubs, trees. Picks seeds and gleans or pounces upon insects.

OTHER:

REFERENCES: Grinnell and Storer 1924, Grinnell and Miller 1944, Bent 1968.





Evening Grosbeak

B179 (*Hesperiphona vespertina*)

STATUS: No official listed status. Uncommon resident; occurrence highly unpredictable at most localities.

DISTRIBUTION/HABITAT: Breeds in mature mixed-conifer and red fir forest. Prefers stands of intermediate percent canopy coverage. Seeks out area with abundant food before nesting, otherwise, highly nomadic. Seems to desert higher elevations in winter; some move downslope in fall and winter to oak and pine/oak habitats of foothills.

SPECIAL HABITAT REQUIREMENTS
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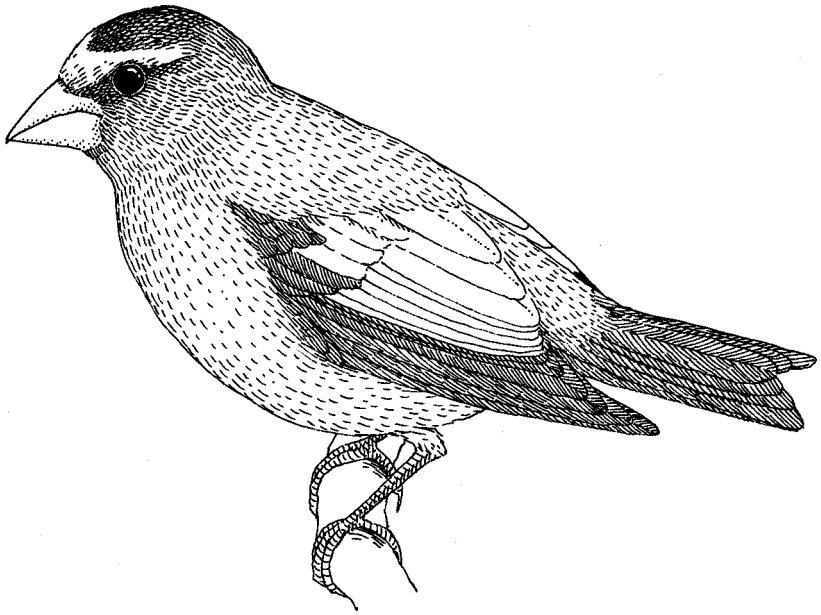
BREEDING: Breeds from early June to early September, with peak from early July to late August. Nests usually above 35 ft (10.7 m) in conifer, though other trees sometimes used. Nest height ranges from 7 to 100 ft (2.1 to 30 m) up. Clutch size from 2 to 5, with mode of 4.

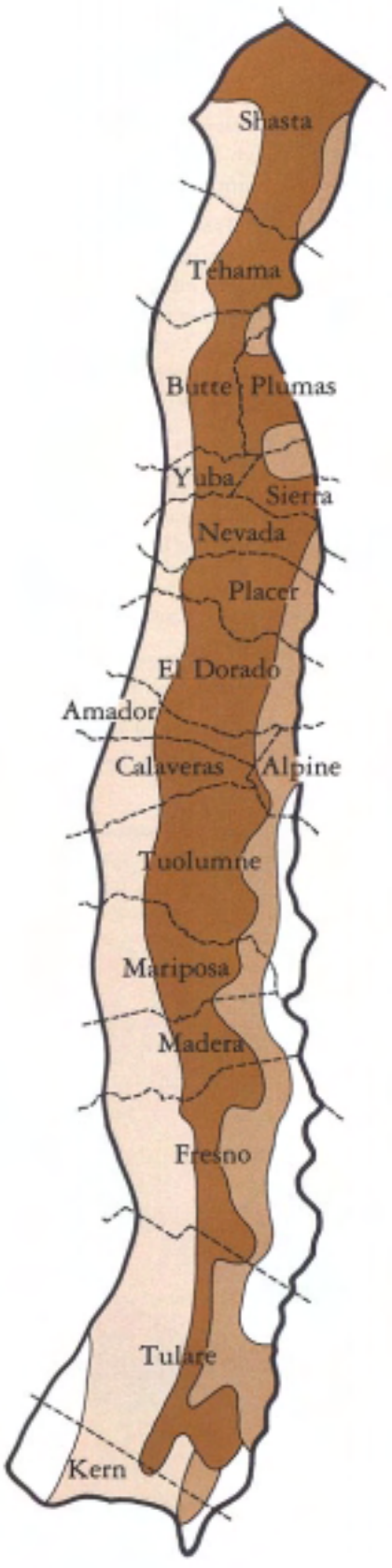
TERRITORY/HOME RANGE: No information available.

FOOD HABITS: Eats mainly large seeds, buds, fruits, and insects. Picks vegetable food from crowns of trees, branch tips, shrubs, and from ground. Insects gleaned from foliage and hawked in air.

OTHER: Usually seen in flocks of 10 to 100.

REFERENCES: Grinnell and Miller 1944, Parks and Parks 1963, Bent 1968.





Purple Finch

B180 (*Carpodacus purpureus*)

STATUS: No official listed status. Fairly common permanent resident in suitable habitat, though numbers fluctuate widely from year to year. Some upslope movement in late summer and downslope movement in fall, winter, and spring periods.

DISTRIBUTION/HABITAT: Breeds in timbered sites from digger pine-oak type up to mixed-conifer forest; prefers higher forest types within that range. Optimum habitat in mature mixed-conifer or ponderosa pine forests with intermediate to high percentage canopy cover. Also breeds in riparian deciduous and black oak habitats. Prefers to breed in moist, shady conifer forests, as in canyon bottoms or near streams or wet meadows. In winter, prefers hardwood to conifers and more open woodland to dense forests.

SPECIAL HABITAT REQUIREMENTS:

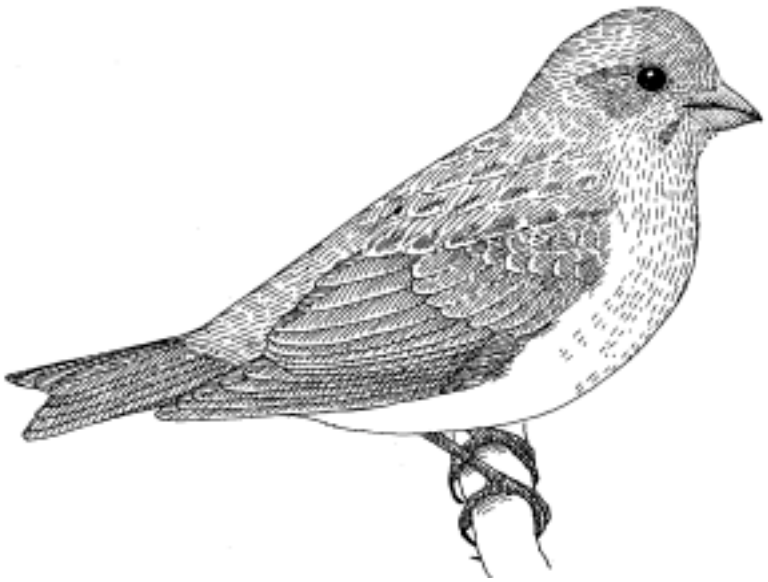
BREEDING: Breeds from early April to mid-August, with peak from mid-May to mid-July. Nests near end of horizontal branch in conifer or deciduous tree, usually near water, and from 6 to 50 ft (1.8 to 15 m) up. Clutch size from 3 to 6, most contain 4 or 5.

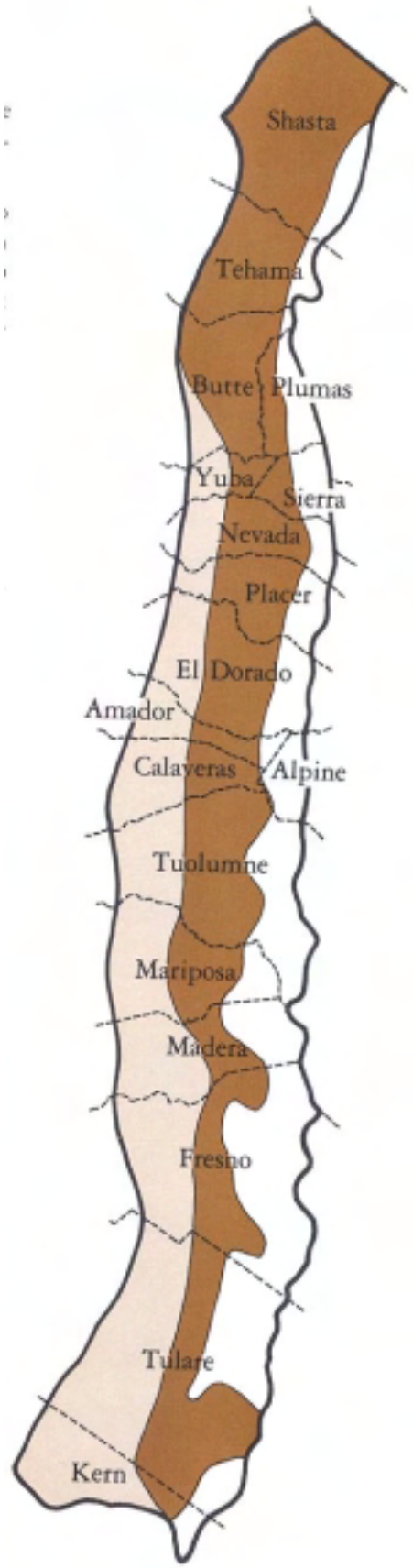
TERRITORY/HOME RANGE: No information.

FOOD HABITS: Eats mainly seeds, buds, flowers, and fruit, and some insects. Removes vegetable food from plants and gleans insects from foliage.

OTHER: Usually found in flocks of 5 to 15, even during breeding season. Favors forest edges for foraging. Easily confused with Cassin's finch, a higher-elevation relative.

REFERENCES: Grinnell and Miller 1944, Salt 1952, Bent 1968.





Cassin's Finch

B181 (*Carpodacus cassinii*)

STATUS: No official listed status. Common resident. Winter distribution poorly known, but apparently much of population moves to east slopes of the Sierra Nevada, remainder moves to lower elevations on west slope.

DISTRIBUTION/HABITAT: Breeds in mature conifer forests from mixed-conifer up to lodgepole pine types; prefers low to intermediate canopy cover. Frequents forest edges more than interior.

SPECIAL HABITAT REQUIREMENTS: Trees/grass-forbs.

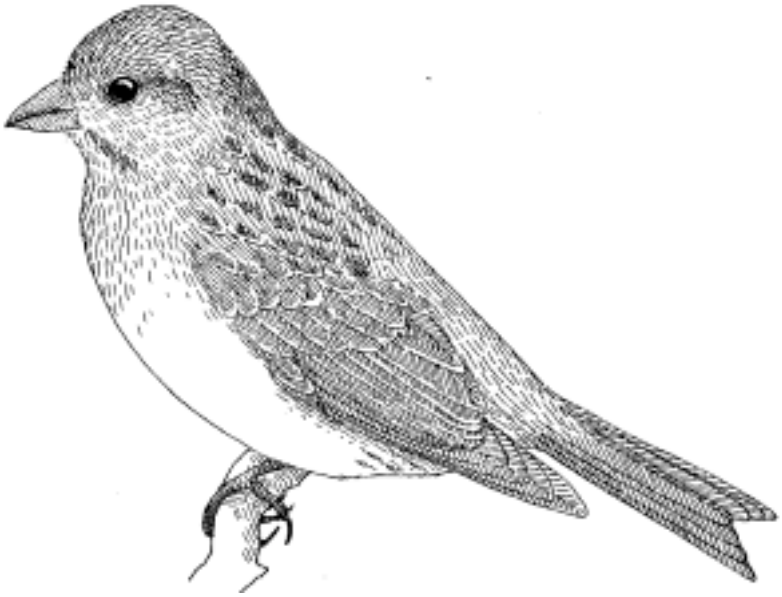
BREEDING: Breeds from mid-May to late August, with peak from late June to early August. Nests near end of flat spray of conifer foliage, exposed to sun from above, from 5 to 150 ft (1.5 to 46 m) up (most nests above 40 ft [12m]). Clutch size from 3 to 6, with 5 most frequent.

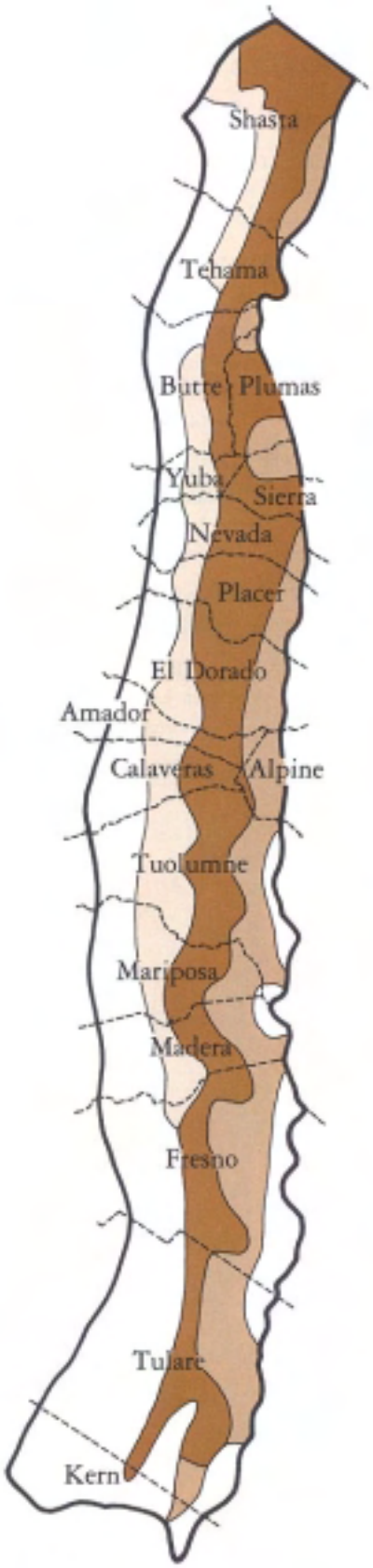
TERRITORY/HOME RANGE: No data on home range. In Utah, males defended no territory but instead followed mate about and defended her from other males (Samson 1976). Tend to breed in loose colonies, with several nests situated close together, even though similar habitat nearby may be vacant.

FOOD HABITS: Feeds on grass and forb seeds, conifer buds and seeds, berries, and insects. Berries, buds, and seeds picked from plants; insects gleaned from foliage; and several food items gleaned from ground.

OTHER: Easily confused with purple finches, which helps to explain uncertainty about winter range. Populations fluctuate widely from year to year.

REFERENCES: Salt 1952, Jones and Baylor 1969, Samson 1976.





House Finch

B182 (*Carpodacus mexicanus*)

STATUS: No official listed status. Abundant resident at lower elevations.

DISTRIBUTION/HABITAT: Breeds commonly in annual grasslands and upslope into chaparral type; prefers early successional stages. No significant seasonal movements.

SPECIAL HABITAT REQUIREMENTS: Elevated perches.

BREEDING: Breeds from mid-March to late August, with peak from mid-April to late June. Nest sites highly varied-a cavity or projection on some man-made structure, dense foliage of trees, old birds' nests, hollow limbs, or crevices in cliff face. Nest generally shaded by foliage or some object, usually from 5 to 20 ft (1.5 to 6.1 m) up, ranging from 3 to 50 ft (0.9 to 15 m). Clutch size from 2 to 6, with mean of 4.5.

TERRITORY/HOME RANGE: No information on home range. In Berkeley, six territories ranged in radius from 6 to 30 ft (1.8 to 9.1 m), averaging 14 ft (4.3 m) around nest (Thompson 1960).

FOOD HABITS: Seeds of grasses and forbs, fruit, and berries comprise most of diet. Gleans from ground, and picks seeds and fruits from grasses and forbs.

OTHER: More numerous around farms, suburbs, and small towns than in natural areas. Prefers open areas with scattered trees, does not *require* trees, but needs overhead perch of some sort (powerlines, buildings, or other) for escape.

REFERENCES: Salt 1952, Evenden 1957, Thompson 1960.





Pine Grosbeak

B183 (*Pinicola enucleator*)

STATUS: No official listed status. Uncommon resident; population numbers fluctuate markedly from year-to-year.

DISTRIBUTION/HABITAT: Breeds in red fir, lodgepole pine, and high elevation riparian deciduous sites. Prefers stands with large trees and low to intermediate percent canopy cover. Usually found near edges of meadows or streams. No evidence of regular downslope movement for winter months, but few records in habitats below breeding range for nonbreeding period.

SPECIAL HABITAT REQUIREMENTS: Nearby meadows or streams.

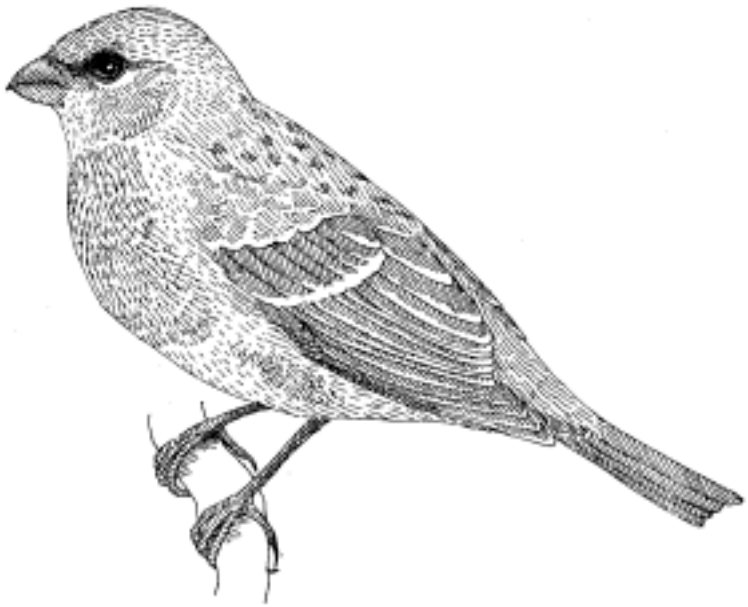
BREEDING: Breeds from late May to early August, with peak from mid-June to late July. Nests in thick foliage near end of horizontal bough or conifer, from 16 to 35 ft (4.9 to 10.7 m) up. Clutch size from 2 to 5, most contain 4.

TERRITORY/HOME RANGE: No information on home range. In a Utah spruce-fir forest, a single breeding territory covered 26 acres (10.5 ha) (French 1954).

FOOD HABITS: Eats mainly buds and seeds of conifers and deciduous trees; also fruit, other seeds, and insects. Picks and gleans food from trees, shrubs, and ground. Moves slowly and deliberately when foraging.

OTHER:

REFERENCES: Grinnell and Miller 1944, French 1954, Bent 1968.





Gray-crowned Rosy Finch

B184 (*Leucosticte tephrocotis*)

STATUS: No official listed status. Common permanent resident in suitable habitat.

DISTRIBUTION/HABITAT: Breeds in alpine meadows, where remains year-round. Sometimes, especially in spring, wanders downslope to elevation as low as 8000 ft (2440 m) in earliest successional stage of lodgepole pine forests. May also be noted rarely in whitebark pine, hemlock, and lodgepole forests adjacent to alpine meadows.

SPECIAL HABITAT REQUIREMENTS: Crevices, talus, or rock outcrops for nest cover.

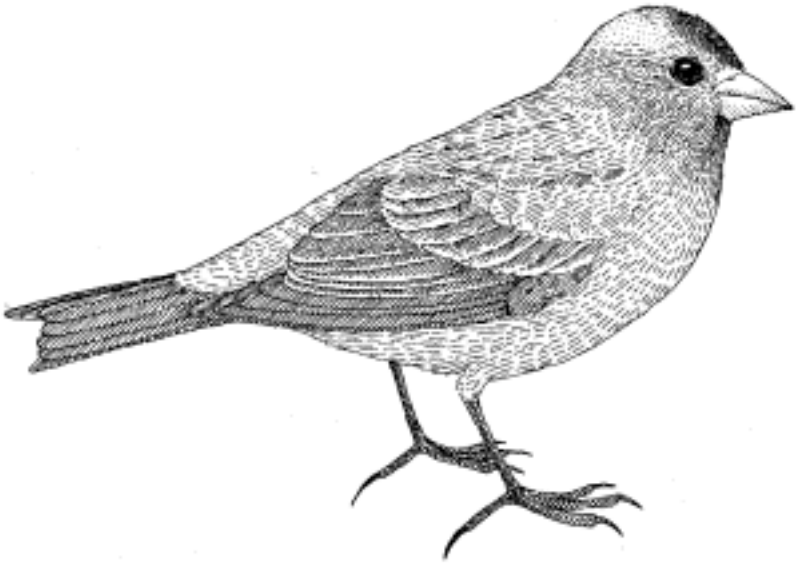
BREEDING: Breeds from early June to mid-August, with peak from late June to early August. Nests in crevices in cliffs, rockslides, and moraines; usually set back in niches or under boulders. Clutch size from 3 to 5, with mean of 4.

TERRITORY/HOME RANGE: Males do not actively defend territory, but only immediate vicinity of mate to keep other males away (Twining 1938). Twining also reported breeders foraged at least 0.5 mi (0.8 km) from nests.

FOOD HABITS: Feeds on insects and seeds, proportions varying with what is most readily available. Obtains food from patches of bare ground, edges of snowbanks, from shallow water, foliage, and air. Picks food from ground, rarely from foliage; hawks insects.

OTHER:

REFERENCES: Twinning 1940; Johnson 1965, 1975.





Pine Siskin

B185 (*Carduelis pinus*)

STATUS: No official listed status. Widespread and fairly common permanent resident; numbers fluctuate because of nomadic behavior in response to food supply and climatic conditions.

DISTRIBUTION/HABITAT: Breeds in coniferous forests from ponderosa pine belt up to lodgepole pine forests, where most abundant (Beedy, unpubl.). Prefers stands with low to intermediate percent canopy coverage. At times, noted below nesting range.

SPECIAL HABITAT REQUIREMENTS:

BREEDING: Breeds from early April to early July, with peak from late April to late June. Nests well concealed amid dense foliage of horizontal limbs of tall conifers, though oaks and maples used occasionally. Nest height ranges from 6 to 50 ft (1.8 to 15 m). Clutch size from 1 to 5, with mean of 3.

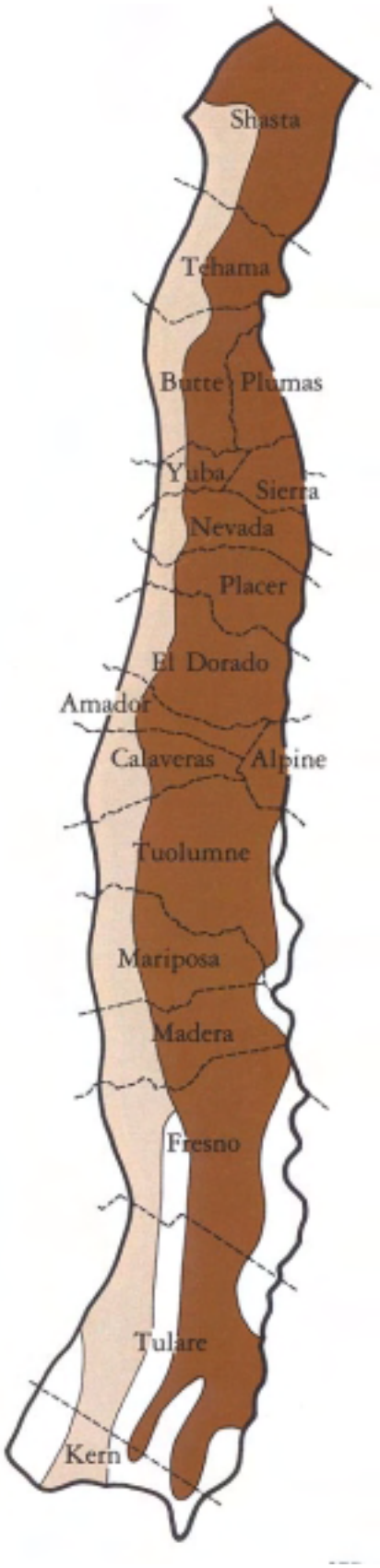
TERRITORY/HOME RANGE: No information available on home range. In New Hampshire, Weaver and West (1943) reported territory sizes as ranging from 3 to 6 ft (0.9 to 1.8 m) diameter areas, centered on nest.

FOOD HABITS: Opportunistic feeder, eating buds and sap of conifers, seeds, and insects. Strongly attracted to salt licks. Takes food from foliage, bark of conifers, and from ground, by gleaning and picking. Usually feeds in flocks.

OTHER:

REFERENCES: Grinnell and Miller 1944, Sumner and Dixon 1953, Bent 1968.





American Goldfinch

B186 (*Carduelis tristis*)

STATUS: No official listed status. Common resident in suitable habitat
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DISTRIBUTION/HABITAT: Breeds in blue oak savannahs, digger pine-oak woodlands, and particularly in low elevation riparian groves. In late summer and fall, some upslope movement, especially in chaparral type and along riparian corridors.

SPECIAL HABITAT REQUIREMENTS: Streams adjacent to open terrain.

BREEDING: Breeds from early April to late July, with peak from mid-May to mid-July. Nests usually in crotch of shrub or tree, varying in height from 3 to 15 ft (0.9 to 4.6 m). Clutch size from 2 to 7, with mean of 5.

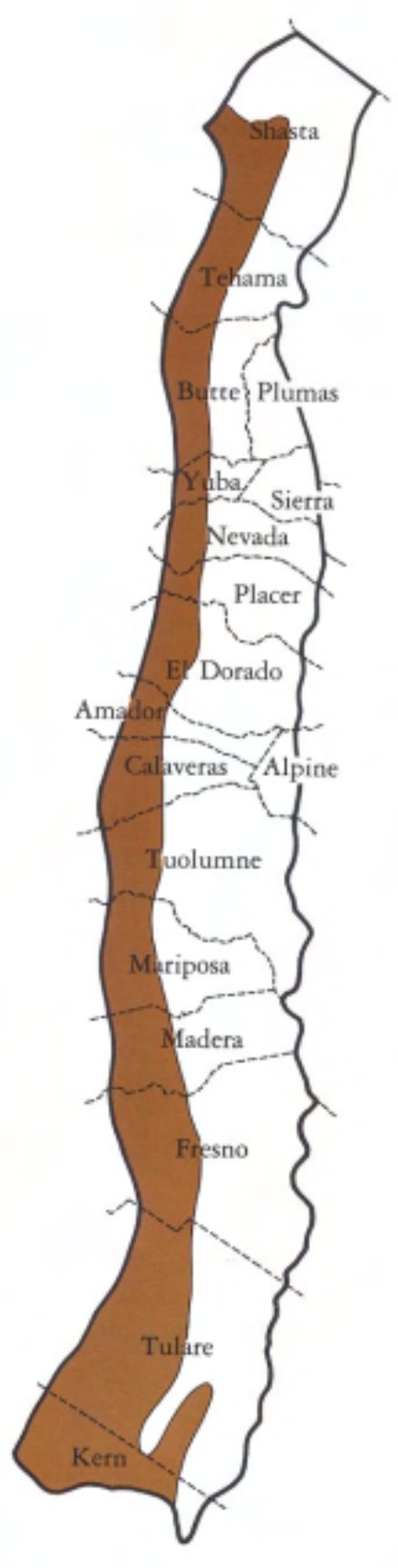
TERRITORY/HOME RANGE: In Michigan, Coutlee (1967) reported territories up to 98 ft (30 m) in diameter, with birds traveling to feeding sites as much as 0.5 mi (0.8 km) away. Stokes (1950) reported Michigan birds in his study had territories from 30 to 90 ft (9.1 to 27 m) in diameter around nest. Nickell (1951) found nesting goldfinches feeding up to 900 ft (274 m) from nest.

FOOD HABITS: Eats mainly seeds of trees and forbs, especially of composites; also some insects. Generally feeds in flocks, picking and gleaning food from flower heads and foliage of forbs, shrubs, and trees.

OTHER:

REFERENCES: Stokes 1950, Nickell 1951, Bent 1968.





Lesser Goldfinch

B187 (*Carduelis psaltria*)

STATUS: No official listed status. Common resident and breeder in suitable habitat.

DISTRIBUTION/HABITAT: Breeds in timbered stages of lower elevation habitats from blue oak savannah up to ponderosa pine and black oak woodlands. Prefers sites with low to intermediate percent canopy coverage. In late summer and fall, some wander upslope to as high as lodgepole pine forests, particularly in sites with shrubs and few or no trees.

SPECIAL HABITAT REQUIREMENTS: Trees/shrubs; dense shrubs; water for breeding.

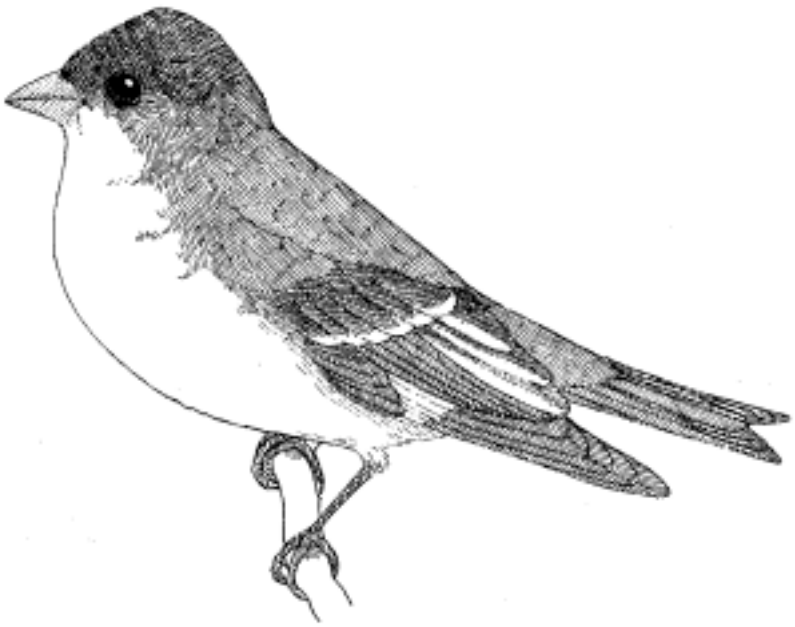
BREEDING: Breeds from late April to late July, with peak from mid-May to mid-July. Nests in terminal foliage, often on drooping branches of shrub or tree; shade required. Nest height ranges from 2 to 30 ft (0.6 to 9.1 m). Clutch size from 3 to 5, with mean of 4.

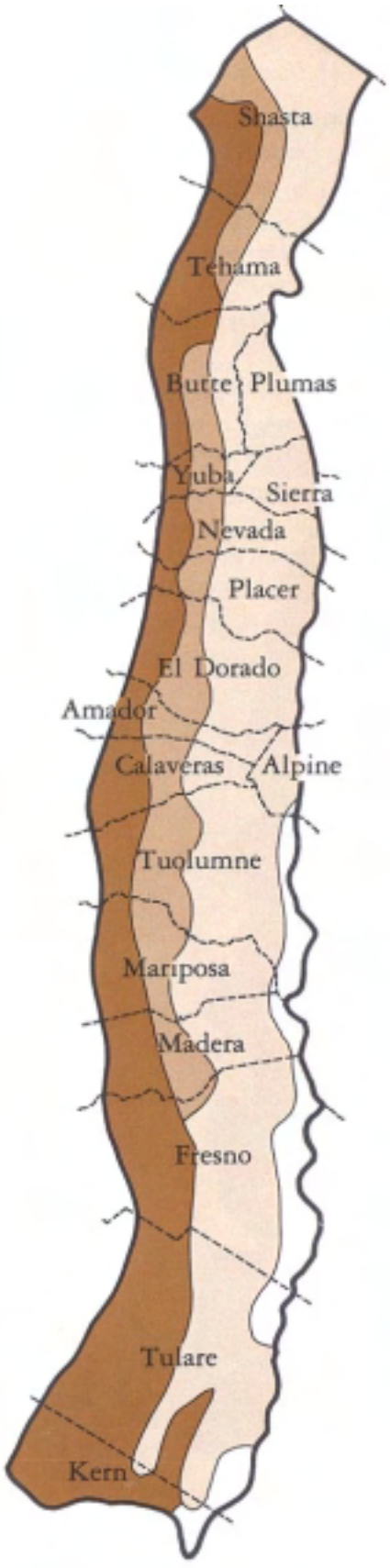
TERRITORY/HOME RANGE: Coutlee (1968a) found area with a diameter of about 98 ft (30 m) around nest defended, and birds traveled up to 0. 5 mi (0.8 km) to forage.

FOOD HABITS: Eats weed seeds, buds, fruits, and small quantities of insects. Strongly attracted to salt licks. Gleans food near ground, as in low-growing composites, and rarely in tree crowns. Feeds in flocks.

OTHER:

REFERENCES: Linsdale 1957; Bent 1968; Coutlee 1968a, 19686.





Lawrence's Goldfinch

B188 (*Carduelis lawrencei*)

STATUS: No official listed status. Rare spring and summer resident, with only a few winter records.

DISTRIBUTION/HABITAT: Breeds at lower elevations, in blue oak savannahs, digger pine-oak woodlands, and riparian deciduous areas. Prefers timbered sites with intermediate percent canopy coverage. Erratic in distribution and abundance throughout range.

SPECIAL HABITAT REQUIREMENTS: Oaks; water for breeding.

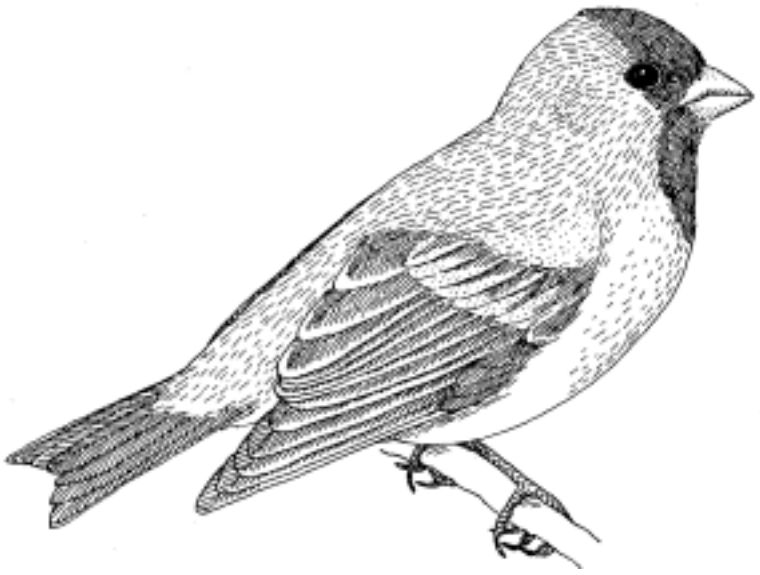
BREEDING: Breeds from early April to mid July, with peak from early May to late June. Nests generally on hillsides covered by dense stands of oak, with water nearby. Nests in colonies. Nest height varies from 20 to 30 ft (6.1 to 9.1 m). Clutch size from 3 to 6, with mean of 4.

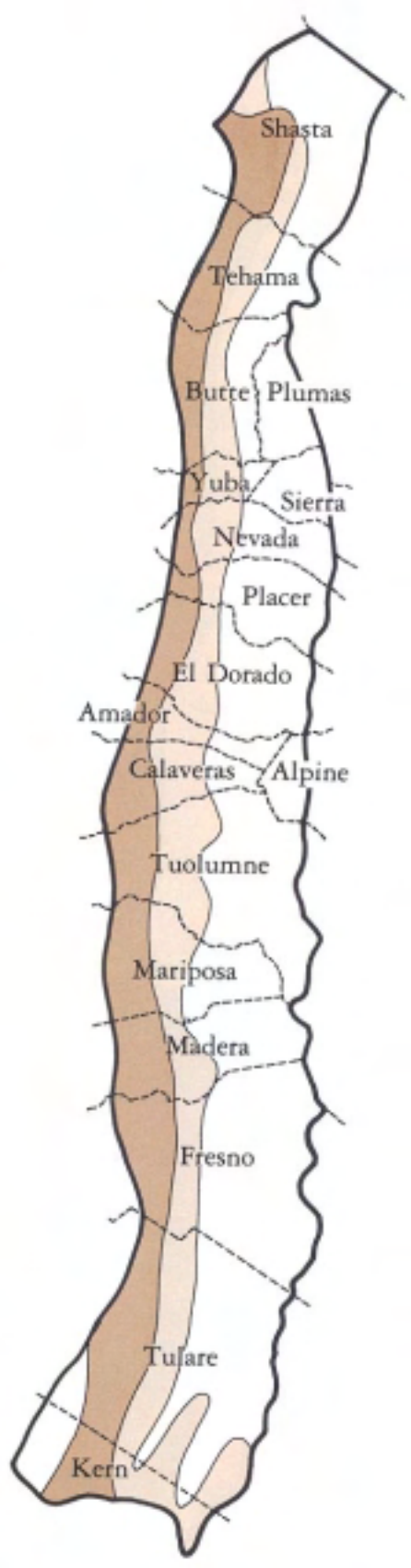
TERRITORY/HOME RANGE: No data on home range. In southern California, Linsdale (1950) reports a territory with radius around nest of 30 to 36 ft (9.1 to 11 m). Coutlee (1968a) states territory ranges from about 33 to 49 ft (10 to 15 m) in diameter.

FOOD HABITS: Weed seeds comprise the diet. In winter, concentrates on chamise achenes; in early summer, nearly restricted to patches of fiddleneck (Boraginaceae). Feeds in flocks, gleaning foliage and ground.

OTHER:

REFERENCES: Grinnell and Miller 1944; Linsdale 1950; Coutlee 1968a, 1968b.





Red Crossbill

B189 (*Loxia curvirostra*)

STATUS: No official listed status. Fairly common but erratic resident of higher mountains; nomadic throughout range.

DISTRIBUTION/HABITAT: Breeds in red fir and lodgepole pine forests; prefers stands with low percent canopy cover. Extremely gregarious, highly nomadic in response to changes in conifer seed production, even descending into valley and foothills in some years (Grinnell and Storer 1924).

SPECIAL HABITAT REQUIREMENTS: Abundant cone crop for breeding.

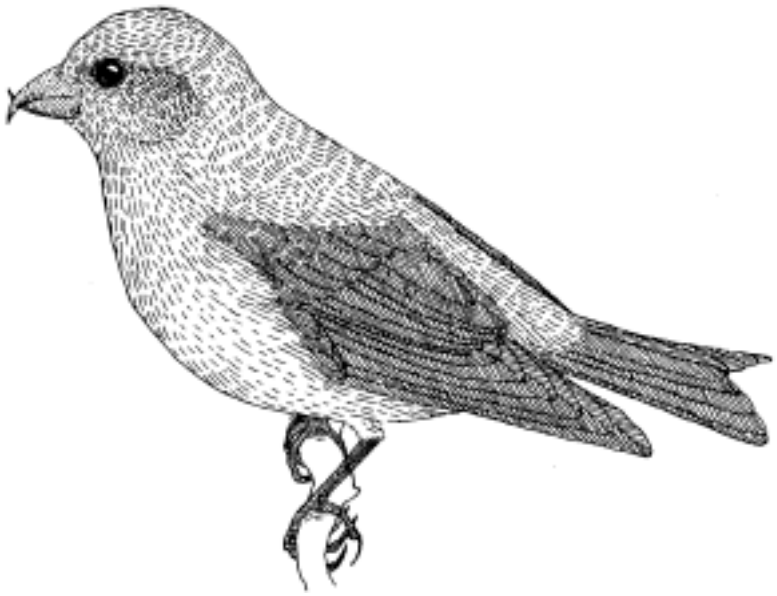
BREEDING: Throughout range, noted breeding in all months of year (Bent 1968), requiring only suitable conifer seed supply. Breeds mostly from February through June. Nests typcially out on horizontal branch of conifer, ranging in height from 12 to 40 ft (3.7 to 12 m). Clutch size from 3 to 5, with mode of 3.

TERRITORY/HOME RANGE: No data available on home range size; territoriality not noted (Snyder 1954).

FOOD HABITS: Eats mainly conifer seeds, primarily lodgepole pine and hemlock, and some insects. Feeds on ground at tips of cone-bearing branches in tree tops, prying seeds from cones with highly modified, crossed mandibles. Both bill and tongue used in extracting seeds.

OTHER:

REFERENCES: Grinnell and Storer 1924, Sumner and Dixon 1953, Bent 1968.





Green-tailed Towhee

B190 (*Pipilo chlorurus*)

STATUS: No official listed status. Uncommon spring and summer resident.

DISTRIBUTION/HABITAT: Breeds in sites with dense shrubs from chaparral zone up to lodgepole pine forests. Generally absent from areas with intermediate to high percent canopy coverage. Particularly associated with dry, brushy slopes of manzanita and ceanothus, a habitat shared with fox sparrow.

SPECIAL HABITAT REQUIREMENTS: Dense shrubs.

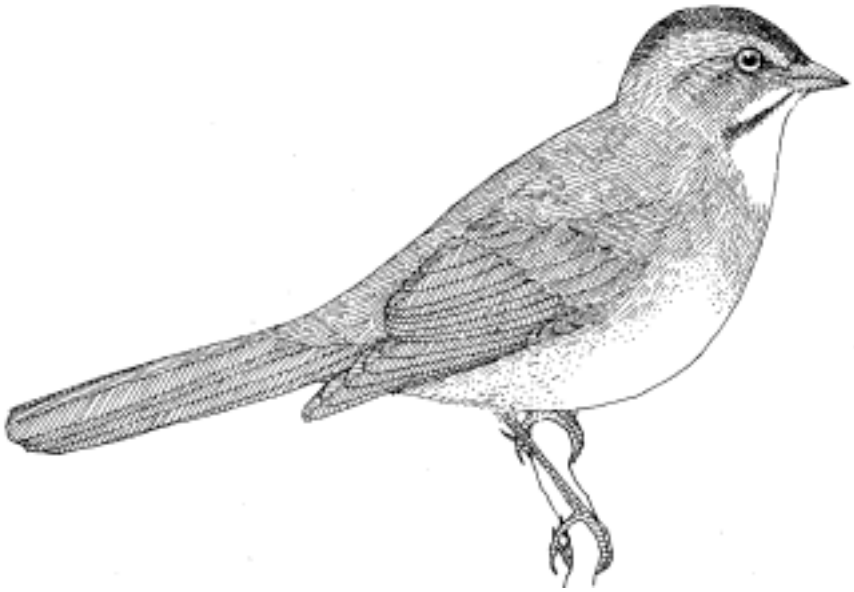
BREEDING: Breeds from mid-April to late July, with peak from late May to early July. Nests well concealed in dense brush, on or near ground. Clutch size from 2 to 5, with 3 or 4 most frequent.

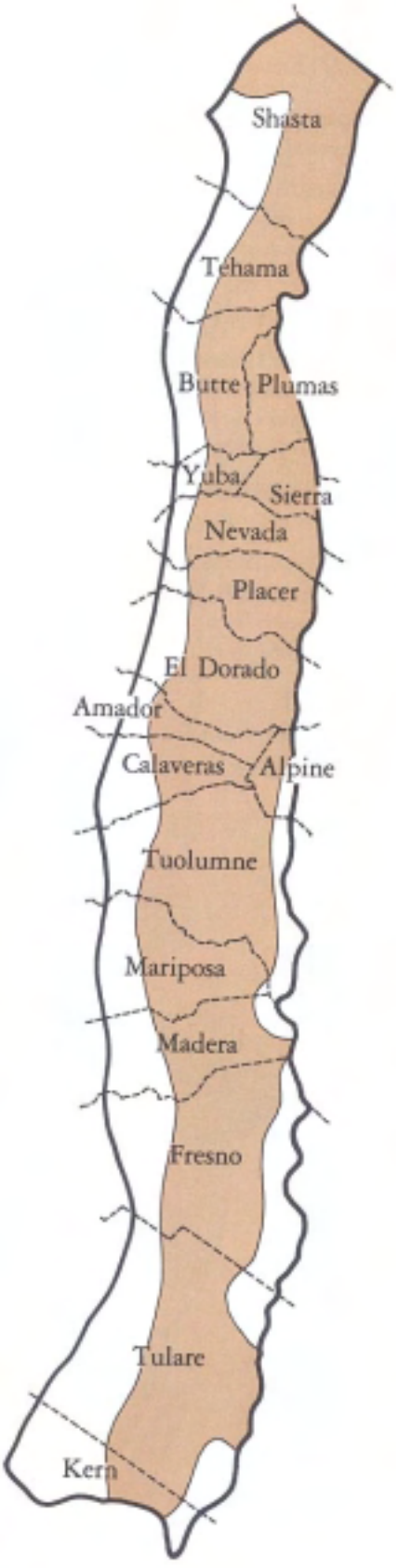
TERRITORY/HOME RANGE: In Colorado, Hering (1948) reported two territories as 0.2 and 0.4 acre (0.08 and 0.16 ha). No information available. on home range.

FOOD HABITS: Eats primarily seeds of weeds and shrubs, and some wild berries and insects. Scratches in leaf litter on ground, and gleans food uncovered.

OTHER:

REFERENCES: Grinnell and Storer 1924, Grinnell and Miller 1944, Bent 1968.





Rufous-sided Towhee

B191 (*Pipilo erythrophthalmus*)

STATUS: No official listed status. Common resident at low to middle elevations; rare upslope movement in fall.

DISTRIBUTION/HABITAT: Breeds from blue oak savannahs up to mixed-conifer forests; prefers sites with low percent canopy cover and dead brush to provide high concentration of decaying organic material for feeding.

SPECIAL HABITAT REQUIREMENTS: Dense shrubs; litter.

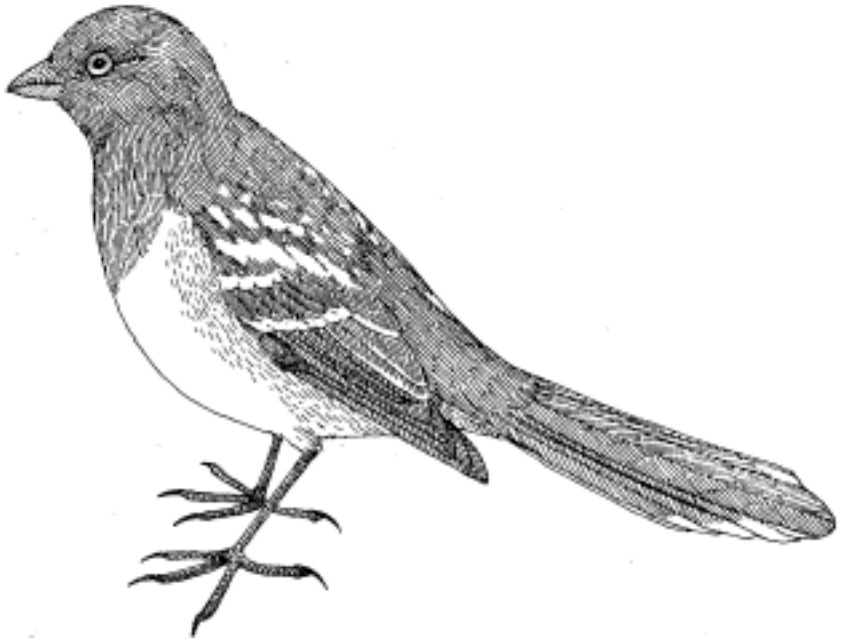
BREEDING: Breeds from late April to mid-July, with peak from mid-May to late June. Nests on ground or in low shrub, usually in well-concealed thicket edge with isolated trees and shrubs, often near piles of dead brush. Clutch size from 2 to 6, most contain 4 or 5.

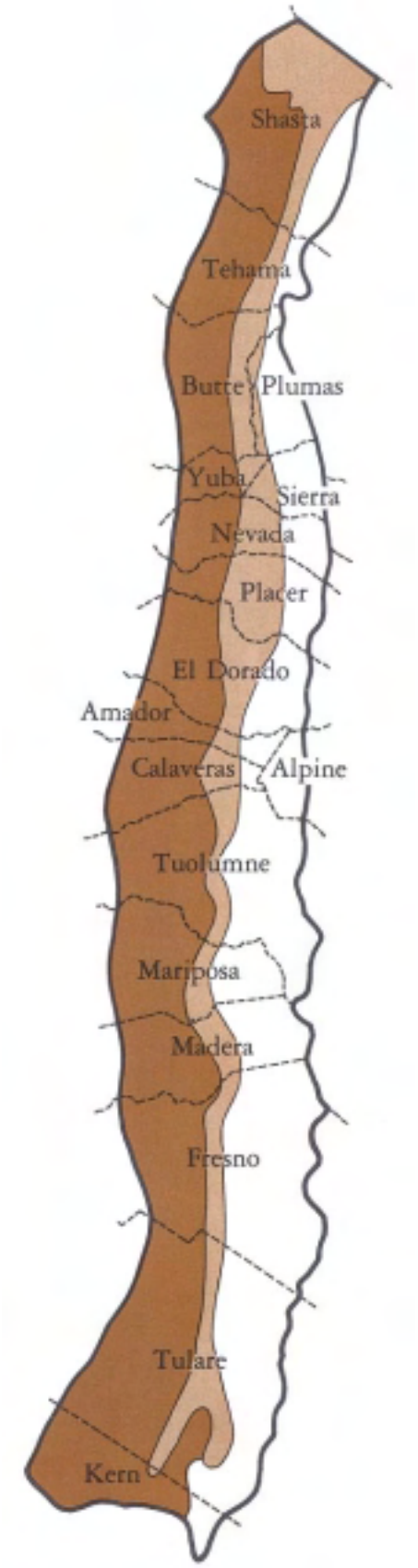
TERRITORY/HOME RANGE: Territories in coastal California chaparral site ranged from 2 to 2.8 acres (0.8 to 1.1 ha) (Mans 1961). In Kansas, Fitch (1958) found territories to range from 1.9 to 6.7 acres (0.8 to 2.7 ha) with mean of 4.4 acres (1.8 ha) (n = 7). Little information on home range size. In Kentucky, Barbour (1941) found winter home ranges of two flocks to cover 9.3 and 31 acres (3. 8 and 12.6 ha).

FOOD HABITS: Eats insects (many caterpillars when nesting), spiders, and seeds. Takes most food from ground by scratching and digging in leaf litter. Sometimes gleans foliage.

OTHER: Slash piles in logged areas of conifer forests may provide suitable foraging sites, especially in fall.

REFERENCES: Baumann 1959, Davis 1960, Bent 1968.





Brown Towhee

B192 (*Pipilo fuscus*)

STATUS: No official listed status. Common resident at low elevations.

DISTRIBUTION/HABITAT: Breeds in blue oak savannahs, digger pine-oak woodlands, chaparral, and low elevation riparian deciduous habitats; prefers sites with few or no trees.

SPECIAL HABITAT REQUIREMENTS: Dense shrubs; shrubs/grass-forbs.

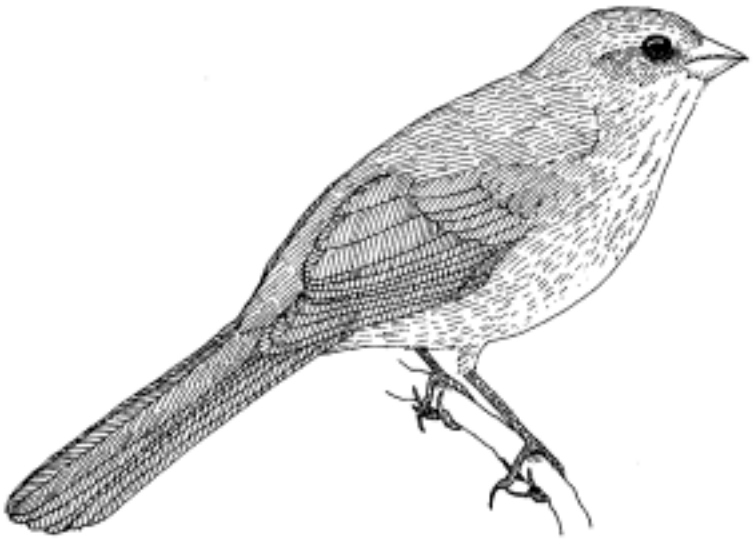
BREEDING: Breeds from early April to late June, with peak from early May to mid-June. Nests in low, dense brush where well concealed; also nests in trees occasionally, at heights up to 20 ft (6.1 m). Clutch size usually 3 or 4.

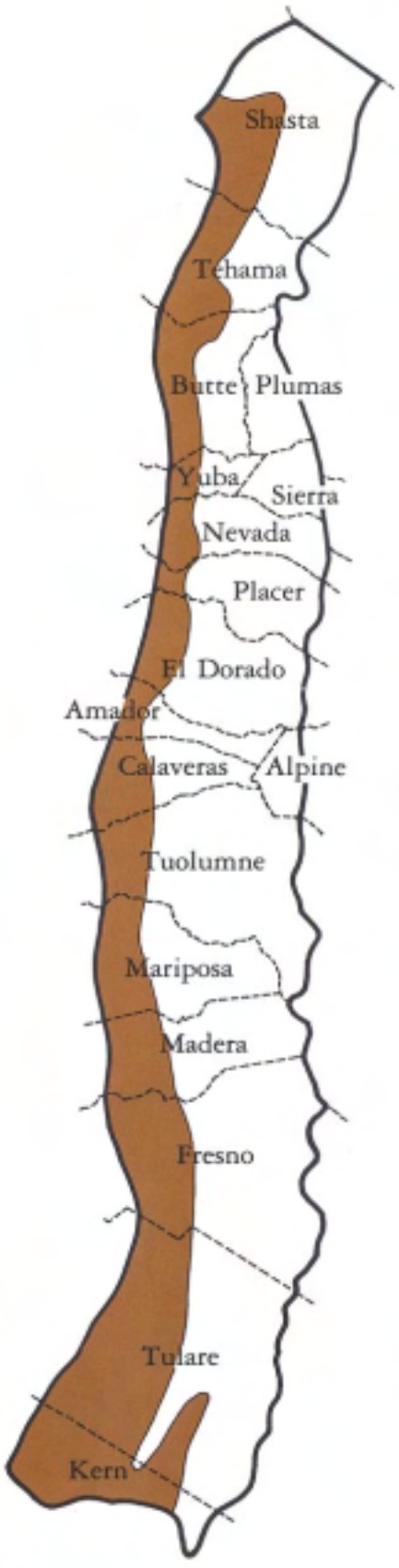
TERRITORY/HOME RANGE: No information on home range. In a California residential area, Bent (1968) reported that territories usually averaged from 1 to 2 acres (0.4 to 0.8 ha), though they ranged up to 5 acres (2 ha).

FOOD HABITS: Feeds on insects, weed seeds, and some fruit. Obtains food primarily from ground, scratches in leaf litter and gleans food uncovered.

OTHER: Activities such as grazing, farming, logging, road building, and landscaping resulted in new habitats, allowing for localized expansion of range.

REFERENCES: Grinnell and Miller 1944, Davis 1951, Bent 1968.





Savannah Sparrow

B193 (*Passerculus sandwichensis*)

STATUS: No official listed status. Common fall and winter visitor to low elevations; occasional summer and fall visitor to middle and high elevations.

DISTRIBUTION/HABITAT: Essentially confined to grassland habitats; may be found in early successional stages of other habitat types.

SPECIAL HABITAT REQUIREMENTS:

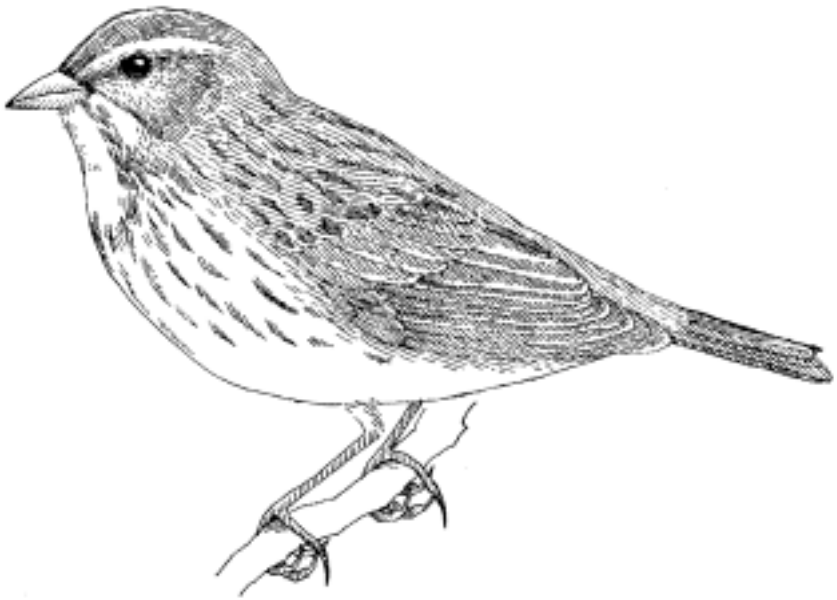
BREEDING: Apparently does not breed in the western Sierran zone.

TERRITORY/HOME RANGE: In Georgia, Norris (1960) reported a short-term (1 week) winter home range of 8 acres (3.2 ha). Data on breeding territory not applicable in the western Sierran zone.

FOOD HABITS: Eats insects and seeds obtained from the ground.

OTHER:

REFERENCES: Grinnell and Miller 1944, Bent 1968, Welsh 1975. .





Grasshopper Sparrow

B194 (*Ammodramus .savannarum*)

STATUS: No official listed status; on the 1978 Audubon Society Blue List. Rare summer resident at low elevations.

DISTRIBUTION/HABITAT: Breeds in grasslands and early successional stages, if sufficient grasses, up to ponderosa pine and black oak types. Irregularly distributed in California, with abundance varying from year-to-year. Probably winters below the 1000 ft (305 m) contour line set as lower limit of area included in this document.

SPECIAL HABITAT REQUIREMENTS:

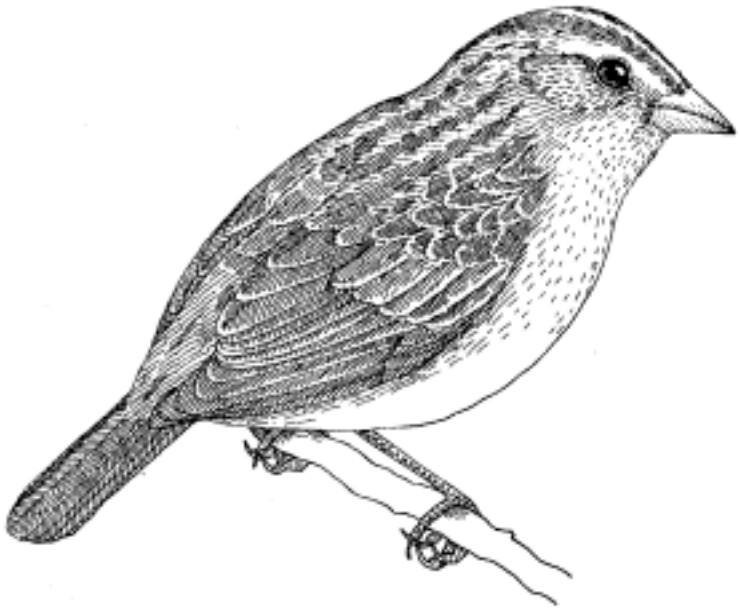
BREEDING: Breeds from late April to late June, with peak from mid-May to mid-June. Nests sunken in slight depressions in ground, hidden at base of clumps of grass or other cover. Most clutches contain 4 or 5 eggs.

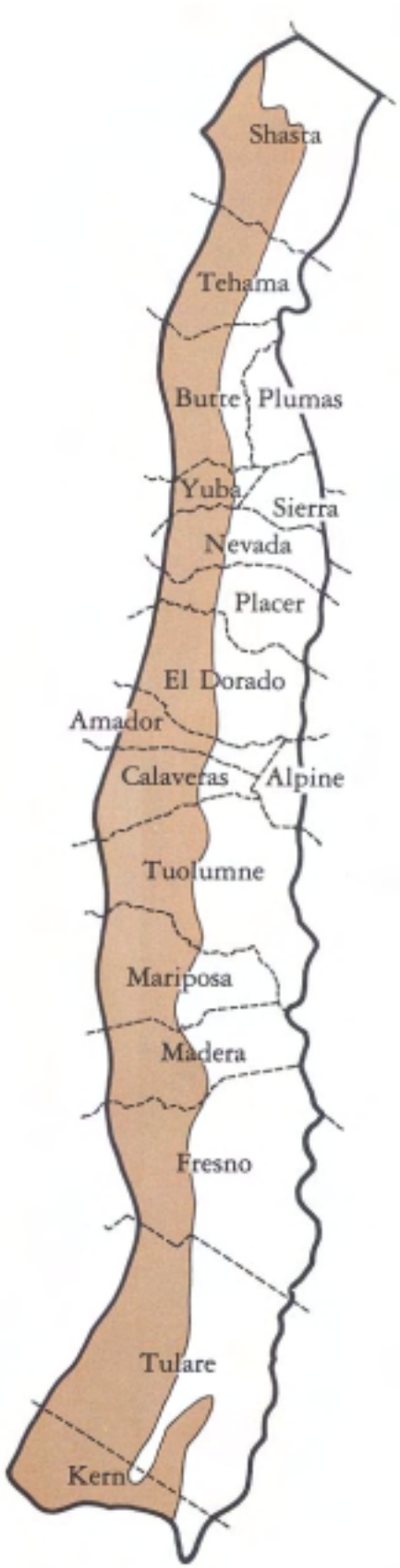
TERRITORY/HOME RANGE: No data on home range. In Wisconsin, territory size ranged from 0.8 to 3.2 acres (0.3 to 1.3 ha), with mean of 2 acres (0.8 ha) (Wiens 1973).

FOOD HABITS: Feeds mainly on insects, especially Orthopterans where abundant. Searches for food on ground, and sometimes scratches in litter.

OTHER:

REFERENCES: Grinnell and Miller 1944, Bent 1968, Tramontano 1971.





Vesper Sparrow

B195 (*Pooecetes gramineus*)

STATUS: No official listed status. Rare fall and winter visitor to lower elevations, only rarely at higher elevations in late summer and fall.

DISTRIBUTION/HABITAT: Frequents grasslands and early successional stages lacking shrubs.

SPECIAL HABITAT REQUIREMENTS:

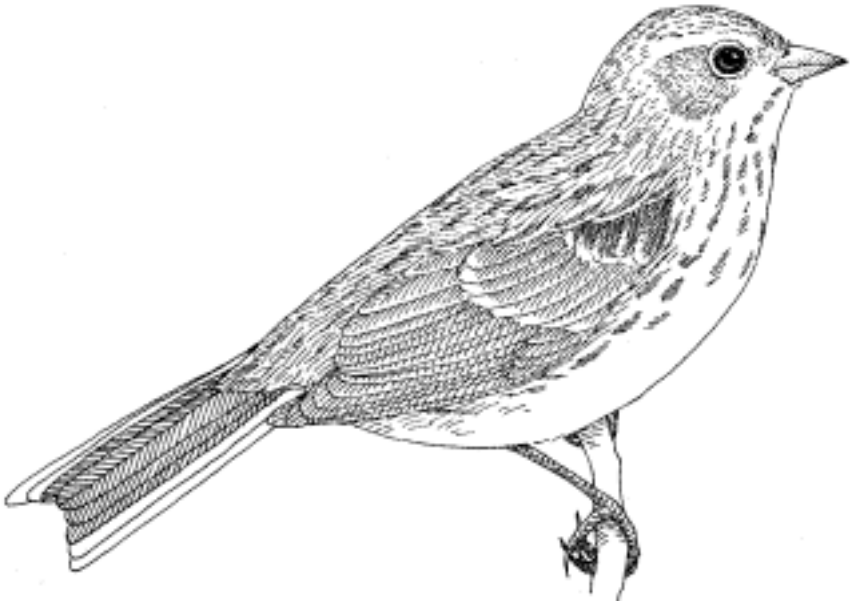
BREEDING: Does not breed in the western Sierran zone.

TERRITORY/HOME RANGE: Not applicable.

FOOD HABITS: Feeds on seeds, insects, and spiders. Feeds on ground and also gleans grass surfaces.

OTHER:

REFERENCES: Grinnell and Miller 1944, Bent 1968, Best 1972.





Lark Sparrow

B196 (*Chondestes grammacus*)

STATUS: No official listed status. Fairly common resident.

DISTRIBUTION/HABITAT: Breeds from blue oak savannahs up to ponderosa pine belt; generally prefers sites with scattered shrubs, or trees, or both.

SPECIAL HABITAT REQUIREMENTS: Shrubs/grass-forbs.

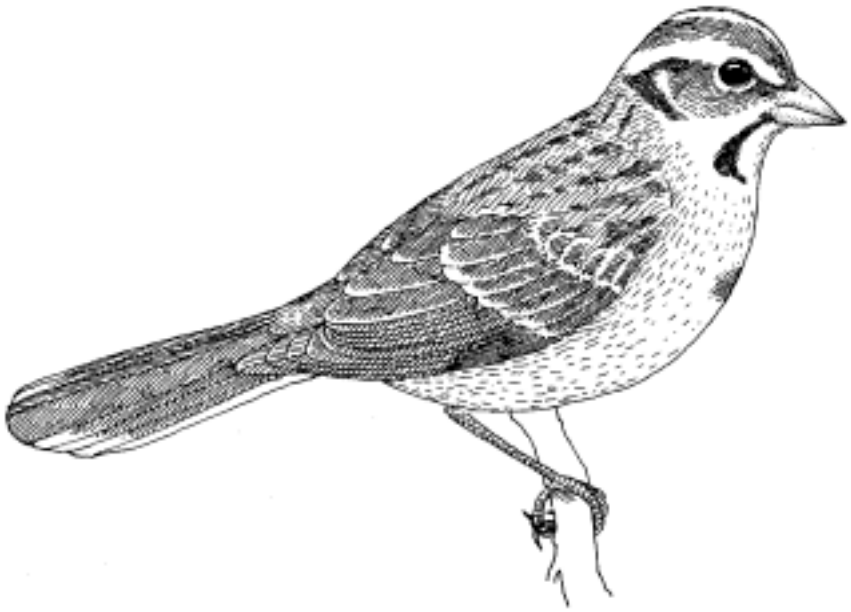
BREEDING: Breeds from late April to early July, with peak from mid-May to late June. Nests in depressions on ground, near clump of grass, or in low shrub. Most clutches contain 4 or 5 eggs.

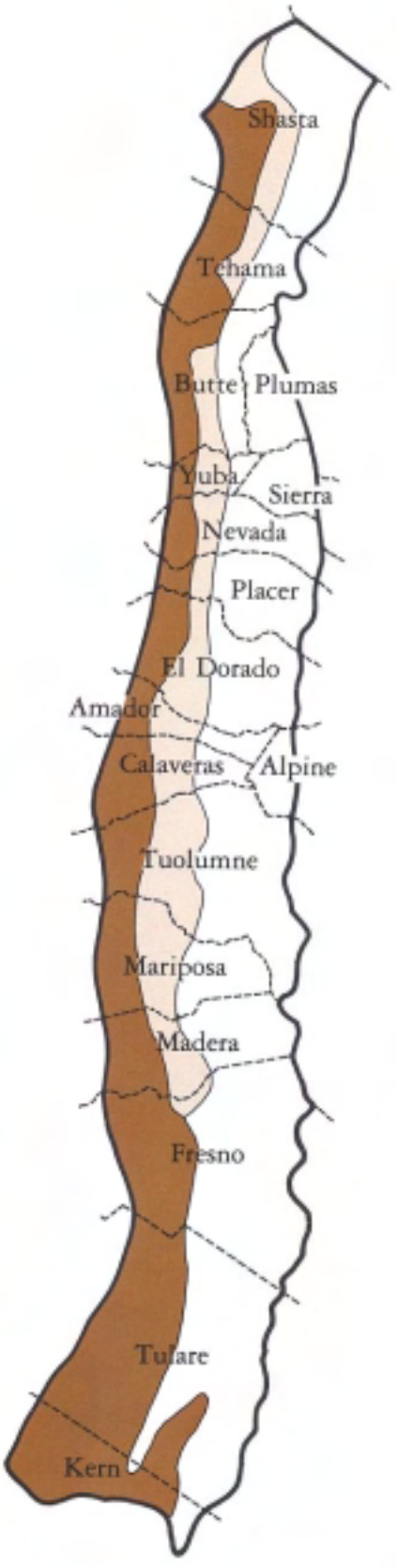
TERRITORY/HOME RANGE: Fitch (1958) reported two territories at 3.4 and 8.8 acres (1.4 and 3.6 ha); he also reported summer range of one pair at 15 acres (6.1 ha). Defense of space strongest during courtship period (Bent 1968).

FOOD HABITS: Eats seeds of annuals and variety of insects. Forages on ground, prefers areas with plant litter; also gleans shrubs and small trees.

OTHER:

REFERENCES: Grinnell and Miller 1944, Bent 1968, Tramontano 1971.





Rufous-crowned Sparrow

B197 (*Aimophila ruficeps*)

STATUS: No official listed status. Uncommon resident.

DISTRIBUTION/HABITAT: Breeds in shrublands of blue oak savannahs, digger pine-oak woodlands, and especially chaparral zone. Some late summer and fall movement upslope into ponderosa pine forests. Seen at 4000 ft (1220 m) in Yosemite Valley (Gaines 1977).

SPECIAL HABITAT REQUIREMENTS: Shrubs/grass-forbs.

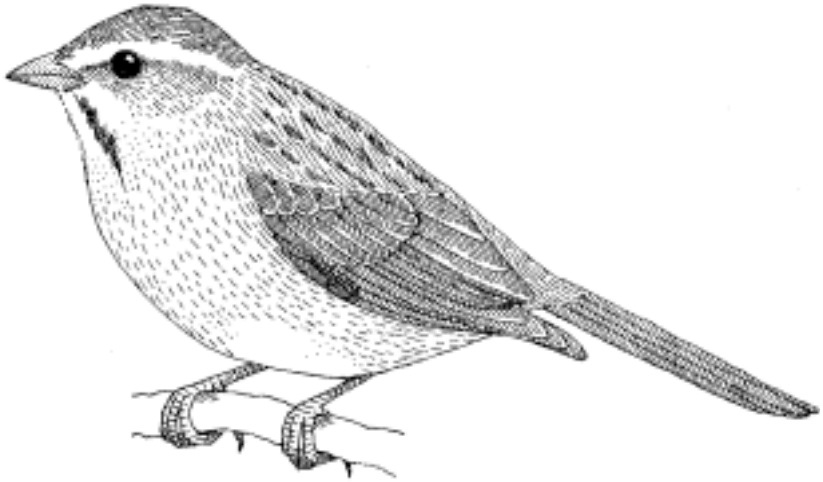
BREEDING: Breeds from mid-April to late June, with peak from early May to mid-June. Nests always on ground in grassy area, usually at base of shrub. Clutch size from 2 to 4, with mean of 3.

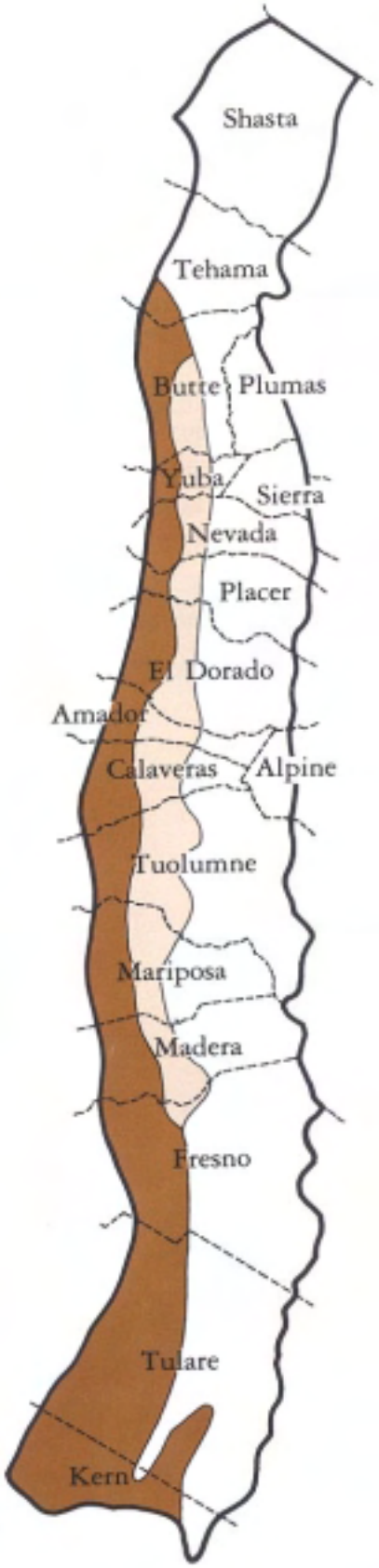
TERRITORY/HOME RANGE: No data on home range. In Southern California, 14 territories ranged from 1 to 3.8 acres (0.4 to 1.5 ha), with mean of 2.2 acres (0.9 ha) (Bent 1968).

FOOD HABITS: Obtains insects and various seeds by searching on ground and among grasses, or by gleaning from foliage of live oaks.

OTHER: A gregarious species; reported as semicolonial nester.

REFERENCES: Grinnell and Storer 1924, Grinnell and Miller 1944, Bent 1968.





Black-throated Sparrow

B198 (*Amphispiza bilineata*)

STATUS: No official listed status. Rare summer resident along Kern River; accidental in other areas in the Sierra Nevada.

DISTRIBUTION/HABITAT: Found in spring and summer in chaparral type, where it breeds. A few fall records in chaparral habitats in the northern Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS:

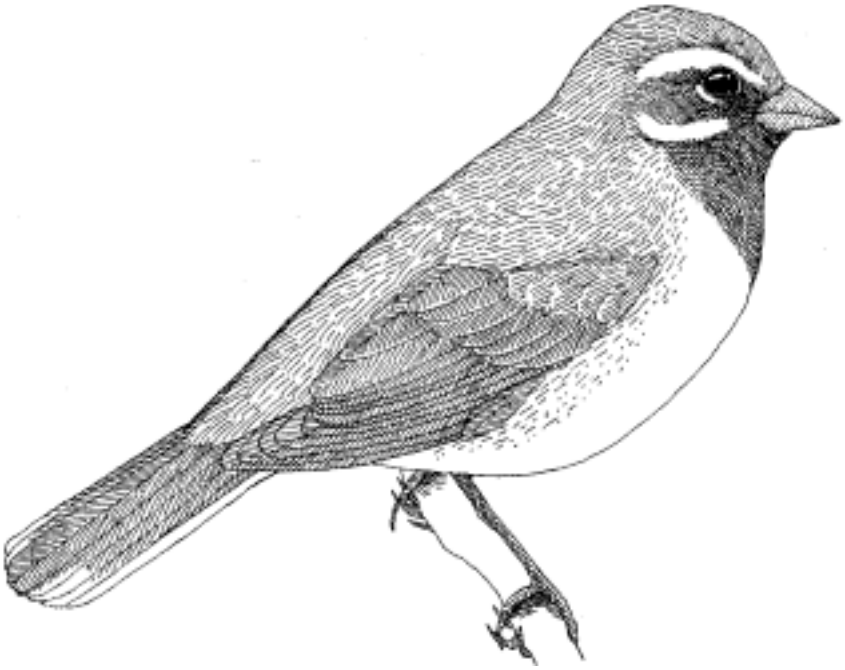
BREEDING: Breeds from mid-April to late June, with peak from late April to early June. Nests usually well concealed near ground in small shrub. Clutch size usually 3 or 4.

TERRITORY/HOME RANGE: Heckenlively (1967) reported New Mexico territories as about 394 to 492 ft ("about 120 to 150 meters") in diameter. Linsdale (1938) noted one pair apparently stayed in open area of about 1.4 acres (0.6 ha).

FOOD HABITS: Eats seeds and foliage; takes insects during nesting period. Feeds on ground and in grasses, forbs, and low shrubs. Sometimes hawks aerial insects.

OTHER:

REFERENCES: Grinnell and Miller 1944, Bent 1968, Tramontano 1971.





Sage Sparrow

B199 (*Amphispiza belli*)

STATUS: No official listed status. Common resident in central and southern areas.

DISTRIBUTION/HABITAT: Confined to chaparral vegetation; breeds only in dense, continuous stands of shrubs. In late summer and fall, usually moves upslope.

SPECIAL HABITAT REQUIREMENTS: Shrubs/grass-forbs.

BREEDING: Breeds from early April to mid-June, with peak from late April to late May. Nests on or near ground, under overhanging shrub; *Artemisia* often used when available. Clutch averages 4.

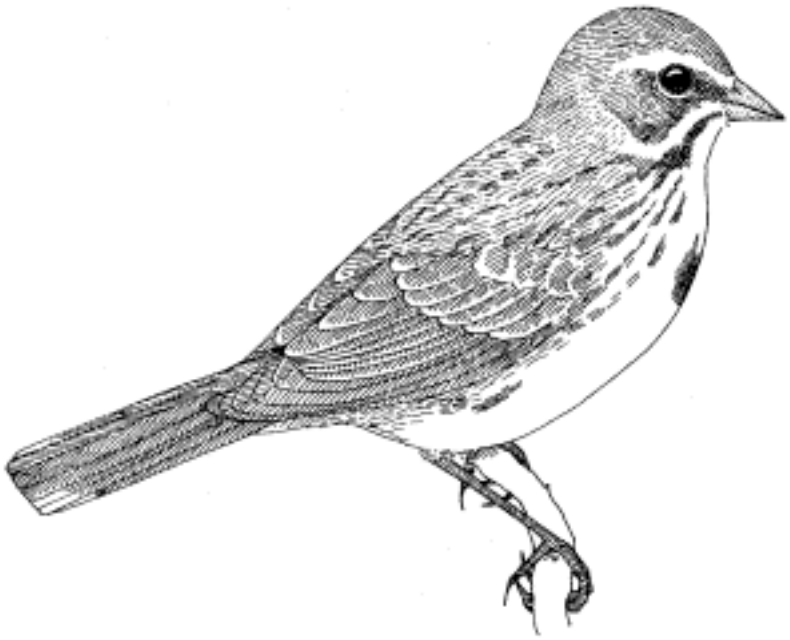
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TERRITORY/HOME RANGE: No data on home range. In Tehama County, territories about 150 ft (46 m) apart (Bent 1968).

FOOD HABITS: Eats insects, seeds, and succulent vegetation; may be sufficient to provide water needs. Gleans food from ground and low shrubs.

OTHER:

REFERENCES: Grinnell and Miller 1944, Sumner and Dixon 1953, Bent 1968.





Dark-eyed Junco

B200 (*Junco hyemalis*)

STATUS: No official listed status. Common to abundant summer resident at middle to high elevations; abundant winter resident at low elevations.

DISTRIBUTION/HABITAT: Breeds in timbered habitats from ponderosa pine and black oak woodland types upslope through lodgepole pine forests. Prefers areas with low percent canopy coverage. Frequents forest edges, but not confined to them. In fall and winter, moves downslope; abundant from annual grasslands up to ponderosa pine and black oak woodland zone.

SPECIAL HABITAT REQUIREMENTS: Shrubs/grass-forbs.

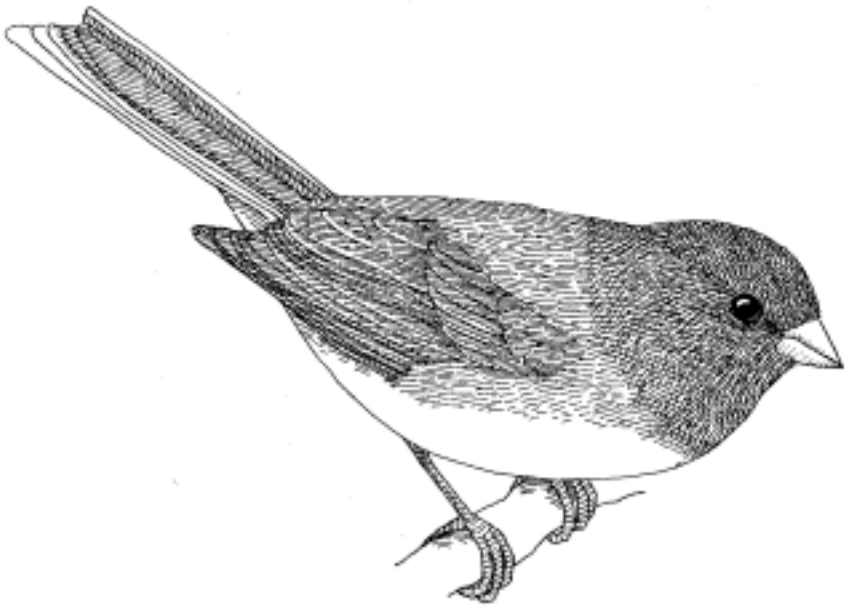
BREEDING: Breeds from early May to mid-August, with peak from early June to late July. Nests usually on ground, well concealed beneath grasses, shrubs, fallen logs, or in rock crevices; water usually nearby. Clutch size from 3 to 5 , with mean of 4.

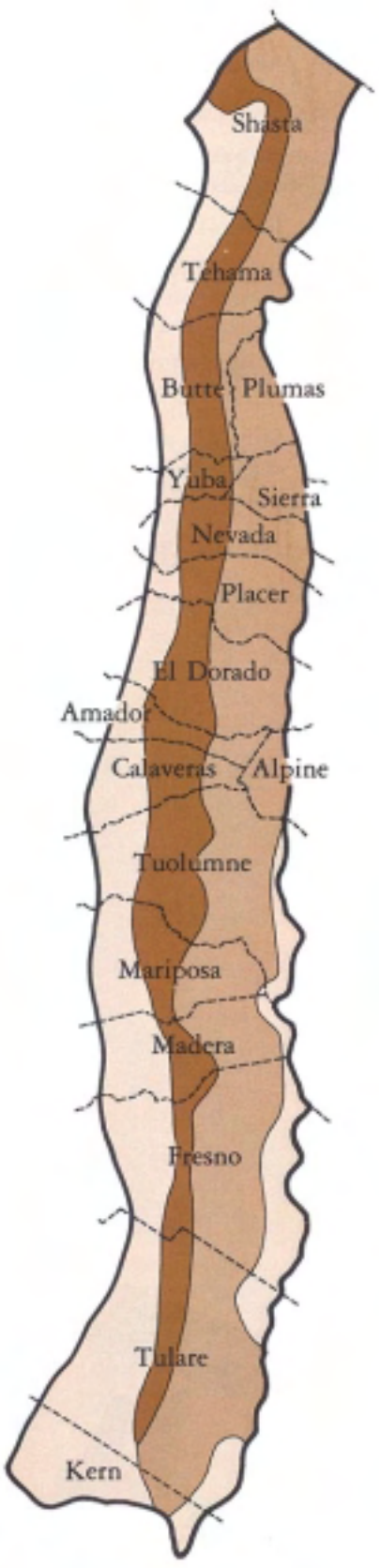
TERRITORY/HOME RANGE: In Kansas, winter home range averaged 26 acres (10.5 ha) for males and 13 acres (5.3 ha) for females (Fitch 1958). In New York, Bent (1968) recorded territories as "casually" estimated at 2 to 3 acres (0.8 to 1.2 ha).

FOOD HABITS: Eats arthropods, various seeds, and some fruit. Feeds mostly on ground in forests and meadows, also gleans foliage of shrubs and small trees, and hawks aerial insects. During nonbreeding period, typically feeds in flocks, often with white-crowned and golden-crowned sparrows.

OTHER: One of most abundant and most easily recognized species in timbered sections of the Sierra Nevada. Formerly known as Oregon junco.

REFERENCES: Williams 1942, Sumner and Dixon 1953, White 1973.





Chipping Sparrow

B201 (*Spizella passerina*)

STATUS: No official listed status. Fairly common spring migrant and summer resident.

DISTRIBUTION/HABITAT: Breeds from chaparral zone up to lodgepole pine forests; prefers stands with low to intermediate percent canopy cover, and areas with bare ground or sparse grass.

SPECIAL HABITAT REQUIREMENTS:

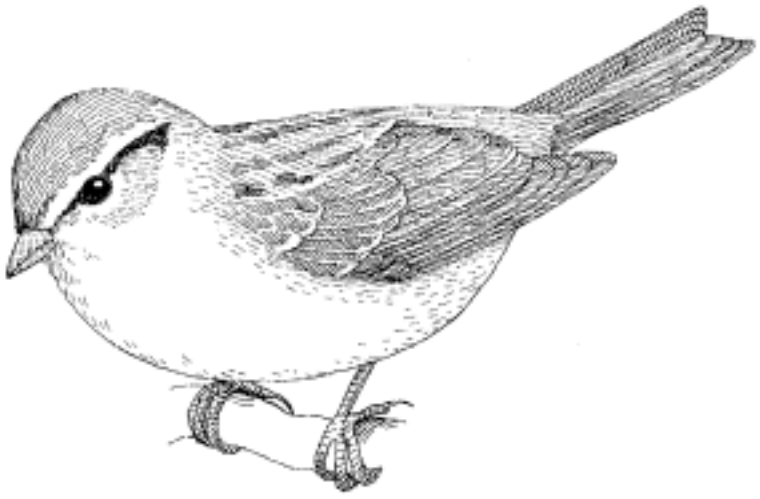
BREEDING: Breeds from early April to mid-July, with peak from mid-May to late June. Nests near outer end of branch, usually of conifer, from 5 to 40 ft (1.5 to 12 m) above ground. Clutch size from 3 to 5, with mean of 4.

TERRITORY/HOME RANGE: No data on home range. In an Arizona piñon-juniper-ponderosa pine ectone, Laudenslayer and Balda (1976) reported mean territory size as 6.9 acres (2.8 ha). A pair in South Carolina defended 7.6 acres (3.1 ha) while nest building but only 2.7 acres (1.1 ha) while feeding young (Odum and Kuenzler 1955).

FOOD HABITS: Insects and weed seeds gleaned from ground and foliage; insects rarely hawked from air.

OTHER:

REFERENCES: Grinnell and Storer 1924, Grinnell *et al.* 1930, Bent 1968.





Brewer's Sparrow

B202 (*Spizella breweri*)

STATUS: No official listed status. Rare summer resident and breeder.

DISTRIBUTION/HABITAT: Reported rarely in chaparral and shrub successional stages from ponderosa pine to the lodgepole pine forests. Only one confirmed nesting record (Grinnell *et al.* 1930), though probably nests in Kern River canyon (Sumner and Dixon 1953), and in Placer County (D. Gaines, pers. commun.). Often associated with *Artemisia.*

SPECIAL HABITAT REQUIREMENTS:

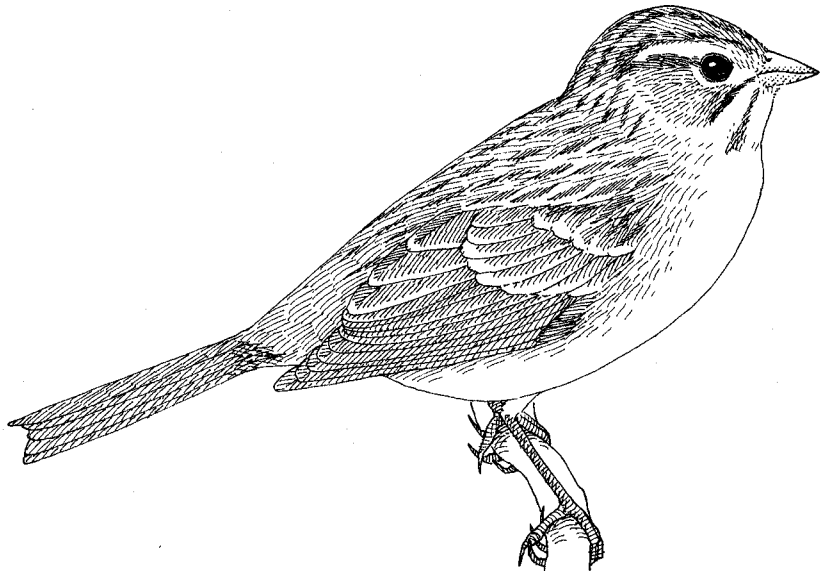
BREEDING: Breeds from late April to early July, with peak from mid-May to late June. Nests in small shrub in well-concealed situation, usually on south-facing slopes. Nest height less than 3 ft (0. 9 m). Clutch size from 3 to 5 , with mean of 4.

TERRITORY/HOME RANGE: No data on territory or home range.

FOOD HABITS: Eats primarily weed seeds, though some insects are taken. Picks up seeds from ground and gleans low foliage.

OTHER:

REFERENCES: Grinnell and Storer 1924, Grinnell and Miller 1944, Bent 1968.





Black-chinned Sparrow

B203 (*Spizella atrogularis*)

STATUS: No official listed status. Uncommon summer resident in suitable habitat.

DISTRIBUTION/HABITAT: Restricted to dense shrub habitats, particularly in chaparral zone, but also in early successional stages of ponderosa pine, black oak woodland, and mixed-conifer zones. Prefers dry, south-facing slopes, usually associated with *Adenostoma, Artemisia, Ceanothus,* and *Arctostaphylos.*

SPECIAL HABITAT REQUIREMENTS: Shrubs/grass-forbs.

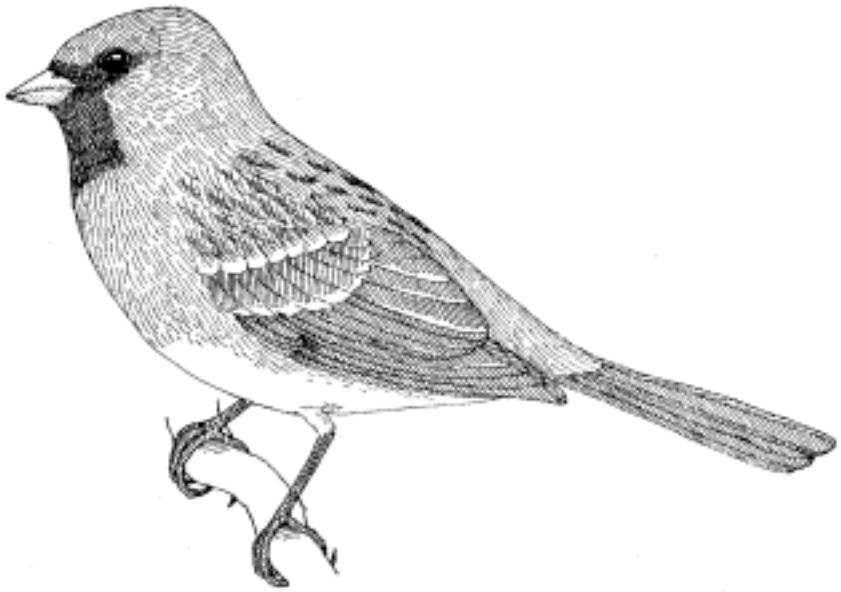
BREEDING: Breeds from mid-April to mid-July, with peak from mid-May to late June. Nest concealed in low bush. Clutch size from 2 to 4, with mean of 3.

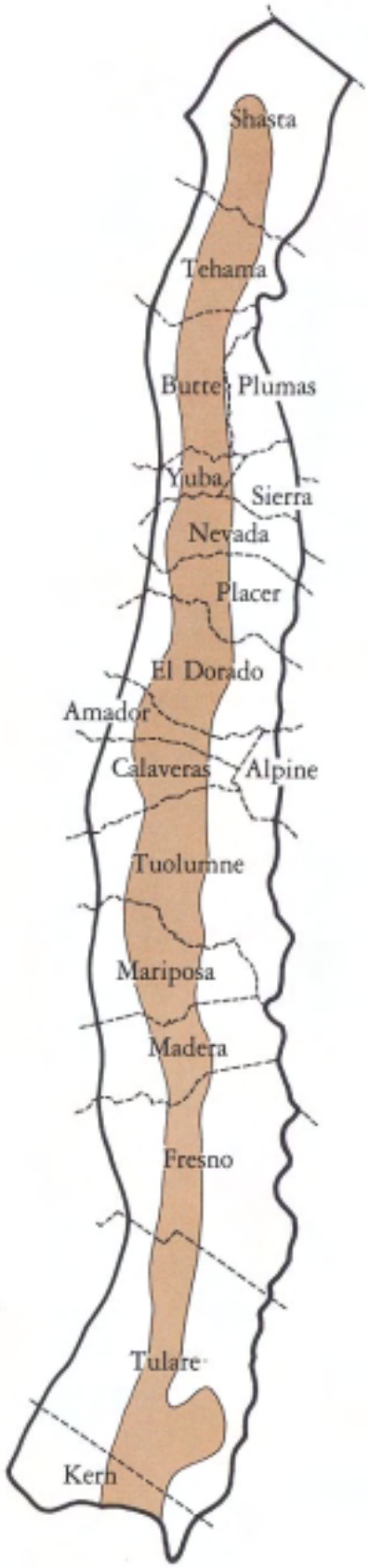
TERRITORY/HOME RANGE: No data available.

FOOD HABITS: No data available.

OTHER:

REFERENCES: Grinnell and Miller 1944, Bent 1968.





White-crowned Sparrow

B204 (*Zonotrichia leucophrys*)

STATUS: No official listed status. Common to abundant in preferred habitat.

DISTRIBUTION/HABITAT: Breeds in early successional stages of lodgepole pine forests and alpine meadows, primarily along edges of meadows, streams, or lakes, usually using willow or small lodgepole pine for cover and perching. Our breeding population leaves the Seirra Nevada in September. Wintering birds arrive from Canada and Alsaka in September, found at all elevations below lodgepole belt in fall, moving down to foothills and valley floor for winter. Prefers fairly open areas with patches of shrubs or thickets.

SPECIAL HABITAT REQUIREMENTS: Shrubs/grass-forbs; water for breeding.

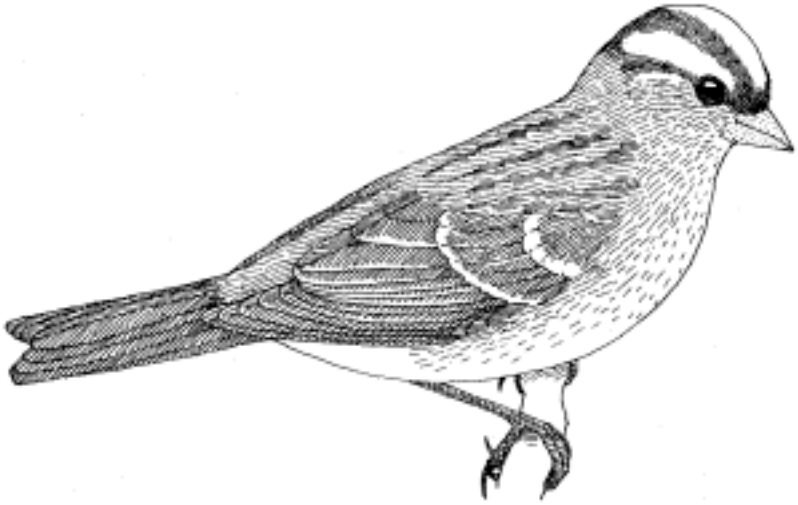
BREEDING: Breeds from late May to late August, with peak from late June to early August. Nests on ground at base of bush, or in low branches of shrub, willow, or small conifer. Height ranges from 0 to 5 ft (0 to 1.5 m) above ground.

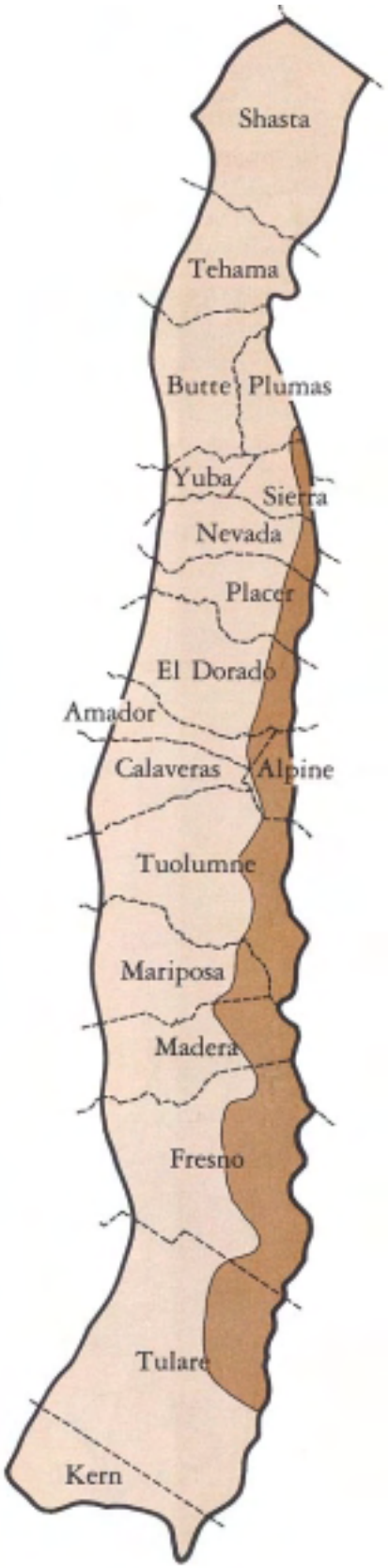
TERRITORY/HOME RANGE: Morton *et al.* (1972) reported defended areas around nest of 0.4 to about 2 acres (0.15 to about 0.8 ha), stating that the pair may occupy an area as large as 3.7 to 4.9 acres (1.5 to 2.0 ha)-a possible estimate of home range. These estimates come from Sierran birds near Tioga Pass. Ralph and Pearson (1971) reported territory sizes of birds in Marin County ranging from 0.15 to 1.5 acres (0.06 to 0.59 ha) with average of 0.6 acre (0.24 ha). Price (1931) reported winter flock home range as 15 to 20 acres (6.1 to 8.1 ha) in San Mateo County, while Blanchard (1941) found winter home ranges in coastal California of 0.9 to 1.7 acres (0.4 to 0.7 ha).

FOOD HABITS: Eats mostly seeds of grasses and forbs, also eats green shoots, berries, and insects. Gleans food from bare ground or grassy areas near shrubs. Usually scratches the ground in search of food.

OTHER:

REFERENCES: Blanchard 1941, Blanchard and Erickson 1949, DeWolfe and DeWolfe 1962, Morton 1967, Morton *et al.* 1972.





Golden-crowned Sparrow

B205 (*Zonotrichia atricapilla*)

STATUS: No official listed status. Common winter visitor.

DISTRIBUTION / HABITAT: Widespread; prefers interrupted brushlands, such as streamside thickets and chaparral with open patches. Prefers moister sites than congener, the white-crowned sparrow. Found sparingly in early fall as high as red fir zone, but moves down to chaparral, digger pine-oak, and blue oak zones for winter and spring.

SPECIAL HABITAT REQUIREMENTS:

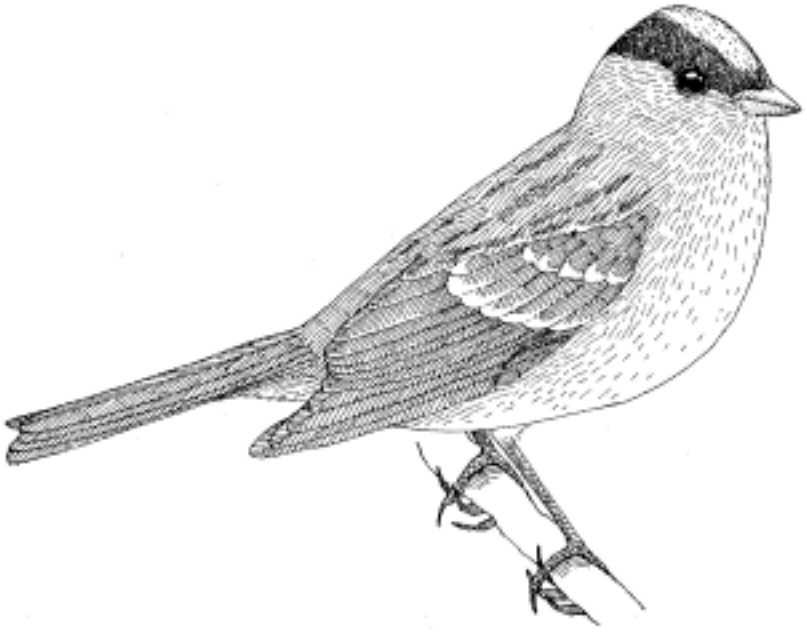
BREEDING: Does not nest in the western Sierran range.

TERRITORY / HOME RANGE: Winter home range size at San Jose was about 3 acres (1.2 ha) (Robertson 1957). In San Mateo County, Price (1931) reported winter home range of flocks as 15 to 20 acres (6.1 to 8.1 ha).

FOOD HABITS: Eats mainly seeds, shoots, buds, and flowers of grasses and forbs. Scratches in ground litter, picks seeds, and gleans items, mainly from ground.

OTHER:

REFERENCES: Robertson 1957, Bent 1968, Davis 1973.





Fox Sparrow

B206 (*Passerella iliaca*)

STATUS: No official listed status. Common resident in the western Sierran zone.

DISTRIBUTION/HABITAT: Breeds from chaparral zone up to lodgepole pine forests; prefers sites with considerable shrub layer. In fall and winter, found in blue oak savannahs and digger pine-oak woodlands.

SPECIAL HABITAT REQUIREMENTS: Dense shrubs.

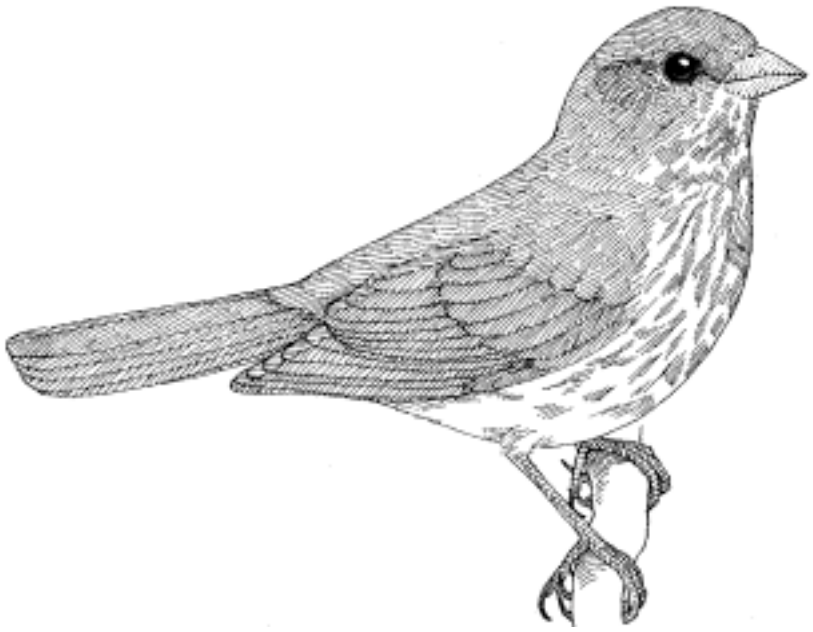
BREEDING: Breeds from mid-May to early August, with peak from early June to late July. Nests placed in dense shrubs, or occasionally on the ground. Nests range in height from 0 to 6 ft (0 to 1.8 m). Mean clutch size 3 or 4, with range from 3 to 5.

TERRITORY/HOME RANGE: No data on home range or territory size. Six pairs reported on 6.5 acres (2.6 ha) in Lassen County (Linsdale 1928).

FOOD HABITS: Feeds mainly on insects in summer, and seeds in winter. Feeds on the ground, scratching in litter under shrubs and in weed patches.

OTHER: Nesting form leaves the Sierra Nevada for winter, has grayish head and back. Wintering birds migrate from further north, have browner heads and backs.

REFERENCES: Grinnell and Storer 1924, Bent 1968, Gaines 1977.





Lincoln's Sparrow

B207 (*Melospiza lincolnii*)

STATUS: No official listed status. Fairly common summer resident and migrant at high elevations, and winter resident at low elevations.

DISTRIBUTION/HABITAT: Nests usually in wet meadows or lakeside and streamside thickets at middle to high elevations. Breeding birds generally leave the Sierra Nevada by September; northern migrants come into riparian and lakeside habitats in the lowland oak and digger pine-oak types.

SPECIAL HABITAT REQUIREMENTS: Dense shrubs; ponds, lakes, streams, rivers, or wet meadows.

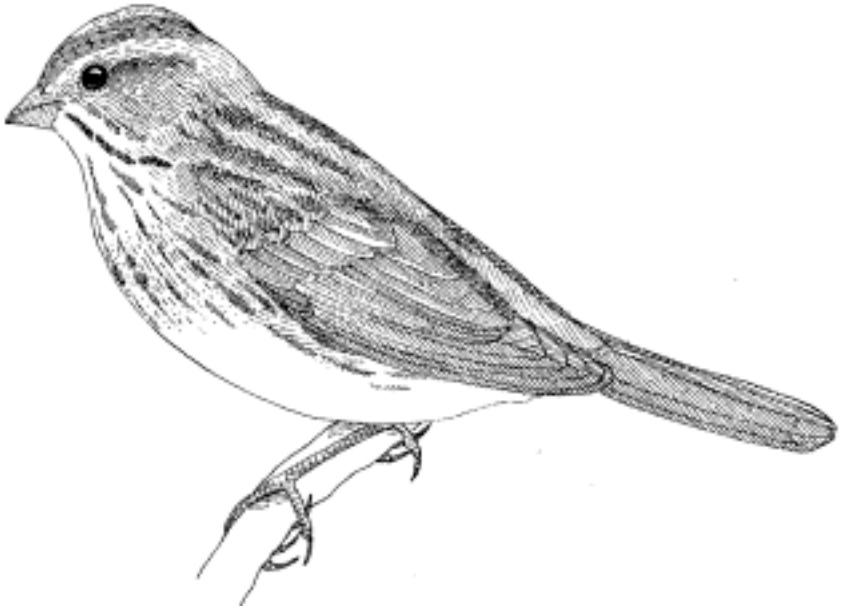
BREEDING: Breeds from mid-May to late July, with peak from late May to late June. Nest placed in a depression on the ground, well concealed by dense shrubbery. Clutch size from 3 to 6, with mean of 4.

TERRITORY/HOME RANGE: No data on home range. In Ontario, territory size appeared to be about 1 acre (0.4 ha) (Bent 1968).

FOOD HABITS: Feeds mainly on insects and seeds taken from ground and air. Scratches in ground litter and flycatches from the ground.

OTHER:

REFERENCES: Grinnell and Storer 1924, Grinnell and Miller 1944, Bent 1968.





Song Sparrow

B208 (*Melospiza melodic*)

STATUS: No official listed status. Fairly common resident at low elevations; limited numbers at mid-elevations in summer.

DISTRIBUTION/HABITAT: Breeds in low, dense vegetation along streams, ponds and marshes, and wet meadows from blue oak savannahs up to ponderosa pine and black oak woodland zone. Found in winter in similar habitats, but generally below about 2000 ft (610 m).

SPECIAL HABITAT REQUIREMENTS: Dense shrubs; ponds, lakes, streams, rivers, or wet meadows.

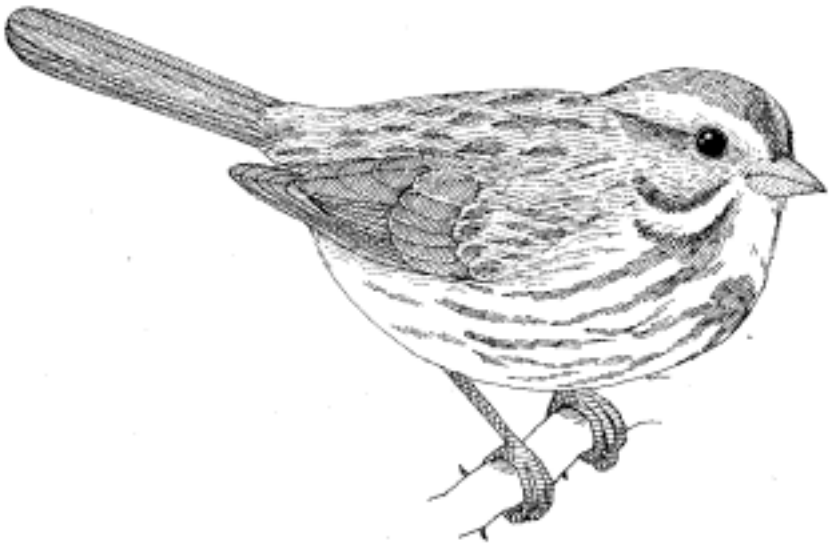
BREEDING: Breeds from late April to early July, with peak from late May to late June. Nest situated in low, dense shrubbery in wet meadows or streamside thickets; must have concealment and a secure support. Nest height ranges from 0 to 12 ft (0 to 3.7 m). Clutch size from 3 to 6, with mean of 4.

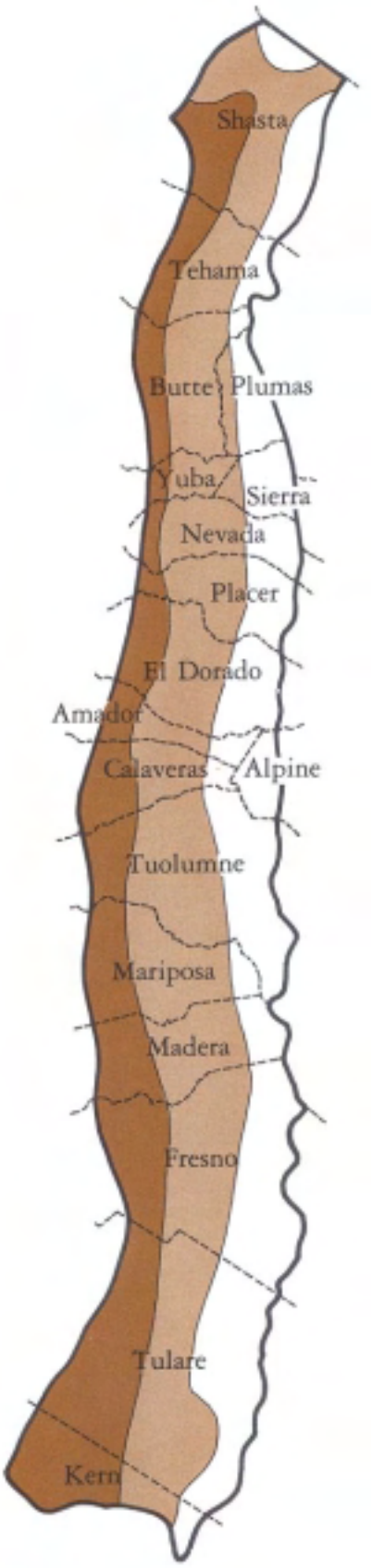
TERRITORY/HOME RANGE: Territories in Ohio ranged from 0.5 to 1. 5 acres (0.2 to 0.6 ha), averaging 0.7 acre (0.3 ha) (Nice 1943). Territory size in salt marshes of Contra Costa County averaged about 4350 ft^2 (400 m^2) in a year of high density (Johnston 1956). Home range data scanty; a single winter home range in New York reported at 1.4 acres (0.6 ha) (Butts 1927); a single winter home range in Kansas reported at 8.9 acres (3.6 ha), and an average based on 29 poorly studied birds of about 6.8 acres (2.8 ha) (Fitch 1958).

FOOD HABITS: Eats insects, weed seeds, some fruit, and berries. Forages on ground, scratching in litter; gleans foliage low in thickets; and rarely hawks aerial insects.

OTHER: Some evidence suggests recent and slight increase in abundance and distribution on west slopes of the Sierra Nevada.

REFERENCES: Grinnell and Storer 1924; Nice 1937, 1943; Bent 1968.





Rare Species

Observations of the following 57 species of birds in the western Sierra Nevada have been documented five or fewer times:

Common Loon (*Gavia immer*)
Arctic Loon (*Gavia arctica*)
Horned Grebe (*Podiceps auritus*)
White Pelican[1] (*Pelecanus occidentalis*)
Double-crested Cormorant (*Phalacrocorax auritus*)
Great Egret (*Casmerodias albus*)
Snowy Egret (*Egretta thula*)
American Bittern (*Botaurus lentiginosus*)
Gadwall (*Anas strepera*)
Blue-winged Teal (*Anal discors*)
Common Goldeneye (*Bucephala clangula*)
White-winged Scoter (*Melanitta deglandi*)
Surf Scoter (*Melanitta perspicillata*)
Rough-legged Hawk (*Buteo lagopus*)
Ferruginous Hawk (*Buteo regalis*)
Sage Grouse (*Centrocercus urophasianus*)
Bobwhite[2] (*Colinus virginianus*)
Sandhill Crane[1] (*Grus canadensis*)
Sora (*Porzana carolina*)
Solitary Sandpiper (*Tringa solitaria*)
Wandering Tattler (*Heteroscelus incanus*)
Willer (*Catoptrophorus semipalmatus*)
Greater Yellowlegs (*Tringa melanoleuca*)
Black-necked Stilt (*Himantopus mexicanus*)
Northern Phalarope (*Lobipes lobatus*)
Parasitic Jaeger (*Stercorarius parasiticus*)
Forster's Tern (*Sterna forsteri*)
Caspian Tern (*Hydroprogne caspia*)
Rock Dove[3] (*Columba livia*)
Yellow-billed Cuckoo[4] (*Coccyzus americanus*)
Lesser Nighthawk (*Chordeiles acutipennis*)
Costa's Hummingbird (*Calypte costae*)
Ladder-backed Woodpecker[5] (*Picoides scalaris*)
Wied's Crested Flycatcher (*Myiarchus tyrannulus*)
Gray Flycatcher (*Empidonax wrightii*)
Bank Swallow (*Riparia riparia*)
Purple Martin (*Progne subis*)
Cactus Wren[5] (*Campylorhynchus brunneicapillus*)
Sage Thrasher (*Oreoscoptes montanus*)
Bohemian Waxwing (*Bombycilla garrulus*)
Northern Shrike (*Lanius excubitor*)
Black-and-white Warbler (*Mniotilta varia*)
Virginia's Warbler (*Vermivora virginiae*)
Magnolia Warbler (*Dendroica magnolia*)
Blackburnian Warbler (*Dendroica fusca*)
Ovenbird (*Seiurus aurocapillus*)
Connecticut Warbler (*Oporonis agilis*)
American Redstart (*Setophaga ruticilla*)
Hooded Oriole (*Icterus cucullatus*)
Scott's Oriole[5] (*Icterus parisorum*)
Rusty Blackbird (*Euphagus carolinus*)
Summer Tanager (*Piranga flava*)
Rose-breasted Grosbeak (*Pheucticus ludovicianus*)
Indigo Bunting (*Passerina cyanea*)
Gray-headed Junco[6] (*Junco caniceps)*
Harris' Sparrow (*Zonotrichia querula)*
White-throated Sparrow (*Zonotrichia albicollis)*

[1] Flocks overhead often seen, but seldom land.
[2] Introduced species; uncertain whether established.
[3] Small populations in a few low-elevation communities, such as Auburn, Placer County (R. Stallcup, pers. commun., May, 1977).
[4] Found only in riparian woodland along Kern River, Kern County; breeds.
[5] Found only in Joshua tree woodland along Kern River, Kern County; probably breeds.
[6] One breeding record, in Mineral King area, Tulare County (Stallcup and Greenberg 1974).

Literature Cited

Adkisson, C. S.
1966. The nesting and behavior of mockingbirds in northern lower Michigan. Jack-Pine Warbler 44:102-116.

Ainley, D. G.
1971. Rock wrens on the Farallones. Point Reyes Bird Observ. Newsletter 20:6.

Aldrich, E. C.
1935. Nesting of the dusky poor-will, with six illustrations. Condor 37:49-55.

Aldrich, J. W.
1953. Habits and habitat differences in two races of Traill's flycatcher. Wilson Bull. 65:8-11.

Allen, R. P., and F. P. Mangels.
1940. Studies of the nesting behavior of the black-crowned night heron. Proc. Linnean Soc. New York 50-51:1-28.

American Ornithologists' Union.
1957. Check-list of North American birds. 691 p. Port City Press, Baltimore.

American Ornithologists' Union.
1973. Thirty-second supplement to the American Ornithologists' Union check-list of North American birds. Auk 90:411-419.

American Ornithologists' Union.
1976. Thirty-third supplement to the American Ornithologists' Union check-list of North American birds. Auk 93:875-879.

Anderson, D. R., P. A. Skaptason, K. G. Kahey, and C. J. Henny.
1974. Population ecology of the mallard. III Bibliography of published research and management findings. Bur. Sport Fish. and Wildl., Resour. Publ. 119. 46 p.

Armitage, K. B.
1955. Territorial behavior in fall migrant rufous hummingbirds. Condor 57:239-240.

Armstrong, E. A.
1955. The wren. Collins, London. 312 p.

Armstrong, J. T.
1965. Breeding home range in the nighthawk and other birds: Its evolutionary and ecological significance. Ecology 46:619-629.

Bakus, G. J.
1959a. Observations on the life history of the dipper in Montana. Auk 76:190-207.

Bakus, G. J.
1959b. Territoriality, movements, and population density of the dipper in Montana. Condor 61:410-425.

Balda, R. P., and G. C. Bateman.
1971. Flocking and annual cycle of the piñon jay, *Gymnorhinus cyanocephalus.* Condor 73:287-302.

Balda, R. P., and G. C. Bateman.
1972. The breeding biology of the piñon jay. Living Bird 11:5-42.

Balda, R. P., G. C. Bateman, and G. F. Foster.
1972. Flocking associates of the piñon jay. Wilson Bull. 84:60-76.

Baldwin, P. H., and W. F. Hunter.
1963. Nesting and nest visitors of the Vaux's swift. Auk 80:81-85.

Baldwin, P. H., and N. K. Zaczkowski.
1963. Breeding biology of the Vaux's swift. Condor 65:400-406.

Balgooyen, T. G.
1976. Behavior and ecology of the American kestrel in the Sierra Nevada of California. Univ. Calif. Publ. Zool. 103:1-86.

Ball, I. J., D. S. Gilmer, L. M. Cowardin, and J. H. Riechmann.
1975. Survival of wood duck and mallard broods in north-central Minnesota. J. Wildl. Manage. 39:776-780.

Barbour, R. W.
1941. Winter habits of the red-eyed towhee in eastern Kentucky. Amer. Midl. Nat. 26:593-595.

Barlow, C.
1899. Nesting behavior of the hermit warbler in the Sierra Nevada, California. Auk 16:156-161.

Barlow, J. C., R. D. James, and N. Williams.
1970. Habitat co-occupancy among some vireos of the subgenus *Vireo* (Ayes: Vireonidae). Can. J. Zool. 48:395-398.

Bartholomew, G. A., T. R. Howell, and T. J. Cade.
1957. Torpidity in the white-throated swift, Anna hummingbird and poor-will. Condor 59:145-155.

Barwick, L. H., and D. W. Speake.
1973. Seasonal movements and activities of wild turkey gobblers in Alabama. *In* Wild turkey management. Proc. Second Natl. Wild Turkey Symp. Columbia, Missouri, 1970. G. C. Sanderson and H. C. Schultz,

eds. p. 125-133. Missouri Chapter, Wildl. Soc. and Univ. Missouri Press, Columbia.

Baumann, S. A.
1959. The breeding cycle of the rufous-sided towhee (*Pipilo erythrophthalmus* L.) in central California. Wasmann J. Biol. 17:161-220.

Beason, R. C., and E. C. Franks.
1974. Breeding behavior of the horned lark. Auk 91:65-74.

Beaver, D. L., and P. L. Baldwin.
1975. Ecological overlap and the problem of competition and sympatry in the western and Hammond's flycatchers. Condor 77:1-13.

Beecham, J. J., and M. N. Kochert.
1975. Breeding biology of the golden eagle in southwestern Idaho. Wilson Bull. 87:506-513.

Beedy, E. C.
1975. Avifaunal complexity and forest structure in the Sierra Nevada of California. M.A. thesis, Univ. Calif., Davis. 100 p.

Beer, J. R., L. D. Frenzel, and N. Hansen.
1956. Minimum space requirements of some nesting passerine birds. Wilson Bull. 68:200-209.

Behle, W. H.
1942. Distribution and variation of the horned larks (*Otocoris alpestris*) of western North America. Univ. Calif. Publ. Zool. 46:205-316.

Behle, W. H.
1958. The bird life of Great Salt Lake. Univ. Utah Press, Salt Lake City. 203 p.

Bellrose, F. C.
1976. Ducks, geese and swans of North America. 543 p. Stackpole Books, Harrisburg, Pa.

Bendell, J. F., and P. W. Elliott.
1966. Habitat selection in blue grouse. Condor 68:431-446.

Bendell, J. F., and P. W. Elliott.
1967. Behavior and the regulation of numbers in blue grouse. Can Wildl. Serv. Rep. Set. 4. 76 p.

Bengston, S. A.
1966a. Field studies on the harlequin duck in Iceland. Wildfowl Trust Annu. Rep. (1964-1965) 17:79-94.

Bengston, S. A.
1966b. Breeding ecology of the harlequin (*Histrionicus histrionicus*) in Iceland. Ornis Scandinavica 3:25-43.

Bent, A. C.
1927. Life histories of North American shorebirds, I. U.S. Natl. Mus. Bull. 142. 420 p.

Bent, A. C.
1929. Life histories of North American shorebirds, II. U.S. Natl. Mus. Bull. 146. 412 p.

Bent, A. C.
1932. Life histories of North American gallinaceous birds. U.S. Natl. Mus. Bull. 162. 490 p.

Bent, A. C.
1939. Life histories of North American woodpeckers. U.S. Natl. Mus. Bull. 174. 334 p.

Bent, A. C.
1940. Life histories of North American cuckoos, goatsuckers, hummingbirds and their allies. U.S. Natl. Mus. Bull. 176. 506 p.

Bent, A. C.
1942. Life histories of North American flycatchers, larks, swallows, and their allies. U.S. Nad. Mus. Bull. 179. 555 p.

Bent, A. C.
1946. Life histories of North American jays, crows, and titmice. U.S. Natl. Mus. Bull. 191. 495 p.

Bent, A. C.
1948. Life histories of North American nuthatches, wrens, thrashers, and their allies. U.S. Natl. Mus. Bull. 195. 475 p.

Bent, A. C.
1949. Life histories of North American thrushes, kinglets, and their allies. U.S. Natl. Mus. Bull. 196. 454 p.

Bent, A. C.
1950. Life histories of North American wagtails, shrikes, vireos, and their allies. U.S. Natl. Mus. Bull. 197. 411 p.

Bent, A. C.
1958. Life histories of North American blackbirds, orioles, tanagers, and their allies. U.S. Natl. Mus. Bull. 211. 549 p.

Bent, A. C.
1968. Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows, and their allies. U.S. Natl. Mus. Bull. 237. 1889 p.

Best, L. B.
1972. First-year effects of sagebrush control on two sparrows. J. Wildl. Manage. 36:534-544.
Blackman, T. W.
1976. Distribution and relative densities of the band-tailed pigeon (*Columba fasciata monilas*) in California. Calif. Dep. Fish and Game, Wildl. Manage. Branch Admin. Rep. 72-2. 35 p.
Blanchard, B. D.
1941. The white-crowned sparrows (*Zonotrichia leucophrys*) of the Pacific seaboard: Environment and annual cycle. Univ. Calif. Publ. Zool. 46:1-178.
Blanchard, B. D., and M. M. Erickson.
1949. The cycle in the Gambel's sparrow. Univ. Calif. Publ. Zool. 47:255-318.
Boag, D. A.
1966. Population attributes of blue grouse in southeastern Alberta. Can. J. Zool. 44:799-814.
Bock, C. E.
1969. Intra- vs. interspecific aggression in pygmy nuthatch flocks. Ecology 50:903-905.
Bock, C. E.
1970. The ecology and behavior of the Lewis woodpecker (*Asyndesmus lewis*). Univ. Calif. Publ. Zool. 92:1-100.
Bock, C. E., and J. H. Bock.
1974. On the geographical ecology of the three-toed woodpeckers, *Picoides tridactylus* and *P. arcticus.* Amer. Midl. Natur. 92:397-405.
Bowles, J. H., and F. R. Decker.
1934. Swainson's hawk in Washington State. Auk 51:446-450.
Brenton, D. F., and R. Pittaway, Jr.
1971. Observations of the great gray owl on its winter range. Can. Field Nat. 85:315-322.
Brewer, R.
195 5. Size of home range in eight bird species in a southern Illinois swamp thicket. Wilson Bull. 67:140-141.
Brown, J. L.
1964. The integration of agnostic behavior in the Stellar's jay, *Cyanocitta stelleri* (Gmelin). Univ. Calif. Publ. Zool. 60:223-328.
Brown, L., and D. Amadon.
1968. Eagles, hawks, and falcons of the world. 945 p. McGraw-Hill Book Co., New York.
Bryant, H. C.
1914. A determination of the economic status of the western meadow-lark in California. Univ. Calif. Publ. Zool. 11:377-510.
Bryant, H. C.
1916. Habits and food of the roadrunner in California. Univ. Calif. Publ. Zool. 17:21-50.
Bull, E. L., and E. C. Meslow.
1977. Habitat requirements of the pileated woodpecker in northeastern Oregon. J. For. 75:335-337.
Burger, G. V.
1954. Wild turkeys in central-coastal California. Condor 56:198-206.
Butts, W. K.
1927. The feeding range of certain birds. Auk 44:329-3 50.
Caccamise, D. F.
1974. Competitive relationships of the common and lesser nighthawks. Condor 76:1-20.
Cade, T. J.
1955. Experiments on winter territoriality of the American kestrel, *Falco sparverius.* Wilson Bull. 67:5-17.
Cade, T. J.
1960. Ecology of the peregrine and gyrfalcons in Alaska. Univ. Calif. Publ. Zool. 63:151-267.
Calder, W. A.
1971. Temperature relationships and nesting of the calliope hummingbird. Condor 73:314-321.
Chabreck, R. H.
1963. Breeding habits of the pied-billed grebe in an impounded coastal marsh in Louisiana. Auk 80:447-452.
Choate, T. S.
1963. Habitat and population dynamics of white-tailed ptarmigan in Montana. J. Wildl. Manage. 27:684-699.
Christensen, G. C.
1970. The chukar partridge: Its introduction, life history, and management. Nevada Dep. Fish and Game Biol. Bull. 4. 82 p.
Clark, R. J.
1975. A field study of the short-eared owl, *Asio flammeus* (Pontoppidan), in North America. Wildl. Monogr. 47:67.
Cogswell, H. L.
1962. Territory size in three species of chaparral birds in relation to vegetation density and

structure. Ph.D. thesis, Univ. Calif. Library, Berkeley. 567 p.

Coles, V.
1944. Nesting of the turkey vulture in Ohio caves. Auk 61:219-228.

Collins, C. T., and R. E. Landry.
1977. Artificial nest burrows for burrowing owls. North Amer. Bird Bander 2:151-154.

Combellack, C. R. B.
1954. A nesting of violet-green swallows. Auk 71:435-442.

Cornwell, G. W.
1963. Observations on the breeding biology and behavior of a nesting population of belted kingfishers. Condor 65:426-431.

Coulombe, H. N.
1971. Behavior and population ecology of the burrowing owl, *Speotyto cunicularia*, in the Imperial Valley of California. Condor 73:162-176.

Coutlee, E. L.
1967. Agnostic behavior in the American goldfinch. Wilson Bull. 79:89-109.

Coutlee, E. L.
1968a. Comparative breeding behavior of lesser and Lawrence's goldfinches. Condor 70:228-242.

Coutlee, E. L.
1968b. Maintenance of lesser and Lawrence's goldfinches. Condor 70:378-384.

Cowan, J. B.
1952. Life history and productivity of a population of western mourning doves in California. Calif. Fish and Game 38:505-521.

Craighead, J., and F. Craighead.
1940. Nesting pigeon hawks. Wilson Bull. 52:241-248.

Craighead, J. J., and F. C. Craighead, Jr.
1956. Hawks, owls, and wildlife. 443 p. Stackpole Publ., Harrisburg.

Crase, F. T.
1976. Occurrence of the chestnut-backed chickadee in the Sierra Nevada Mountains, California. Amer. Birds 30:673-675.

Crockett, A. B.
1975. Ecology and behavior of the Williamson's sapsucker in Colorado. Ph.D. thesis, Univ. Colo. Library, Boulder. 125 p.

Crockett, A. B., and H. H. Hadow.
1975. Nest site selection by Williamson and red-naped sapsuckers. Condor 77:365-368.

Dalke, P. D., A. S. Leopold, and D. L. Spencer.
1946. The ecology and management of the wild turkey in Missouri. Missouri Conserv. Comm. Tech. Bull. No. 1.

Davis, D. E.
1954. The breeding biology of Hammond's flycatchers. Auk 71:164-171.

Davis, E. M.
1937. Observations on nesting barn swallows. Bird-Banding 8:66-73.

Davis, J.
1951. Distribution and variation of the brown towhee. Univ. Calif. Publ. Zool. 52:1-120.

Davis, J.
1960. Nesting behavior of the rufous-sided towhee in coastal California. Condor 62:434-456.

Davis, J.
1973. Habitat preferences and competition of wintering juncos and golden-crowned sparrows. Ecology 54:174-180.

Davis, J., G. F. Fisler, and B. S. Davis.
1963. The breeding biology of the western flycatcher. Condor 65:337-382.

Dawson, W. L.
1919. The solitaires of Shasta. Condor 21:12-21.

Dehaven, R. W., F. T. Crase, and P. P. Woronecki.
1975. Breeding status of the tricolored blackbird, 1969-1972. Calif. Fish and Game 61:166-180.

Dennis, J. V.
1958. Some aspects of the breeding ecology of the yellow-breasted chat (*Icteria virens*). Bird-Banding 29:169-183.

Devillers, P.
1970. Identification and distribution in California of the Sphyrapicus varius group of sapsuckers. Calif. Birds 1:47-76.

De Wolfe, B. B., and R. H. De Wolfe.
1962. Mountain white-crowned sparrows in California. Condor 64:378-389.

Dimmick, R. W.
1968. Canada geese of Jackson Hole: Their ecology and management. Wyoming Game and Fish Comm. Bull. 11. 86 p.

Dixon, J. B.
1934. Nesting of the Clark nutcracker in California. Condor 36:229-234.

Dixon, J. B.
1937. The golden eagle in San Diego County, California. Condor 39:49-56.

Dixon, J. B., R. E. Dixon, and J. E. Dixon.
1957. Natural history of the white-tailed kite in San Diego County, California. Condor 59:156-165.
Dixon, K. L.
1949. Behavior of the plain titmouse. Condor 51:110-136.
Dixon, K. L.
1954. Some ecological relations of chickadees and titmice in central California. Condor 56:113-124.
Dixon, K. L.
1956. Territoriality and survival in the plain titmouse. Condor 58:169.
Dixon, K. L., and J. D. Gilbert.
1964. Altitudinal migration in the mountain chickadee. Condor 66:61-64.
Drewien, R. C., and P. F. Springer.
1969. Ecological relationships of breeding blue-winged teal to prairie potholes. *In* Saskatoon Wetlands Seminar. Can. Wildl. Serv. Rep. Set. 6:102-105.
Dunkle, S. W.
1977. Swainson's hawks on the Laramie Plains, Wyoming. Auk 94:65-71.
Dzubin, A.
1955. Some evidence of home range in waterfowl. Trans. 20th North Amer. Wildl. Conf. p. 278-298.
Earhart, C. M., and N. K. Johnson.
1970. Size dimorphism and food habits of North American owls. Condor 72:251-264.
Eckhardt, R. C.
1976. Polygyny in the western wood peewee. Condor 78:561-562.
Edminster, F. C.
1954. American game birds of field and forest. 490 p. Charles Scribner's and Sons, New York.
Edson, J. M.
1943. A study of the violet-green swallow. Auk 60:396-403.
Eisenmann, E.
1971. Range expansion and population increase in North and Middle America of the white-tailed kite. Amer. Birds 25:529-536.
Emlen, J. T., Jr.
1939. Seasonal movements of a low-density valley quail population. J. Wildl. Manage. 3:118-130.
Emlen, J. T., Jr.
1940. The mid-winter distribution of the crow in California. Condor 42:287-294.
Emlen, J. T., Jr.
1942. Notes on a nesting colony of western crows. Bird-Banding 13:143-153.
Emlen, J. T., Jr.
1952. Social behavior in nesting cliff swallows. Condor 54:177-199.
Emlen, J. T., Jr.
1954. Territoriality, nest building, and pair formation in the cliff swallow. Auk 71:16-35.
Enderson, J. H.
1960. A population study of the sparrow hawk in east-central Illinois. Wilson Bull. 72:222-231.
Enderson, J. H.
1964. A study of the prairie falcon in the central Rocky Mountain region. Auk 81:332-352.
Eng, R. L., and G. W. Gullion.
1962. The predation of goshawks upon ruffed grouse on the Cloquet Forest Research Center, Minnesota. Wilson Bull. 74:227-242.
Erickson, M. M.
1938. Territory, annual cycle, and numbers in a population of wrentits (*Chamaea fasciata*). Univ. Calif. Publ. Zool. 42:247-334.
Erickson, R. C.
1948. Life history and ecology of the canvasback, *Nyroca valisineria* (Wilson) in southeast Oregon. Ph.D. thesis, Iowa State Univ. Library, Ames. 240 p.
Erpino, M. J.
1968. Nest-related activities of black-billed magpies. Condor 70:154-165.
Erskine, A. J.
1972. Buffleheads. Can. Wildl. Serv. Rep. Set. 4:1-240.
Ervin, S. H.
1974. Flock integrity, pair maintenance, and the occurrence of supernumerary birds in the bushtit. Ph.D. thesis, Univ. Calif. Library, Santa Barbara. 108 p.
Evenden, F. G., Jr.
1957. Observations on nesting behavior of the house finch. Condor 59:112-117.
Ewaschuk, E., and D. A. Boag.
1972. Factors affecting hatching success of densely nesting Canada geese. J. Wildl. Manage. 36:1097-1106.
Fitch, H. S.
1958. Home ranges, territories, and seasonal movements of vertebrates of the natural

history reservation. Univ. Kansas, Publ. Mus. Natl. Hist. 11:63-326.

Fitch, H. S., F. Swenson, and D. F. Tillotson.
1946. Behavior and food habits of the red-tailed hawk. Condor 48:205-237.

Fogarty, M. J., and K. A. Arnold.
1977. Common snipe (*Capella gallinago delicata = Gallinago gallinago* of Edwards, 1974). *In* Management of migratory shore and upland game birds in North America G. C. Sanderson, ed. p. 189-209. Inter. Assoc. Fish and Wildl. Agencies and U. S. Fish and Wildl. Serv.

Forbes, J. A., and D. W. Warner.
1974. Behavior of a radio-tagged saw-whet owl. Auk 91:783-795.

Forman, L. D.
1976. Observations of common merganser broods in northwestern California. Calif. Fish and Game 62:207-212.

Forsman, E. D., E. C. Meslow, and M. J. Strub.
1977. Spotted owl abundance in young versus old-growth forests, Oregon. Wildl. Soc. Bull. 5:43-47 .

Fredrickson, L. H.
1970. Breeding biology of American coots in Iowa. Wilson Bull. 82:445-457.

Fredrickson, L. H.
1977. American coot (*Fulica americana*). *In* Management of migratory shore and upland game birds in North America. G. C. Sanderson, ed. p. 123-147. Inter. Assoc. Fish and Wildl. Agencies and U. S. Fish and Wildl. Serv.

French, N. R.
1954. Notes on breeding activities and on gular sacs in the pine grosbeak. Condor 56:83-85.

Friedmann, H.
1929. The cowbirds: A study in the biology of social parasitism. 421 p. Charles C. Thomas, Springfield, Ill.

Friedmann, H., L. F. Kiff, and S. 1. Rothstein.
1977. A further contribution to knowledge of the host relations of the parasitic cowbirds. Smithsonian Contrib. Zool. 235. 75 p.

Frydendall, M. J.
1967. Feeding ecology and territorial behavior of the yellow warbler. Ph.D. thesis, Utah State Univ. Library, Logan. 100 p.

Fuller, R. W.
1953. Studies in the life history and ecology of the American pintail, *Anas acuta tzitzihoa,* in Utah. M.S. thesis, Utah State Univ. Library, Logan.

Gaines, D.
1977. Birds of the Yosemite Sierra: A distributional survey. California Syllabus, Oakland. 153 p.

Garber, D. P.
1972. Osprey study, Lassen and Plumas Counties, California, 1970-71. Calif. Dep. Fish and Game, Wildl. Manage. Branch Admin. Rep. 72-1. 33 p.

Garrett, R. L., and D. J. Mitchell.
1973. A study of prairie falcon populations in California. Calif. Dep. Fish and Game, Wildl. Manage. Branch Admin. Rep. 73-2. 15 p.

Gehrman, K. A.
1951. An ecological study of the lesser scaup duck (*Aythya affinis*) at west Medical Lake, Spokane County, Washington. M. S. thesis, Washington State Univ. Library, Pullman. 94 p.

Geis, M. P.
1956. Productivity of Canada geese in Flathead Valley, Montana. J. Wildl. Manage. 20:409-419.

Genelly, R. E.
1955. Annual cycle in a population of California quail. Condor 57:263-285.

Gerstenberg, R. M., and R. M. Jurek.
1972. Selected references on shorebirds. Calif. Dep. Fish and Game. P. R. Proj. W-54-R. 47 p. (mimeo).

Gibson, F.
1971. The breeding biology of the American avocet (*Recurvirostra americana*) in central Oregon. Condor 73:444-454.

Gilmer, D. S.
1971. Home range and habitat use of breeding mallards (*Anas platyrhynchos*) and wood ducks (*Aix sponsa*) in north-central Minnesota as determined by radio-tracking. Ph.D. thesis, Univ. Minn Library, Minneapolis. 142.

Gilmer, D. S., I. J. Ball, L. M. Cowardin, J. H. Riechmann, and J. R. Tester.
1975. Habitat use and home range of mallards breeding in Minnesota. J. Wildl. Manage. 39:781-789.

Glahn, J. F.
1974. Study of breeding rails with recorded

calls in north-central Colorado. Wilson Bull. 86:206-214 .

Glazener, W. C.
1946. Food habits of wild geese on the Gulf Coast of Texas. J. Wildl. Manage. 10:322-329.

Glover, F. A.
1953a. Nesting ecology of the pied-billed grebe in northwestern Iowa. Wilson Bull. 65:32-39.

Glover, F. A.
1953b. A nesting study of the band-tailed pigeon (*Columba f. fasciata*) in northwestern California. Calif. Fish and Game 39:397-407.

Gould, G. I.
1974. The status of the spotted owl in California. Calif. Dep. Fish and Game, Wildl. Manage. Branch Admin. Rep. 74-6. 56 p.

Graves, W. C.
1975. Wild turkey management in California. *In* Proc. Third national wild turkey symposium. L. K. Halls, ed. p. 1-5. Texas Parks and Wildl. Dep.

Greenhalgh, C. M.
1952. Food habits of the California gull in Utah. Condor 54:302-308.

Grice, D., and J. P. Rogers.
1965. The wood duck in Massachusetts. Mass. Div. Fish and Game. Proj. W-19-R. 96 p.

Grinnell, J., H. C. Bryant, and T. I. Storer.
1918. The game birds of California. Univ. Calif. Press, Berkeley. 642 p.

Grinnell, J., and T. I. Storer.
1924. Animal life in the Yosemite. Univ. Calif. Press, Berkeley. 752.

Grinnell, J., J. Dixon, and J. Linsdale.
1930. Vertebrate natural history of a section of northern California through the Lassen Peak region. Univ. Calif. Publ. Zool. 35:1-594.

Grinnell, J., and A. H. Miller.
1944. The distribution of the birds of California. Pacific Coast Avifauna 27:1-608.

Griscom, L., and A. Sprunt, Jr.
1957. The warblers of America. 356 p. Devin-Adair Co., New York.

Gullion, G. W.
1953. Territorial behavior of the American coot. Condor 55:169-186.

Gullion, G. W.
1954. The reproductive cycle of American coots in California. Auk 71:366-412.

Gutierrez, R. J.
1975. A literature review and bibliography of the mountain quail, *Oreortyx pictus* (Douglas). U.S. Forest Serv., Region 5, California, San Francisco. 33 p.

Gutierrez, R. J., C. E. Braun, and T. P. Zapatka.
1975. Reproductive biology of the band-tailed pigeon in Colorado and New Mexico. Auk 92:665-677.

Gutierrez, R. J., and W. D. Koenig.
1978. Characteristics of storage trees used by acorn woodpeckers in two California woodlands. J. For. 86:162-164.

Hamerstrom, F.
1969. A harrier population study. *In* Peregrine falcon populations, their biology and decline. J. J. Hickey, ed. p. 367-385. Univ. of Wisconsin Press, Madison.

Hamilton, R. B.
1975. Comparative behavior of the American avocet and the black-necked stilt (Recurvirostridae). A.O.U. Ornithol. Monogr. 17. 98 p.

Hamilton, W. J., III, and W. M. Gilbert.
1969. Starling dispersal from a winter roost. Ecology 50:886-898.

Hammond, M. C., and C. J. Henry.
1949. Success of marsh hawk nests in North Dakota. Auk 66:271-274.

Hammond, M. C., and G. E. Mann.
1956. Waterfowl nesting islands. J. Wildl. Manage. 20:345-352.

Hann, H. W.
1950. Nesting behavior of the American dipper in Colorado. Condor 52:49-62.

Hansen, E. L., and B. E. Carter.
1963. A nesting study of Brewer's blackbirds in Klamath County, Oregon. Murrelet 44:18-21.

Hanson, H. D., and C. W. Kossack.
1963. The mourning dove in Illinois. Ill. Dep. Conserv. Tech. Bull. 2. 133 p.

Harlow, R. C.
1922. The breeding habits of the northern raven in Pennsylvania. Auk 39:399-410.

Harper, H. T., B. H. Harry, and W. D. Bailey.
1958. The chukar partridge in California. Calif. Fish and Game 44:5-50.

Harrison, H. H.
1951. Notes and observations on the Wilson warbler. Wilson Bull. 63:143-148.

Hebard, F. V.
1961. Yellow warblers in conifers. Wilson Bull. 73:394-395.
Heckenlively, D. B.
1967. Role of song in territoriality of black-throated sparrows. Condor 69:429-430.
Henny, J. J., and H. W. Wight.
1972. Population ecology and environmental pollution: Red-tailed and Cooper's hawks . *In* Population ecology of migratory birds: A symposium. Bur. Sport Fish. and Wildl., Wildl. Res. Rep. 2:229-250.
Hensel, R. J., and W. A. Troyer.
1964. Nesting studies of the bald eagle in Alaska. Condor 66:282-286.
Hensley, H. M.
1954. Ecological relations of the breeding bird population of the desert biome in Arizona. Ecol. Monogr. 24:185-207.
Hering, L.
1948. Nesting birds of the Black Forest, Colorado. Condor 50:49-56.
Hertz, P. E., J. V. Remsen, Jr., and S. I. Zones.
1976. Ecological complementarity of three sympatric parids in a California oak woodland. Condor 78:307-316.
Hespenheide, H. A.
1964. Competition and the genus *Tyrannus.* Wilson Bull. 76:265-281.
Hickey, J. J., and D. W. Anderson.
1969. The peregrine falcon: Life history and population literature. *In* Peregrine falcon populations, their biology and decline. J. J. Hickey, ed. p. 3-42. Univ. Wisconsin Press, Madison.
Hirth, D. H., A. E. Hester, and F. Greeley.
1969. Dispersal and flocking of marked young robins (*Turdus migratorius*) after fledging. Bird-Banding 40:208-215.
Hoffman, R. S.
1956. Observations on a sooty grouse population at Sagehen Creek, California. Condor 58:321-336.
Hofslund, P. B.
1960. A life history study of the yellowthroat, *Geothlypis trichas.* Proc. Minnesota Acad. Sci. 27:144-174.
Höhn, E. O.
1967. Observations on the breeding biology of Wilson's phalarope (*Steganopus tricolor*) in central Alberta. Auk 84:220-244.
Holm, C. H.
1973. Breeding sex ratios, territoriality, and reproductive success in the red-winged blackbird (*Agelaius phoeniceus*). Ecology 54:356-365.
Horak, C. J.
1970. A comparative study of the foods of the sora and Virginia rail. Wilson Bull. 82:206-213.
Hori, J.
1963. Three bird flights in the wild mallard. Wildfowl Trust Annu. Rep. 14:124-132.
Horn, H. S.
1968. The adaptive significance of colonial nesting in the Brewer's blackbird. Ecology 49:682-694.
Howard, R. D.
1974. The influence of sexual selection and interspecific competition on mockingbird song (*Mimus polyglottos*). Evolution 28:428-438.
Howard, W. E.
1959. The European starling in California. Calif. Dep. Agric. Bull. 48:171-179.
Howell, J. C.
1942. Notes on the nesting habits of the American robin (*Turdus migratorius* L.). Amer. Midl. Nat. 28:529-603.
Howell, T. R.
1952. Natural history and differentiation in the yellow-bellied sapsucker. Condor 54:237-282.
Hoyt, S. F.
1957. The ecology of the pileated woodpecker. Ecology 38:246-256.
Hunter, W. F., and P. H. Baldwin.
1962. Nesting of the black swift in Montana. Wilson Bull. 74:409-416.
Ives, J. H.
1972. Common egret and great blue heron nest study, Indian Island, Humboldt County, California. Calif. Dep. Fish and Game, Wildl. Manage. Branch Admin. Rep. 72-9. 41 p.
Jackman, S. M., and J. M. Scott.
1975. Literature review of twenty-three selected forest birds of the Pacific Northwest. USDA Forest Serv., Reg. 6, Portland, Oreg. 382 p.
Jackson, G. L., and T. S. Baskett.
1964. Perch-cooing and other aspects of breed-

ing behavior of mourning doves. J. Wildl. Manage. 28:293-307 .

Jewett, S. G., W. P. Taylor, W. T. Shaw, and J. W. Aldrich.
1953. Birds of Washington State. 767 p. Univ. Washington Press, Seattle.

Johnsgard, P. A.
1973. Grouse and quails of North America. 553 p. Univ. Nebraska Press, Lincoln.

Johnsgard, P. A.
1975a. North American game birds. 183 p. Univ. Nebraska Press, Lincoln.

Johnsgard, P. A.
1975b. Waterfowl of North America. 640 p. Indiana Univ. Press, Bloomington.

Johnson, N. K.
1963. Biosystematics of sibling species of flycatchers in the *Empidonax hammondii-oberholseri-wrightii* complex. Univ. Calif Publ. Zool. 66:79-238.

Johnson, N. K.
1965. Differential timing and routes of the spring migration in the Hammond's flycatcher. Condor 67:423-437.

Johnson, N. K.
1966. Bill size, and the question of competition in allopatric and sympatric populations of dusky and gray flycatchers. Syst. Zool. 15:70-87.

Johnson, N. K.
1976. Breeding distribution of Nashville and Virginia's warblers. Auk 93:219-230.

Johnson, R. E.
1965. Reproductive activities of rosy finches, with special reference to Montana. Auk 82:190-205 .

Johnson, R. E.
1975. New breeding localities for *Leucosticte* in the contiguous western United States. Auk 92:586-589.

Johnston, D. W., and M. E. Forster.
1954. Interspecific relations of breeding gulls at Honey Lake, California. Condor 56:38-42.

Johnston, R. F.
1956. Population structure in salt marsh song sparrows. Part II: Density, age structure, and maintenance. Condor 58:254-272.

Jones, R. E.
1960. Activities of the magpie during the breeding period in southern Idaho. Northwest Sci. 34:18-25.

Jones, R. E., and A. S. Leopold.
1967. Nesting interference in a dense population of wood ducks. J. Wildl. Manage. 31:221-228.

Jones, S.
1979. The Accipiters-goshawk, Cooper's hawk, sharp-shinned hawk. Habitat Management Series for Unique or Endangered Species, Rep. 17, U. S. Bur. Land Manage. Tech. Note 335. 51 p.

Jones, V. E., and L. M. Baylor.
1969. Nesting of the Cassin's finch at Pocatello, Idaho. Tebiwa 12:64-68.

Joyner, D. E.
1969. A survey of the ecology and behavior of the ruddy duck (Oxyura *jamaicensis*) in northern Utah. M.S. thesis, Univ. Utah Library, Salt Lake City. 82 p.

Jurek, R. M., and H. R. Leach.
1973. California shorebird study. Accelerated research program on shore and upland migratory game birds. P. R. Proj. W-54-R Final Rep. 233 p. (44 p. appendix).

Kale, H. W., II.
1965. Ecology and bioenergetics of the long-billed marsh wren, *Telmatodytes palustris griseus* (Brewsteri), in Georgia salt marshes. Publ. Nuttall Ornithol. Club 5, 150 p.

Karalus, K. E., and A. W. Eckert.
1974. The owls of North America. 278 p. Doubleday, Garden City, New York.

Kaufman, G. W.
1971. Behavior and ecology of the sora, *Porzana carolina*, and the Virginia rail, *Rallus limicola*. Ph.D. thesis, Univ. Minn. Library, Minneapolis.

Kendeigh, S. C.
1941a. Birds of a prairie community. Condor 43:165-174.

Kendeigh, S. C.
1941b. Territory and mating behavior of the house wren. Illinois Biol. Monogr. 18:1-120.

Kendeigh, S. C.
1973. A symposium on the house sparrow (*Passer domesticus*) and European tree sparrow (*P. montanus*) in North America. A. O. U. Ornithol. Monogr. 14. 121 p.

Kessel, B.
1957. A study of the breeding biology of the European starling (*Sturnus vulgaris* L.) in

North America. Amer. Midl. Nat. 58:257-331.

Kilham, L.
1959. Early reproductive behavior of flickers. Wilson Bull. 71:323-336.

Kilham, L.
1962. Reproductive behavior of downy woodpeckers. Condor 64:126-133.

Kilham, L.
1970. Feeding behavior of downy woodpeckers. I. Preference for paper birches and sexual differences. Auk 87:544-556.

Kilham, L.
1972. Reproductive behavior of white-breasted nuthatches. 11. Courtship. Auk 89:115-129.

Kilham, L.
1973. Reproductive behavior of the red-breasted nuthatch. Auk 90:597-609.

King, J. R.
1955. Notes on the life history of Traill's flycatcher (*Empidonax traillii*) in southeastern Washington. Auk 72:148-173.

Kingery, H. E.
1962. Breeding bird census. Coastal chaparral. Audubon Field Notes 16:534-535.

Knorr, O. A.
1957. Communal roosting of the pygmy nuthatch. Condor 59:398.

Knorr, O. A.
1961. The geographical and ecological distribution of the black swift in Colorado. Wilson Bull. 73:155-170.

Koford, C. B.
1953. The California condor. Nat. Audubon Soc. Res. Rep. 4. 154 p.

Koplin, J. R.
1971. Osprey workshop: Summary of research findings and management recommendations. Cal-Nevada Section, The Wildlife Society. 1971 Transactions. p. 114-122.

Krebs, J. R.
1974. Colonial nesting and social feeding as strategies for exploiting food resources in the great blue heron (*Ardea herodias*). Behavior 51:99-131.

Kroodsma, D. E.
1973. Coexistence of Bewick's wrens and house wrens in Oregon. Auk 90:341-352.

Kuenzel, W. J., and R. G. Wiegert.
1973. Energetics of a spotted sandpiper feeding on brine fly larvae *(Paracoenia;* Diptera; Ephyridae) in a thermal spring community. Wilson Bull. 85:473-476.

Kuerzi, R. G.
1941. Life history studies of the tree swallow. Proc. Linnean Soc. New York 52-53:1-52.

Lanyon, W. E.
1956. Territory in the meadowlarks, genus *Sturnella.* Ibis 98:485-489.

Lanyon, W. E.
1957. The comparative biology of the meadowlarks (*Sturnella*) in Wisconsin. Publ. Nuttall Ornithol. Club 1. 67 p.

Laskey, A. R.
1962. Breeding biology of mockingbirds. Auk 79:596-606.

Laudenslayer, W. F., and R. P. Balda.
1976. Breeding bird use of a piñon-juniper-ponderosa pine ecotone. Auk 93:571-586.

Lawrence, G. E.
1950. The diving and feeding activity of the western grebe on the breeding grounds. Condor 52:3-16.

Lawrence, L. de K.
1948. Comparative study of the nesting behavior of the chestnut-sided and Nashville warblers. Auk 65:204-219.

Lawrence, L. de K.
1967. A comparative life-history study of four species of woodpeckers. A. O. U. Ornithol. Monogr. 5. 156 p.

Lea, R. B.
1942. A study of the nesting habits of the cedar waxwing. Wilson Bull. 54:225-237.

Leopold, A. S.
1977. The California quail. 281 p. Univ. Calif. Press, Berkeley.

Lewis, J. C.
1963. Observations on the winter range of wild turkeys in Michigan. J. Wildl. Manage. 27:98-102.

Ligon, J. D.
1971. Late summer-autumnal breeding of the pinon jay in New Mexico. Condor 73:147-153.

Ligon, J. D.
1973. Foraging behavior of the white-headed woodpecker in Idaho. Auk 90:862-869.

Linsdale, J. M.
1928. Variations in the fox sparrow with reference to natural history and osteology. Univ. Calif. Publ. Zool. 30:251-392.

Linsdale, J. M.
1937. The natural history of magpies. Pacific Coast Avifauna 25. 234 p.
Linsdale, J. M.
1938. Environmental responses of vertebrates in the Great Basin. Amer. Midl. Nat. 19:1-206.
Linsdale, J. M.
1950. Observations on the Lawrence goldfinch. Condor 52:255-259.
Linsdale, J. M.
1957. Goldfinches on the Hastings Natural History Reservation. Amer. Midl. Nat. 57:1-119.
Lockie, J. D.
1955. The breeding habits and food of short-eared owls after a vole plague. Bird Study 2: 5 3-69.
Lund, J. V.
1952. Nesting activities of the eastern mourning dove in southern Michigan. M. S. thesis, Michigan State Univ. Library, East Lansing.
Lunk, W. A.
1962. The rough-winged swallow: A study based on its breeding biology in Michigan. Publ. Nuttall Ornithol. Club 4:1-155.
Luttich, S. N., L. B. Keith, and J. D. Stephenson.
1971. Population dynamics of the red-tailed hawk (*Buteo jamaicensis*) at Rochester, Alberta. Auk 88:75-87.
Mackey, J. P.
1954. Some aspects of mourning dove behavior related to reproduction. M.S. thesis, Ohio State Univ. Library, Columbus. 101 p.
Mackie, R. J., and H. K. Buechner.
1963. The reproductive cycle of the chukar. J. Wildl. Manage. 27:246-260.
MacRoberts, M. H.
1970. Notes on the food habits and food defense of the acorn woodpecker. Condor 72:196-204.
MacRoberts, M. H., and B. R. MacRoberts.
1976. Social organization and behavior of the acorn woodpecker in central California. A. O. U. Ornithol. Monogr. 21. 115 p.
Mans, M. L.
1961. Breeding bird census. Coastal chaparral. Audubon Field Notes 15:514-515.
Manuwal, D. A.
1970. Notes on the territoriality of Hammond's flycatchers in western Montana. Condor 72:364-365.
Marshall, J. T.
1939. Territorial behavior of the flammulated screech owl. Condor 41:71-78.
Marshall, J. T.
1942. Food and habits of the spotted owl. Condor 44:66-67.
Marshall, J. T.
1957. Birds of pine-oak woodland in southern Arizona and adjacent Mexico. Pacific Coast Avifauna 32. 125 p.
Marti, C. D.
1974. Feeding ecology of four sympatric owls. Condor 76:45-61.
Martin, S. G.
1970. The agnostic behavior of varied thrushes (*Ixoreus naevius*) in winter assemblages. Condor 72:452-459.
Mayfield, H.
1958. Nesting of the black-backed three-toed woodpecker in Michigan. Wilson Bull. 70:195-196.
Mayhew, W. W.
1958. The biology of the cliff swallow in California. Condor 60:7-37.
McAllister, N. M.
1958. Courtship, hostile behavior, nest-establishment and egg-laying in the eared grebe (*Podiceps caspicus*). Auk 75:290-311.
McGeen, D. S., and J. T. McGeen.
1968. The cowbirds of Otter Lakes. Wilson Bull. 80:84-93.
McGilvery, F. B.
1968. A guide to wood duck production habitat requirements. U.S. Dep. Inter., Bur. Sport Fish. and Wildl., Res. Publ. 60.
Meanly, B.
1965. The roosting behavior of the red-winged blackbird in the southern United States. Wilson Bull. 77:217-228.
Mendall, H. L.
1958. The ring-necked duck in the Northeast. Univ. Maine Bull. 60, 317 p.
Mewaldt, L. R.
1956. Nesting behavior of the Clark nutcracker. Condor 58:3-23.
Meyerriecks, A. J.
1960. Comparative breeding behavior of four species of North American herons. Publ. Nuttall Ornithol. Club 2:1-158.
Michener, H., and J. R. Michener.
1935. Mockingbirds, their territories and individualities. Condor 37:97-140.

Miller, A. H.
1931. Systematic revision and natural history of the American shrikes (*Lanius*). Univ. Calif. Publ. Zool. 38:11-242.
Miller, A. H., and C. E. Bock.
1972. Natural history of the Nuttall woodpecker at the Hastings Reservation. Condor 74:284-294.
Miller, A. H., E. McMillan, and I. McMillan.
1965. The status and welfare of the California condor. Nat. Audubon Soc. Res. Rep. 6. 61 p.
Miller, E. V.
1941. Behavior of the Bewick wren. Condor 43:81-99.
Miller, J. R., and J. T. Miller.
1948. Nesting of the spotted sandpiper at Detroit, Michigan. Auk 65:558-567.
Mills, G. S.
1975. A winter population study of the American kestrel in central Ohio. Wilson Bull. 87:241-247.
Minock, M. E.
1971. Social relationships among mountain chickadees. Condor 73:118-120.
Moisan, G., R. 1. Smith, and R. K. Martinson.
1967. The green-winged teal: Its distribution, migration, and population dynamics. U.S. Dep. Inter., Fish and Wildl. Serv., Spec. Sci. Rep. 100. 248 p.
Morse, D. H.
1972. Habitat differences of Swainson's and hermit thrushes. Wilson Bull. 84:206-208.
Morton, M. L.
1967. Diurnal feeding patterns in white-crowned sparrows, *Zonotrichia leucophrys gambeli*. Condor 69:491-512.
Morton, M. L., J. L. Horstmann, and J. M. Osborn.
1972. Reproductive cycle and nesting success of the mountain white-crowned sparrow (*Zonotrichia leucophrys oriantha*) in the central Sierra Nevada Condor 74:152-163.
Mumford, R. E., and R. L. Zusi.
1958. Notes on movements, territories and habitat of wintering saw-whet owls. Wilson Bull. 70:188-191.
Murray, G. A.
1976. Geographic variation in the clutch sizes of seven owl species. Auk 93:602-613.
Mussehl, T. W.
1960. Blue grouse production, movements, and populations in the Bridger Mountains, Montana. J. Wildl. Manage. 24:60-68.
Naylor, A. E.
1953. Production of the Canada goose on Honey Lake Refuge, Lassen County, California. Calif. Fish and Game 39:83-94.
Naylor, A. E.
1960. The wood duck in California with special reference to the use of nest boxes. Calif. Fish and Game 46:241-269.
Neff, J. A.
1947. Habits, food, and economic status of the band-tailed pigeon. North Amer. Fauna 58:1-76.
Nelson, T.
1930. Growth rate of the spotted sandpiper chick with notes on nesting habits. Bird-Banding 1:1-12.
Newman, T.
1978. Food habits of young-of-the-year California quail on California annual grass rangelands. M. S. thesis, Calif. State Univ., Library, Fresno. 81 p.
Nice, M. M.
1922. A study of the nesting of mourning doves (Part 1). Auk 39:457-474.
Nice, M. M.
1923. A study of the nesting of mourning doves (Part 2). Auk 40:37-58.
Nice, M. M.
1937. Studies in the life history of the song sparrow. Part 1. A population study of the song sparrow. Trans. Linnean Soc. New York 4:1-227.
Nice, M. M.
1943. Studies in the life history of the song sparrow. Part II. The behavior of the song sparrow and other passerines. Trans. Linnean Soc. New York 6:1-329.
Nickell, W. P.
1951. Studies of habitats, territory, and nests of the eastern gold-finch. Auk 68:447-470.
Nolan, V., Jr.
1960. Breeding 'behavior of the Bell vireo in southern Indiana. Condor 62:225-244.
Norris, R. A.
1958. Comparative biosystematics and life history of the nuthatches *Sitta pygmea* and *Sitta pusilla*. Univ. Calif. Publ. Zool. 56:119-300.
Norris, R. A.
1960. Density, racial composition, sociality and

selective predation in nonbreeding populations of savannah sparrows. Bird-Banding 31:173-216.

North, C. A.
1973. Population dynamics of the house sparrow (*Passer domesticus* L.) in Wisconsin. In Productivity, population dynamics, and systematics of granivorous birds. S. C. Kendeigh and J. Pinowski, eds. p. 195-219. Polish Sci. Publ., Warsaw.

Oberlander, G.
1939. The history of a family of black phoebes. Condor 41:133-151.

Odum, E. P., and E. J. Kuenzler.
1955. Measurement of territory size and home range size in birds. Auk 72:128-137.

Ohlendorf, H. M.
1974. Competitive relationships among kingbirds (*Tyrannus*) in Trans-Pecos Texas. Wilson Bull. 86:357-373.

Ohlendorf, H. M.
1976. Comparative breeding ecology of phoebes in Trans-Pecos Texas. Wilson Bull. 88:255-271.

Ohmart, R. D.
1973. Observations on the breeding adaptations of the roadrunner. Condor 75:140-149.

Orians, G. H.
1961. The ecology of blackbird (*Agelaius*) social systems. Ecol. Monogr. 31:285-312.

Orians, G. H., and H. S. Horn.
1969. Overlap in foods and foraging of four species of blackbirds in the potholes of central Washington. Ecology 50:930-938.

Oring, L. W., and M. Knudson.
1972. Monogamy and polyandry in the spotted sandpiper. Living Bird 11:59-73.

Ormiston, J. H.
1966. The food habits, habitat, and movements of mountain quail in Idaho. M.S. thesis, Univ. Idaho Library, Moscow.

Owen, O. S.
1957. Observations on territorial behavior in the English sparrow. Bull. Ecol. Soc. Amer. 38:101-102.

Palmer, R. S., ed.
1962. Handbook of North American birds, Vol. 1. 567 p. Yale Univ. Press, New Haven and London.

Palmer, R. S., ed.
1976. Handbook of North American Birds, Vols. 2 and 3. Waterfowl. Part 1, 521 p.; Part II, 560 p. Yale Univ. Press, New Haven and London.

Parks, G. H., and H. C. Parks.
1963. Some notes on a trip to an evening grosbeak nesting area. Bird-Banding 34:22-30.

Payne, R. B.
1965. Clutch size and numbers of eggs laid by brown-headed cowbirds. Condor 67:44-60.

Payne, R. B.
1969. Breeding season and reproductive physiology of tricolored and redwinged blackbirds. Univ. Calif. Publ Zool. 90:1-114.

Payne, R. B.
1973. The breeding season of a parasitic bird, the brown-headed cowbird, in central California. Condor 75:80-99.

Paynter, R. A., Jr.
1954. Interrelations between clutch-size, brood-size, prefledging survival, and weight in Kent Island tree swallows. Bird-Banding 25:35-58, 102-110, 136-148.

Peeters, H. J.
1962. Nuptial behavior of the band-tailed pigeon in the San Francisco Bay Area. Condor 64:445-470.

Pettingill, O. S., Jr.
1930. Observations on the nesting activities of the hermit thrush. Bird-Banding 1:72-77.

Phelps, J. E.
1955. The adaptability of the Turkish chukar partridge (*Alectoris graeca* Meisner) in central Utah. M. S. thesis, Utah State College Library, Logan. 56 p.

Phillips, A. R.
1955. The history of Say's phoebe at Flagstaff. Plateau 28:25-28.

Pickwell, G. B.
1931. The prairie horned lark. St. Louis Acad. Sci. Trans. 27:1-153.

Pickwell, G. B.
1947. The American pipit in its Arctic-alpine home. Auk 64:1-14.

Pitelka, F. A.
1951a. Speciation and ecologic distribution in American jays of the genus *Aphelocoma*. Univ. Calif. Publ. Zool. 50:195-464.

Pitelka, F. A.
1951b. Ecological overlap and interspecific strife in breeding populations of Anna and Allen hummingbirds. Ecology 32:641-661.

Pitelka, F. A., P. Q. Tomich, and G. W. Treichel.
1955. Ecological relations of jaegers and owls as lemming predators near Barrow, Alaska. Ecol. Monogr. 25:85-117.
Planck, R. J.
1967. Nest site selection and nesting of the European starling in California. Ph.D. thesis, Univ. Calif. Library, Davis. 124 p.
Porter, R. D., and C. M. White, in collaboration with R. J. Erwin.
1973. The peregrine falcon in Utah, emphasizing ecology and competition with the prairie falcon. Brigham Young Univ. Sci. Bull. Biol. Set. 18:1-74.
Pospahala, R. S., D. R. Anderson, and C. J. Henny.
1974. Population ecology of the mallard II: breeding habitat conditions, size of breeding populations and production indices. Bur. Sport Fish. and Wildl. Res. Publ. 115. 73 p.
Pospichal, L. B., and W. H. Marshall.
1954. A field study of sora rail and Virginia rail in central Minnesota. Flicker 26:2-32.
Poston, H. J.
1969. Home range and breeding biology of the shoveler. M.S. thesis, Utah State Univ. Library, Logan. 86 p.
Poston, H. J.
1974. Home range and breeding biology of the shoveler. Can. Wildl. Serv. Rep. Set. 25. 49 p.
Power, H. W., III.
1966. Biology of the mountain bluebird in Montana. Condor 68:351-371.
Pratt, H. M.
1970. Breeding biology of the great blue herons and common egrets in central California. Condor 72:407-416.
Price, J. B.
1931. Some flocking habits of the crowned sparrows. Condor 33:238-242.
Putnam, L. S.
1949. The life history of the cedar waxwing. Wilson Bull. 61:141-182.
Raitt, R. J., Jr.
1960. Breeding behavior in a population of California quail. Condor 62:284-292.
Ralph, C. J., and C. J. Pearson.
1971. Correlation of age, size of territory, plumage, and breeding success in white-crowned sparrows. Condor 73:77-80.
Rand, A. L., and R. M. Rand.
1943. Breeding notes on the phainopepla. Auk 60:333-341.
Randall, W., and R. Austing.
1952. Ecological notes on the long-eared and saw-whet owls in southwestern Ohio. Ecology 33:422-426.
Rea, A. M.
1970. Winter territoriality in a ruby-crowned kinglet. West. Bird-Bander 45:4-7.
Reynolds, R. T.
1978. Food and habitat partitioning in two groups of coexisting Accipiters. Ph.D. thesis, Oregon State Univ. Library, Corvallis.
Ritter, L. V.
1972. The breeding biology of scrub jays. M.A. thesis, Calif. State Univ. Library, Chico. 49 p.
Robertson, F. D.
1957. The flocking habits of the golden-crowned sparrow in a winter society. West. Bird-Bander 32:29-31.
Root, R. B.
1967. The niche exploitation pattern of the blue-gray gnatcatcher. Ecol. Monogr. 37:317-350.
Root, R. B.
1969. The behavior and reproductive success of the blue-gray gnatcatcher. Condor 71:16-31.
Rust, H. J.
1920. The home life of the western warbling vireo. Condor 22:85-94.
Salomonson, M. G., and R. P. Balda.
1977. Winter territoriality of Townsend's solitaires (*Myadestes townsendi*) in a piñon-juniper-ponderosa pine ecotone. Condor 79:148-161.
Salt, G. W.
1952. The relation of metabolism to climate and distribution in three finches of the genus *Carpodacus.* Ecol. Monogr. 22:121-152.
Salt, G. W.
1957. An analysis of avifaunas in the Teton Mountains and Jackson Hole, Wyoming. Condor 59:373-393.
Salyer, J. C., and K. F. Lagler.
1946. The eastern belted kingfisher, *Megaceryle alcyon alcyon* (Linnaeus), in relation to fish management. Trans. Amer. Fish. Soc. 76:97-117.
Samson, F. B.
1976. Territory, breeding density, and fall departure in Cassin's finch. Auk 93:477-497.

Samuel, D. E.
1971. The breeding biology of barn and cliff swallows in West Virginia. Wilson Bull. 83:284-301.
Sanderson, G.C., and H.C. Shultz, eds.
1973. Wild Turkey management. Proc. Second Natl. Wild Turkey Symp., Columbia, Missouri, 1970. Missouri Chapter of the Wildl. Soc. and Univ. Missouri, Press, Columbia. 355 p.
Sargent, G. I.
1940. Observations on the behavior of color-banded California thrashers. Condor 42:49-60.
Schmidt, R. K.
1969. Behavior of white-tailed ptarmigan in Colorado. M.S. thesis, Colorado State Univ. Library, Fort Collins.
Schnell, J. H.
1958. Nesting behavior and food habits of goshawks in the Sierra Nevada of California. Condor 60:377-403.
Schorger, A. W.
1966. The wild turkey: its history and domestication. 625 p. Univ. Oaklahoma Press, Norman.
Schranz, F. G.
1943. Nest life of the eastern yellow warbler. Auk 60:367-387.
Sealy, S. G.
1974. Ecological segregation of Swainson's and hermit thrushes on Langara Island, British Columbia. Condor 76:350-351.
Selander, R. K.
1954. A systematic review of the booming nighthawks of western North America. Condor 56:57-82.
Seymour, N. R.
1974. Territorial behavior of wild shovelers at Delta, Manitoba. Wildfowl 25:49-55.
Short, L. L.
1974. Habits and interactions of North American three-toed woodpeckers (*Picoides arcticus* and P. *tridactylus*). Amer. Mus. Novitates 2547:1-42.
Sladen, W. J. L., and W. W. Cochran.
1977. Studies of the whistling swan, 1967-1968. Trans. North Amer. Wildl. and Nat. Res. Conf. 34:42-50.
Small, A.
1974. The birds of California. 310 p. Collier Books, New York.
Smith, D. G., and J. R. Murphy
1973. Breeding ecology of raptors in the eastern Great Basin of Utah. Brigham Young Univ. Sci. Bull., Biol. Ser. 19. 76 p.
Smith, D. G., C. R. Wilson, and H. H. Frost.
1974. History and ecology of a colony of barn owls in Utah. Condor 76:131-136.
Smith, W. J.
1966. Communication and relationships in the genus *Tyrannus*. Publ. Nuttall Ornithol. Club 6:1-250.
Snapp, B. D.
1976. Colonial breeding in the barn swallow (*Hirundo rustica*) and its adaptive significance. Condor 78:471-480.
Snow, C.
1972. American peregrine falcon (*Falco peregrinus anatum*) and Arctic peregrine falcon *(Falco peregrinus tundrius*). Habitat Management Series for Endangered Species, U.S. Bur. Land Manage., Tech. Note 167. 35 p.
Snow, C.
1973. Southern bald eagle (*Haliaeetus leucocephalus leucocephalus*) and northern bald eagle (*Haliaeetus leucocephalus alascanus*). Habitat Management Series for Endangered Species, U. S. Bur. Land Manage., Tech. Note 171. 58 p.
Snow, C.
1974. Prairie falcon (*Falco mexicanus*). Habitat Management Series for Endangered Species, U.S. Bur. Land Manage., Tech. Note 240. 18 p.
Snyder, D. E.
1954. Nesting study of red crossbills. Wilson Bull. 66:32-37.
Speake, D. W., T. E. Lynch, J. W. Fleming, G. A. Wright, and W. J. Hamrick.
1975. Habitat use and seasonal movements of wild turkeys in the southeast. *In* Proc. Third Natl. Wild Turkey Symp. L. K. Halls, ed. p. 122-130. Texas Parks and Wildl. Dep.
Spencer, H., Jr.
1953. The cinnamon teal, *Anas cyanoptera* (Vieillot): its life history, ecology and management. M.S. thesis, Utah State Univ. Library, Logan. 184 p.
Stallcup, R., and R. Greenberg.
1974. The nesting season, June 1-July 31, 1974: Middle Pacific Coast Region. Amer. Birds 28(5): 943-947.

Stendell, R. C.
1972. The occurrence, food habits, and nesting strategy of white-tailed kites in relation to a fluctuating vole population. Ph.D. thesis, Univ. Calif. Library, Berkeley.
Stewart, P. A.
1958. Local movements of wood ducks. Auk 75:157-168.
Stewart, R. E.
1949. Ecology of a nesting red-shouldered hawk population. Wilson Bull. 61:26-35.
Stewart, R. E.
1953. A life history study of the yellowthroat. Wilson Bull. 65:99-115.
Stewart, R. M.
1973. Breeding behavior and life history of the Wilson warbler. Wilson Bull. 85:21-30.
Stiles, F. G., III.
1972. Age and sex determination in rufous and Allen hummingbirds. Condor 74:25-32.
Stiles, F. G., III.
1973. Food supply and the annual cycle of the Anna hummingbird. Univ. Calif. Publ. tool. 97:1-109.
Stocek, R. F.
1970. Observations of the breeding biology of the tree swallow. Cassinia 52:3-20.
Stokes, A. W.
1950. Breeding behavior of the goldfinch. Wilson Bull. 62:107-127.
Stout, G. D., ed.
1967. The Shorebirds of North America. 270 p. Viking Press, New York.
Sturman, W. A.
1968a. The foraging ecology of *Parus atricapillus* and *P. rufescens* in the breeding season, with comparisons with other species of *Parus.* Condor 70:309-322.
Sturman, W. A.
1968b. Description and analysis of breeding habitats of the chickadees, *Parus atricapillus* and *P. rufescens.* Ecology 49:418-431.
Summers-Smith, D.
1963. The House Sparrow. 269 p. Collins, St. James Place, London.
Sumner, E. L., Jr.
1935. A life history study of the California quail, with recommendations for its conservation and management. Calif. Fish and Game 21:167-256.
Sumner, L. and J. S. Dixon.
1953. Birds and mammals of the Sierra Nevada, with records from Sequoia and Kings Canyon National Parks. 484 p. Univ. Calif. Press, Berkeley.
Swank, W. G.
1955. Nesting and production of the mourning dove in Texas. Ecology 36:495-505.
Swearingen, E. M.
1977. Group size, sex ratio, reproductive success and territory size in acorn woodpeckers. West. Birds 8:21-24.
Thelander, C. G.
1973. Bald eagle reproduction in California, 1972-1973. Calif. Dep. Fish and Game, Wildl. Manage. Branch Admin. Rep. 73-5. 17 p.
Thelander, C. G.
1974. Nesting territory utilization by golden eagles (*Aquila chrysaetos*) in California during 1974. State of Calif. Res. Agency, Dep. Fish and Game, Project W-54-R-6. 18 p.
Thelander, C. G.
1975. Distribution and reproductive success of peregrine falcons (*Falco peregrinus anatum*) in California during 1975. Calif. Dep. Fish and Game, Wildl. Manage. Branch Admin. Rep. 75-6. 12 p.
Thelander, C. G.
1976. Distribution and reproductive success of peregrine falcons (*Falco peregrinus anatum*) in California during 1975 and 1976. Calif. Dep. Fish and Game, Wildl. Manage. Branch Admin. Rep. 76-3. 13 p.
Thomas, C. H.
1954. Management implications of the social and spatial behavior of wild turkeys. Oklahoma Coop. Wildl. Res. Unit. Quart. Prog. Rep. 7:4-11.
Thompson, C. F., and V. Nolan, Jr.
1973. Population biology of the yellow-breasted chat (*Icteria virens* L.) in southern Indiana. Ecol. Monogr. 43:145-171.
Thompson, W. L.
1960. Agnostic behavior in the house finch, Part 1: annual cycle and display patterns. Condor 62:245-271.
Thomsen, L.
1971. Behavior and ecology of burrowing owls at the Oakland Municipal Airport. Condor 73:177-192.

Thut, R. N.
1970. Feeding habits of the dipper in southwestern Washington. Condor 72:234-235.
Tomback, D. F.
1977. The behavioral ecology of the Clark's nutcracker (*Nucifraga columbiana*) in the eastern Sierra Nevada. Ph.D. thesis, Univ. Calif. Library, Santa Barbara. 207 p.
Tomlinson, R. E., H. M. Wight, and T. S. Baskett.
1960. Migrational homing, local movement, and mortality of mourning doves in Missouri. Trans. North Amer. Wildl. and Nat. Res. Conf. 25:253-267.
Tramontano, J. P.
1964. Comparative studies of the rock wren and the canyon wren. M.S. thesis, Univ. Arizona Library, Tucson. 59 p.
Tramontano, J. P.
1971. Summer foraging behavior of sympatric Arizona grassland sparrows. Ph.D. thesis, Univ. Arizona Library, Tucson. 82 p.
Trauger, D. L.
1971. Population ecology of lesser scaup (*Aythya affinis*) in subarctic taiga. Ph.D. thesis, Iowa State Univ. Library, Ames. 118 p.
Trefethen, J. B. (ed.).
1966. Wood duck management and research: a symposium. Theme: emphasizing management of forests for wood ducks. Wildl. Manage. Inst. 212 p.
Trimble, S. A.
1975. Merlin (*Falco columbarius*). Habitat Management Series for Endangered Species, U.S. Bur. Land Manage., Tech. Note 271, 41 p.
Tuck, L. M.
1972. The snipes: a study of the genus *Capella*. Can. Wildl. Serv., Ottawa. 429 p.
Tvrdik, G. M.
1971. Pendulum display by the olive-sided flycatcher. Auk 88:174.
Twining, H.
1938. The significance of combat in male rosy finches. Condor 40:246-247.
Twining, H.
1940. Foraging behavior and survival in the Sierra Nevada rosy finch. Condor 42:64-72.
Tyrell, W. B.
1945. A study of the northern raven. Auk 62:1-7.
Van Camp, L. F., and C. F. Henry.
1975. The screech owl: its life history and population ecology in northern Ohio. North Amer. Fauna 71. U.S. Fish and Wildl. Serv. 65 p.
Van Fleet, C. C.
1919. A short paper on the Hutton vireo. Condor 21:162-165.
Verbeek, N. A. M.
1967. Breeding biology and ecology of the horned lark in alpine tundra. Wilson Bull. 79:208-218.
Verbeek, N. A. M.
1970. Breeding ecology of the water pipit. Auk 87:425-451.
Verbeek, N. A. M.
1972. Daily and annual time budget of the yellow-billed magpie. Auk 89:567-582.
Verbeek, N. A. M.
1973. The exploitation system of the yellow-billed magpie. Univ. Calif. Publ. Zool. 99:1-58.
Verbeek, N. A. M.
1975. Comparative feeding behavior of three coexisting Tyrannid flycatchers. Wilson Bull. 87:231-240.
Vermeer, K.
1970. Breeding biology of California and ring-billed gulls. Can. Wildl. Serv. Rep. Set. 12. 52 p.
Verner, J.
1965. Breeding biology of the long-billed marsh wren. Condor 67:6-30.
Verner, J.
1978. California condors: status of the recovery effort. Gen. Tech. Rep. PSW-28, 30 p., illus. Pacific Southwest Forest and Range Exp. Stn., Forest Serv., U. S. Dep. Agric., Berkeley, Calif.
Waian, L. B., and R. C. Stendell.
1970. The white-tailed kite in California with observations of the Santa Barbara population. Calif. Fish and Game 56:188-198.
Walcheck, K. C.
1970. Nesting bird ecology of four plant communities in the Missouri River Breaks, Montana. Wilson Bull. 82:370-382.
Walkinshaw, L. H.
1937. The Virginia rail in Michigan. Auk 54:464-475.
Walsberg, G. E.
1977. Ecology and energetics of contrasting social systems in *Phainopepla nitens* (Aves: Ptilogonatidae). Univ. Calif. Publ. Zool. 108:1-63.

Wattel, J.
1973. Geographic differentiation in the genus *Accipiter*. Publ. Nuttall Ornithol. Club 13:1-231.
Weaver, R. L.
1939. Winter observations and a study of the nesting of English sparrows. Bird-Banding 10:73-79.
Weaver, R. L., and F. H. West.
1943. Notes on the breeding of the pine siskin. Auk 60:492-504.
Welsh, D. A.
1975. Savannah sparrow breeding and territoriality on a Nova Scotia dune beach. Auk 92:23 5-2 51.
Welter, W. A.
1935. The natural history of the long-billed marsh wren. Wilson Bull. 47:1-34.
Weston, H. G., Jr.
1947. Breeding behavior of the black-headed grosbeak. Condor 49:54-73.
Whedon, A. D.
1938. Nesting behavior of kingbirds. Wilson Bull. 50:288-289.
White, H. C.
1953. The eastern belted kingfisher in the Maritime Provinces. Fish. Res. Board Can. Bull. 97. 44 p.
White, J. M.
1973. Breeding biology and feeding patterns of the Oregon junco in two Sierra Nevada habitats. M.S. thesis, Univ. Calif. Library, Berkeley. 130 p.
Wiens, J. A.
1973. Interterritorial habitat variation in grasshopper and savannah sparrows. Ecology 54:877-884.
Wilbur, S. R.
1973. The red-shouldered hawk in the western United States. West. Birds 4:15-22.
Wilbur, S. R.
1976. The status of the California condor, 1972-1975. Arner. Birds 30:789-790
Wilbur, S. R.
1978. The California Condor, 1966-76: A look at its past and future. North American Fauna, 72. U.S. Dep. Inter. Fish and Wildl. Serv., Washington, D.C. 136 p.
Wilburn, J. W.
1971. Lincoln great blue heron rookery study, 1970-1971. Calif. Dep. Fish and Game Spec. Wildl. Invest. 17 p.
Wiley, J. W.
1975. The nesting and reproductive success of red-tailed hawks and red-shouldered hawks in Orange County, California, 1973. Condor 77:133-139.
Williams, C. S., and C. A. Sooter.
1940. Canada goose habitats in Utah and Oregon. Trans. North Amer. Wildl. Conf. 5:383-387.
Williams, L.
1942. Interrelations in a nesting group of four species of birds. Wilson Bull. 54:238-249.
Williams, L.
1952. Breeding behavior of the Brewer blackbird. Condor 54:3-47.
Williamson, F. S. L.
1956. The molt and testis cycles of the Anna hummingbird. Condor 58:342-366.
Willson, M. F.
1966. Breeding ecology of the yellow-headed blackbird. Ecol. Monogr. 36:51-77.
Willson, M. F., and G. H. Orians.
1963. Comparative ecology of red-winged and yellow-headed blackbirds during the breeding season. Proc. 16th Int. Congr. Zool. 3:342-346.
Winter, J.
1974. The distribution of the flammulated owl in California. West. Birds 5:25-44.
Young, H.
1951. Territorial behavior in the eastern robin. Proc. Linnean Soc. New York 58-62:1-37.
Zarn, M.
1974. Burrowing owl (*Speotyto cunicularis hypugea*). Habitat Management Series for Endangered Species, U.S. Bur. Land Manage. Tech. Note 250. 25 p.

Mammals

Marshall White, Reginald H. Barrett, Allan S. Bass, Thomas F. Newman, Thomas J. Rahn, and Daniel F. Williams

This chapter offers information on the status, distribution by habitat, and basic life history of 94 species of mammals inhabiting the western Sierra Nevada. These data were drawn primarily from the literature, much of which consists of reports of studies conducted in areas outside of the Sierra Nevada. Additional information was provided by the field experience of the professional mammalogists involved with the project.

Determinations made about habitat selection, food habits, breeding season, and distribution are generally based upon limited studies or even general impressions of the species elsewhere. For a few species, no life history data were available. For most others, there were few or no data on habitat selection by successional stage or canopy cover, or on microhabitat requirements within the more general habitats of the Sierra Nevada. Life history information on most of the species of bats is especially scanty, and the determinations made beyond are largely unsupported by field studies. Thus, in large part, this work should be viewed as the starting point. It presents a series of hypotheses about habitat requirements that must ultimately be tested by detailed field studies.

Few mammal species of the western Sierra Nevada have "official listed status" (the wolverine and mountain sheep are designated as Rare by the State of California). Some other species are, however, fully protected, and may not be killed or captured except under special permit from the California Department of Fish and Game. Several species are classified by the California Department of Fish and Game as game species or as furbearers, and their capture is regulated by license, season, bag limits, and locality. Finally, those species without special status (above), which include the majority of small, nongame mammals, may be captured only under authority of a special scientific collecting permit or a hunting license.

The scientific and common names for the mammals are those of Jones *et al.* (1975). Departures from that list represent taxonomic changes made since its publication. The species are arranged in phylogenetic order and numbered in sequence, with the prefix "M", for purposes of internal cross-referencing and computer access coding.



Species List

M001 Opossum
Didelphis virginiana

M002 Mount Lyell Shrew
Sorex lyelli

M003 Vagrant Shrew
Sorex vagrans

M004 Dusky Shrew
Sorex monticolus

M005 Ornate Shrew
Sorex ornatus

M006 Water Shrew
Sorex palustris

M007 Trowbridge's Shrew
Sorex trowbridgii

M008 Shrew-mole
Neurotrichus gibbsii

M009 Broad-footed Mole
Scapanus latimanus

M010 Little Brown Myotis
Myotis lucifugus

M011 Yuma Myotis
Myotis yumanensis

M012 Long-eared Myotis
Myotis evotis

M013 Fringed Myotis
Myotis thysanodes

M014 Long-legged Myotis
Myotis volans

M015 California Myotis
Myotis californicus

M016 Small-footed Myotis
Myotis leibii

M017 Silver-haired Bat
Lasionycteris noctivagans

M018 Western Pipistrelle
Pipistrellus hesperus

M019 Big Brown Bat
Eptesicus fuscus

M020 Red Bat
Lasiurus borealis

M021 Hoary Bat
Lasiurus cinereus

M022 Spotted Bat
Euderma maculatum

M023 Townsend's Big-eared Bat
Plecotus townsendii

M024 Pallid Bat
Antrozous pallidus

M025 Brazilian Free-tailed Bat
Tadarida brasiliensis

M026 Pika
Ochotona princeps

M027 Brush Rabbit
Sylvilagus bachmani

M028 Desert Cottontail
Sylvilagus audubonii

M029 Snowshoe Hare
Lepus americanus

M030 White-tailed Jackrabbit
Lepus townsendii

M031 Black-tailed Jackrabbit
Lepus californicus

M032 Mountain Beaver
Aplodontia rufa

M033 Alpine Chipmunk
Eutamias alpinus

M034 Least Chipmunk
Eutamias minimus

M035 Yellow Pine Chipmunk
Eutamias amoenus

M036 Allen's Chipmunk
Eutamias senex

M037 Sonoma Chipmunk
Eutamias sonomae

M038 Merriam's Chipmunk
Eutamias merriami

M039 Long-eared Chipmunk
Eutamias quadrimaculatus

M040 Lodgepole Chipmunk
Eutamias speciosus

M041 Yellow-bellied Marmot
Marmota flaviventris

M042 Belding's Ground Squirrel
Spermophilus beldingi

M043 California Ground Squirrel
Spermophilus beecheyi

M044 Golden-mantled Ground Squirrel
Spermophilus lateralis

M045 Western Gray Squirrel
Sciurus griseus

M046 Douglas' Squirrel
Tamiasciurus douglasii

M047 Northern Flying Squirrel
Glaucomys sabrinus

M048 Botta's Pocket Gopher
Thomomys bottae

M049 Mountain Pocket Gopher
Thomomys monticola

M050 Little Pocket Mouse
Perognathus longimembris

M051 Great Basin Pocket Mouse
Perognathus parvus

M052 Yellow-eared Pocket Mouse
Perognathus xanthonotus

M053 California Pocket Mouse
Perognathus californicus

M054 Heermann's Kangaroo Rat
Dipodomys heermanni

M055 California Kangaroo Rat
Dipodomys californicus

M056 Beaver
Castor canadensis

M057 Western Harvest Mouse
Reithrodontomys megalotis

M058 California Mouse
Peromyscus californicus

M059 Deer Mouse
Peromyscus maniculatus

M060 Brush Mouse
Peromyscus boylii

M061 Piñon Mouse
Peromyscus truei

M062 Dusky-footed Woodrat
Neotoma fuscipes

M063 Bushy-tailed Woodrat
Neotoma cinerea

M064 Western Red-backed Vole
Clethrionomys occidentalis

M065 Heather Vole
Phenacomys intermedius

M066 Montane Vole
Microtus montanus

M067 California Vole
Microtus californicus

M068 Long-tailed Vole
Microtus longicaudus

M069 Muskrat
Ondatra zibethicus

M070 Western Jumping Mouse
Zapus princeps

M071 Porcupine
Erethizon dorsatum

M072 Coyote
Canis latrans

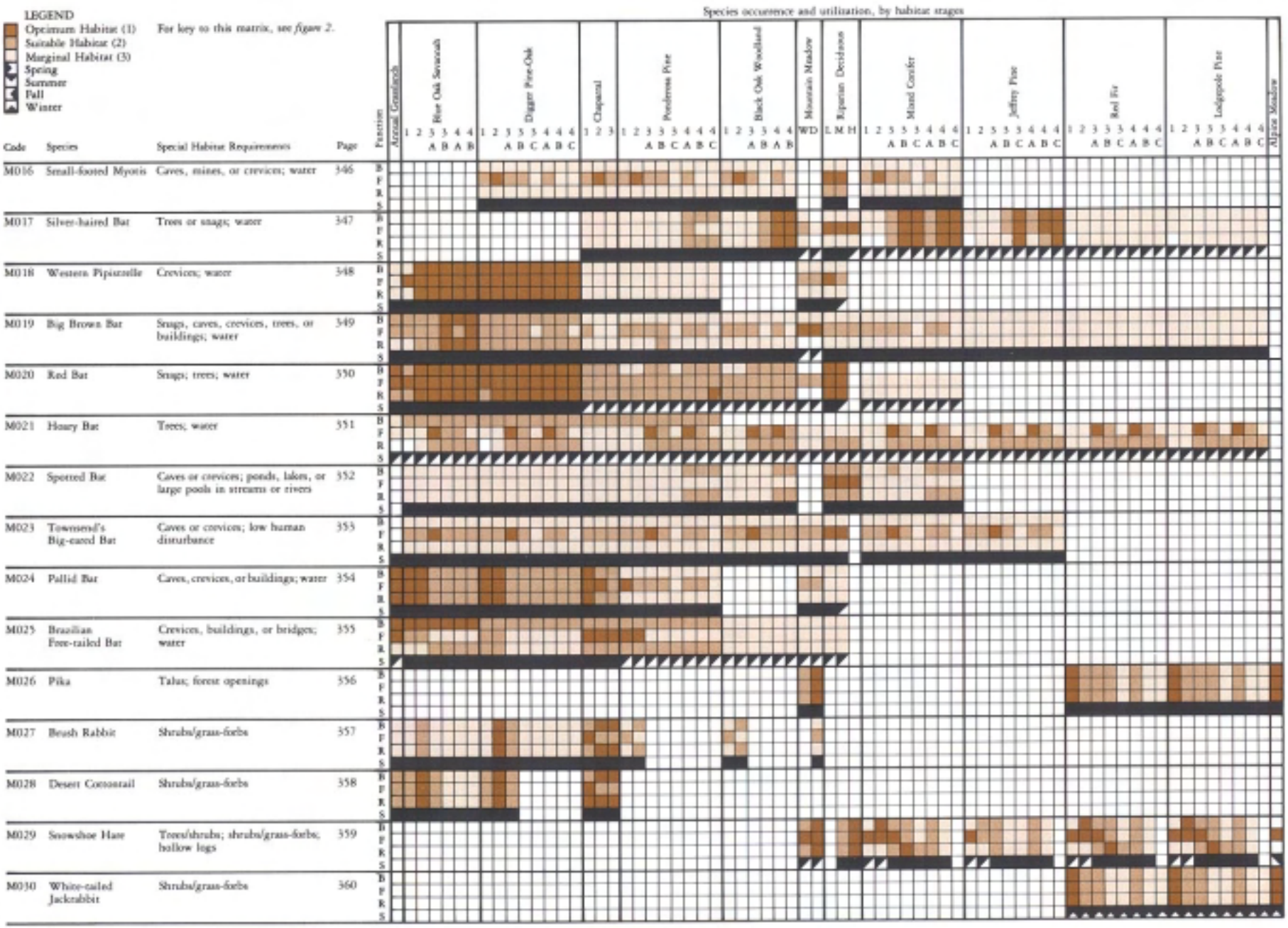
M073 Red Fox
Vulpes vulpes
M074 Gray Fox
Urocyon cinereoargenteus
M075 Black Bear
Ursus americanus
M076 Ringtail
Bassariscus astutus
M077 Raccoon
Procyon lotor
M078 Marten
Martes americana
M079 Fisher
Martes pennanti
M080 Ermine
Mustela erminea
M081 Long-tailed Weasel
Mustela frenata
M082 Mink
Mustela vison
M083 Wolverine
Gulo gulo
M084 Badger
Taxidea taxus
M085 Western Spotted Skunk
Spilogale gracilis
M086 Striped Skunk
Mephitis mephitis
M087 River Otter
Lutra canadensis
M088 Mountain Lion
Felis concolor
M089 Bobcat
Felis rufus
M090 Wild Horse
Equus caballus
M091 Wild Pig
Sus scrofa
M092 Wapiti
Cervus elaphus
M093 Mule Deer
Odocoileus hemionus
M094 Mountain Sheep
Ovis canadensis

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
Summer
Fall
Winter

For key to this matrix, see *figure 2*.

Species occurrence and utilization, by habitat stages

Code	Species	Special Habitat Requirements	Page	Function	Annual Grasslands 1	Blue Oak Savannah 2 3 3 4 4 4 A B A B	Digger Pine-Oak 1 2 3 5 3 4 4 4 A B C A B C	Chaparral 1 2 3	Ponderosa Pine 1 2 3 3 3 4 4 4 A B C A B C	Black Oak Woodland 1 2 3 3 4 4 4 A B A B	Mountain Meadow WD	Riparian Deciduous L M H	Mixed Conifer 1 2 3 3 3 4 4 4 A B C A B C	Jeffrey Pine 1 2 3 3 3 4 4 4 A B C A B C	Red Fir 1 2 3 3 3 4 4 4 A B C A B C	Lodgepole Pine 1 2 3 3 3 4 4 4 A B C A B C	Alpine Meadow
M001	Virginia Opossum		331	B F R S													
M002	Mt. Lyell Shrew	Moist soil	332	B F R S													
M003	Vagrant Shrew	Moist soil; stumps, logs, or litter	333	B F R S													
M004	Dusky Shrew	Moist soil; stumps, logs, or litter	334	B F R S													
M005	Ornate Shrew	Moist soil; stumps, logs, or litter	335	B F R S													
M006	Water Shrew	Clear, cold streams	336	B F R S													
M007	Trowbridge's Shrew	Stumps, logs, or litter	337	B F R S													
M008	Shrew-Mole	Friable soils; litter, rotting logs, or stumps	338	B F R S													
M009	Broad-footed Mole	Forest openings; moist, friable soil	339	B F R S													
M010	Little Brown Myotis	Snags; caves; permanent pools, ponds, or lakes	340	B F R S													
M011	Yuma Myotis	Permanent pools, ponds or lakes; caves, crevices, or snags	341	B F R S													
M012	Long-eared Myotis	Caves, snags, or trees; water	342	B F R S													
M013	Fringed Myotis	Caves or rock crevices; water	343	B F R S													
M014	Long-legged Myotis	Trees, snags, or crevices; water	344	B F R S													
M015	California Myotis	Crevices; water	345	B F R S													

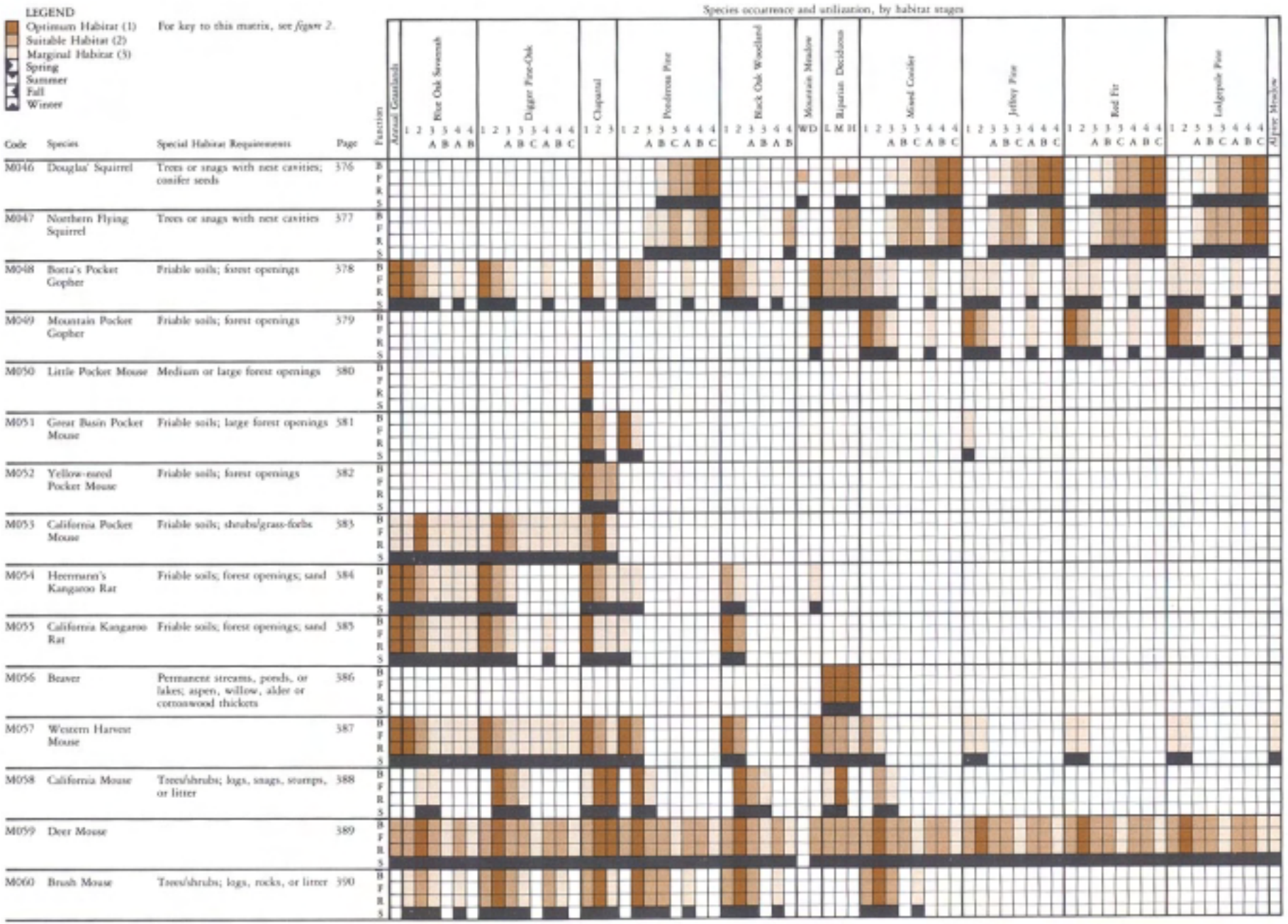

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
Summer
Fall
Winter
For key to this matrix, see figure 2.
Species occurrence and utilization, by habitat stages
Function
Aerial Grasslands
Blue Oak Savannah
Digger Pine-Oak
Chaparral
Ponderosa Pine
Black Oak Woodland
Mountain Meadow
Riparian Deciduous
Mixed Conifer
Jeffrey Pine
Red Fir
Lodgepole Pine
Alpine Meadow
Code
Species
Special Habitat Requirements
Page
M016 Small-footed Myotis Caves, mines, or crevices; water 346
M017 Silver-haired Bat Trees or snags; water 347
M018 Western Pipistrelle Crevices; water 348
M019 Big Brown Bat Snags, caves, crevices, trees, or buildings; water 349
M020 Red Bat Snags; trees; water 350
M021 Hoary Bat Trees; water 351
M022 Spotted Bat Caves or crevices; ponds, lakes, or large pools in streams or rivers 352
M023 Townsend's Big-eared Bat Caves or crevices; low human disturbance 353
M024 Pallid Bat Caves, crevices, or buildings; water 354
M025 Brazilian Free-tailed Bat Crevices, buildings, or bridges; water 355
M026 Pika Talus; forest openings 356
M027 Brush Rabbit Shrubs/grass-forbs 357
M028 Desert Cottontail Shrubs/grass-forbs 358
M029 Snowshoe Hare Trees/shrubs; shrubs/grass-forbs; hollow logs 359
M030 White-tailed Jackrabbit Shrubs/grass-forbs 360

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
Summer
Fall
Winter

For key to this matrix, see *figure 2*.

Species occurrence and utilization, by habitat stages

Code	Species	Special Habitat Requirements	Page
M031	Black-tailed Jackrabbit	Medium or large forest openings	361
M032	Mountain Beaver	Trees/grass-forbs; moist soil	362
M033	Alpine Chipmunk	Talus; logs	363
M034	Least Chipmunk	Large forest openings; stumps, logs, or rocks; shrubs	364
M035	Yellow Pine Chipmunk	Trees/shrubs	365
M036	Allen's Chipmunk	Trees/shrubs; logs, stumps, snags, rocks, or litter	366
M037	Sonoma Chipmunk	Trees/shrubs; logs, stumps, snags, rocks, or litter	367
M038	Merriam's Chipmunk	Trees/shrubs, logs, stumps, snags, rocks, or litter	368
M039	Long-eared Chipmunk	Logs, stumps, snags, rocks, or litter	369
M040	Lodgepole Chipmunk	Trees/shrubs; snags, logs, stumps, rocks, or litter	370
M041	Yellow-bellied Marmot	Talus or rock outcrops; forest openings	371
M042	Belding's Ground Squirrel	Forest openings; friable soils	372
M043	California Ground Squirrel	Forest openings; friable soils	373
M044	Golden-mantled Ground Squirrel	Logs, stumps, or rocks	374
M045	Western Gray Squirrel	Nest cavities in snags or trees; oaks	375


LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
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Summer
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Winter
For key to this matrix, see figure 2.
Species occurrence and utilization, by habitat stages
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Blue Oak Savannah
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Jeffrey Pine
Red Fir
Lodgepole Pine
Alpine Meadow
Code
Species
Special Habitat Requirements
Page
M046 Douglas' Squirrel Trees or snags with nest cavities; conifer seeds 376
M047 Northern Flying Squirrel Trees or snags with nest cavities 377
M048 Botta's Pocket Gopher Friable soils; forest openings 378
M049 Mountain Pocket Gopher Friable soils; forest openings 379
M050 Little Pocket Mouse Medium or large forest openings 380
M051 Great Basin Pocket Mouse Friable soils; large forest openings 381
M052 Yellow-eared Pocket Mouse Friable soils; forest openings 382
M053 California Pocket Mouse Friable soils; shrubs/grass-forbs 383
M054 Heermann's Kangaroo Rat Friable soils; forest openings; sand 384
M055 California Kangaroo Rat Friable soils; forest openings; sand 385
M056 Beaver Permanent streams, ponds, or lakes; aspen, willow, alder or cottonwood thickets 386
M057 Western Harvest Mouse 387
M058 California Mouse Trees/shrubs; logs, snags, stumps, or litter 388
M059 Deer Mouse 389
M060 Brush Mouse Trees/shrubs; logs, rocks, or litter 390

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
Summer
Fall
Winter

For key to this matrix, see *figure 2*.

Species occurrence and utilization, by habitat stages

Code	Species	Special Habitat Requirements	Page
M061	Pinon Mouse	Trees/shrubs, small trees; rock outcrops or talus	391
M062	Dusky-footed Woodrat	Trees/shrubs; litter	392
M063	Bushy-tailed Woodrat	Talus or rock outcrops	393
M064	Western Red-backed Vole	Logs, snags, stumps, or litter	394
M065	Heather Vole		395
M066	Montane Vole	Grasses and/or sedges	396
M067	California Vole	Grasses and/or sedges	397
M068	Long-tailed Vole	Grasses, sedges, and/or forbs	398
M069	Muskrat	Permanent streams, ponds or lakes; grasses and/or sedges	399
M070	Western Jumping Mouse	Moist soil	400
M071	Porcupine	Trees/shrubs or trees/grass-forbs	401
M072	Coyote	Caves, hollows, talus, rock outcrops, or friable soils	402
M073	Red Fox	Caves, hollows, talus, rock outcrops, or friable soil; forest openings	403
M074	Gray Fox	Caves, hollows, talus, rock outcrops, or friable soils	404
M075	Black Bear	Caves, talus, hollows	405

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
Spring
Summer
Fall
Winter

For key to this matrix, see *figure 2*.

Species occurrence and utilization, by habitat stages.

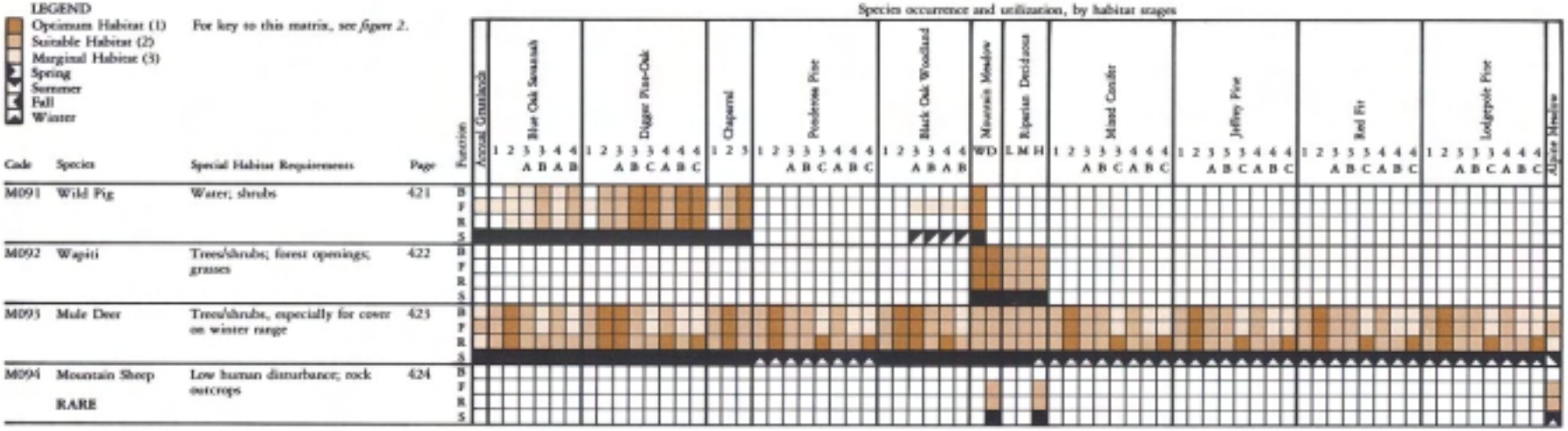
Code	Species	Special Habitat Requirements	Page
M076	Ringtail	Rock outcrops or hollows	406
M077	Raccoon	Snags or hollows; water	407
M078	Marten	Snags; talus	408
M079	Fisher	Snags or hollows	409
M080	Ermine	Litter, logs, stumps, or snags; forest openings	410
M081	Long-tailed Weasel	Forest openings; logs, stumps, or burrows	411
M082	Mink	Permanent streams, ponds or lakes; earthen banks	412
M083	Wolverine RARE	Low human disturbance, talus, rock outcrops, caves, logs, or snags	413
M084	Badger	Forest openings; friable soils	414
M085	Western Spotted Skunk	Logs, talus, rock outcrops, or snags	415
M086	Striped Skunk	Logs, talus, rock outcrops, or snags	416
M087	River Otter	Permanent streams, rivers, or lakes	417
M088	Mountain Lion	Deer for food; den sites in rock outcrops, talus, or caves	418
M089	Bobcat	Rock outcrops, talus, caves, or hollow logs	419
M090	Wild Horse	Grasses; water	420

LEGEND
Optimum Habitat (1)
Suitable Habitat (2)
Marginal Habitat (3)
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Summer
Fall
Winter

For key to this matrix, see *figure 2*.

Species occurrence and utilization, by habitat stages

Code	Species	Special Habitat Requirements	Page	Function
M091	Wild Pig	Water; shrubs	421	B F R S
M092	Wapiti	Trees/shrubs; forest openings; grasses	422	B F R S
M093	Mule Deer	Trees/shrubs, especially for cover on winter range	423	B F R S
M094	Mountain Sheep **RARE**	Low human disturbance; rock outcrops	424	B F R S



Opossum

M001 (*Didelphis virginiana*)

STATUS: No official listed status. Believed expanding its range northward.

DISTRIBUTION/HABITAT: Widespread in valleys and foothills of California. Frequents moist riparian areas in early successional stages of habitats containing oaks. Usually found around buildings, culverts, rock piles, and in trees and snags.

SPECIAL HABITAT REQUIREMENTS:

BREEDING: Breeds from January to October, with peaks in February and June; may have two or three litters per year. Nests in trees or snags, rock piles, under buildings, downed logs, or brush piles. Litter size from 5 to 14, (mean of 8). Gestation. period 14 days; young carried in pouch 2 months, later ride on mother's back.

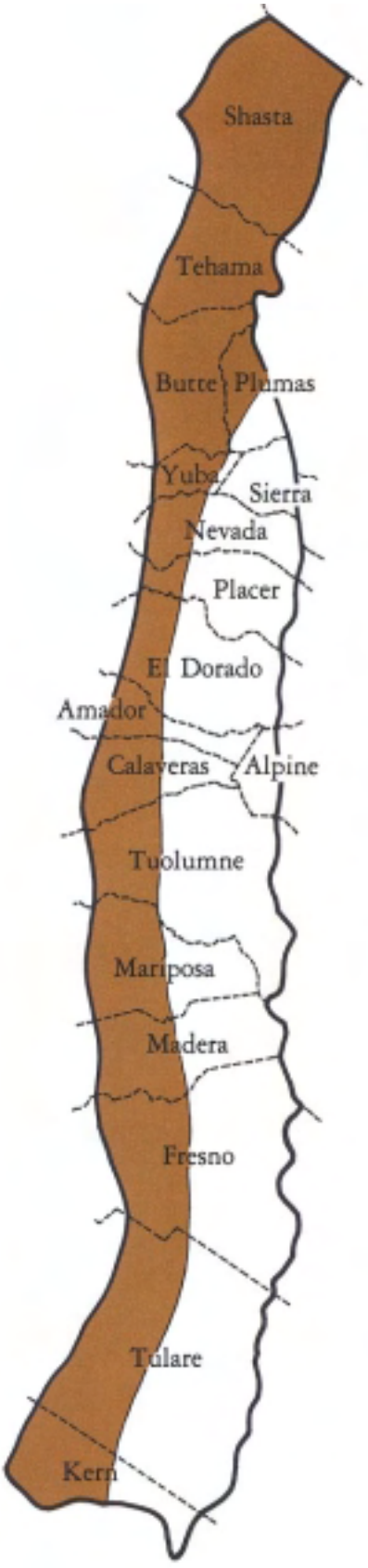
TERRITORY/HOME RANGE: Little information on territory, but believed not to be territorial. Home ranges vary from less than 2.5 to 57 acres (1 to 23 ha) (mean 10 to 12 acres [4 to 5 ha]). Often follows water courses; may range widely in fall.

FOOD HABITS: Eats variety of foods including insects, carrion, small mammals, eggs, fruits, and grains. Feeds primarily at night, gleaning from ground and in bushes and trees. May also feed during day.

OTHER: Introduced into California in 1910; the only marsupial in the United States.

REFERENCES: Lay 1942, Petrides 1949, Ingles 1965, and McManus 1974.





Mount Lyell Shrew

M002 (*Sorex lyelli*)

STATUS: No official listed status. Some sources refer to as rare.

DISTRIBUTION/HABITAT: Limited to areas within or near Yosemite National Park, in vicinity of Mt. Lyell. Favors riparian areas and other wet sites.

SPECIAL HABITAT REQUIREMENTS: Moist Soil.

BREEDING: No information; probably breeding similar to that of dusky shrew.

TERRITORY/HOME RANGE: No information, but probably similar to dusky shrew.

FOOD HABITS: No information available, but probably eats insects and other invertebrates. Probably forages on ground and in rotted stumps and logs.

OTHER: Essentially no published information on biology of species. Closely related to the masked shrew (*Sorex cinereus*).

REFERENCES: Grinnell and Storer 1924, Ingles 1965.





Vagrant Shrew

M003 (*Sorex vagrans*)

STATUS: No official listed status. Most common shrew in mid-elevations of the western Sierra Nevada.

DISTRIBUTION/HABITAT: Found from middle to high elevations of the Sierra Nevada, in and around riparian areas.

SPECIAL HABITAT REQUIREMENTS: Moist soil; rotted logs, stumps, or litter.

BREEDING: Breeds from January to August, with peak from March to May. Litter size from 2 to 9 (mean of 6). Normally one litter per year, sometimes two. Nests in stumps and logs.

TERRITORY/HOME RANGE: Possibly territorial, but no information available. Home range small, varying from 0.007 to 0.2 acre (0.003 to 0.07 ha) (average 0.1 acre [0.04 ha]). Home range sizes vary with age of animal and season, and are probably shaped to follow riparian areas.

FOOD HABITS: Eats insects, spiders, earthworms, other invertebrates, and some plant material. Forages through ground litter, under vegetation, and beneath logs, stumps, and rocks. Consumes food equal to own weight each day.

OTHER: Solitary and secretive; active all year, and intermittently day and night.

REFERENCES: Clothier 1955; Ingles 1961, 1965; Hawes 1977; Terry 1978.





Dusky Shrew

M004 (*Sorex monticolus*)

STATUS: No official listed status. Common at high elevations in the western Sierra Nevada.

DISTRIBUTION/HABITAT: Closely associated with riparian habitats in Jeffrey pine, red fir, and lodgepole pine habitats. Rarely found more than a few meters from water in summer.

SPECIAL HABITAT REQUIREMENTS: Moist Soil; stumps, logs, or litter.

BREEDING: Breeds from February through October, with peak in late spring or early summer. Litter size from 4 to 7 (mean of 5). Usually two or more litters per year. Nests in logs, stumps, litter, or in holes in ground.

TERRITORY/HOME RANGE: No data on territory available. Home range varies with age of animal and season from 0.007 to 0.2 acre (0.003 to 0.07 ha) (mean of 0.1 acre [0.04 ha]).

FOOD HABITS: Eats insects, spiders, other invertebrates, and some plant matter. Feeds by searching wet areas, logs and stumps, and plant cover.

OTHER: Solitary and secretive, active throughout the year, and intermittently day and night.

REFERENCES: Ingles 1960, 1965; Hawes 1977.





Ornate Shrew

M005 (*Sorex ornatus*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Found at lower elevations, with optimum habitats in riparian areas and brushy hillsides of the digger pine-oak, chaparral, and yellow pine communities. Fairly widespread in the central Sierra Nevada, and found in a small area north of Kern Gap.

SPECIAL HABITAT REQUIREMENTS: Moist soil; stumps, logs, or litter.

BREEDING: Breeds from spring to summer, but little information available. Nests in dead wood, brush, and burrows.

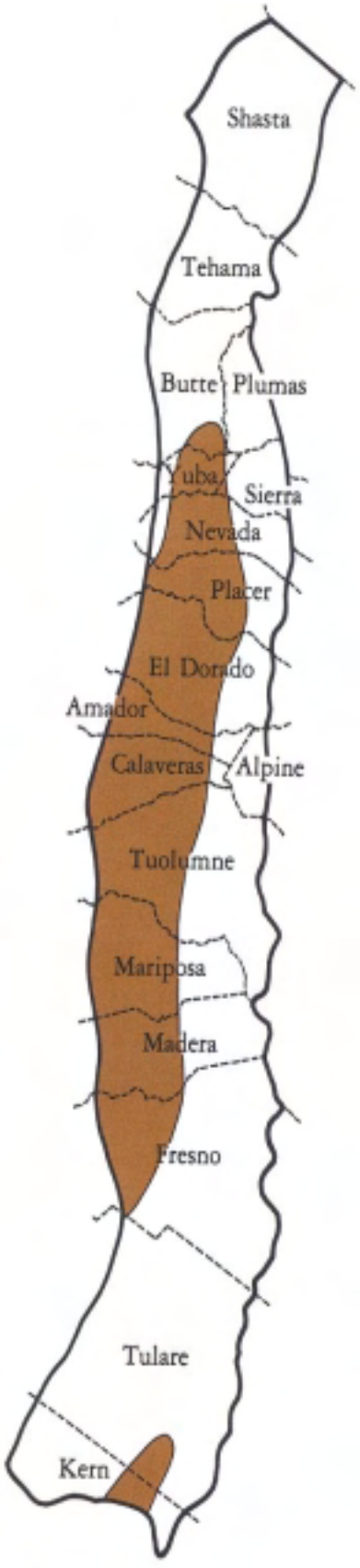
TERRITORY/HOME RANGE: Litter size thought to average about 6. More than one litter per year expected, but no data available.

FOOD HABITS: Feeds on insects and other invertebrates; searches in riparian areas under logs and rocks and in leaf litter.

OTHER: A solitary, secretive animal, active all year, and intermittently day and night.

REFERENCES: Ingles 1965.





Water Shrew

M006 (*Sorex palustris*)

STATUS: No official listed status. Common within its restricted habitat; adversely affected by stream silting and increased turbidity.

DISTRIBUTION/HABITAT: Found in riparian areas at middle and high elevations in the Sierra Nevada. Requires small, cold streams and wet areas with protected stream banks and ground cover.

SPECIAL HABITAT REQUIREMENTS: Clear, cold streams.

BREEDING: Breeds from January to July, with peak in April to June. May have more than one litter per year. Litter size from 5 to 8 (mean of 6). Nests in secluded, protected banks often constructed of moss and near water.

TERRITORY/HOME RANGE: Little information available, but not territorial in captivity. Home range small and closely associated with a stream or wet area.

FOOD HABITS: Forages along streambanks, water edges, and in water. Foods include insects, tadpoles, fish eggs, invertebrates, and fish.

OTHER: Active all year, intermittently day and night.

REFERENCES: Conaway 1952, Sorenson 1962, Ingles 1965.





Trowbridge's Shrew

M007 (*Sorex trowbridgii*)

STATUS: No official listed status. Common and widespread.

DISTRIBUTION/HABITAT: Found throughout the length of the Sierra Nevada in mid-elevation habitats in both dry and wet areas. Optimum habitats in the more mature tree stages of ponderosa pine and mixed-conifer forests.

SPECIAL HABITAT REQUIREMENTS: Stumps, logs, or litter required as nesting and foraging sites.

BREEDING: Breeds from February to June, with peak from March to May. Litter size from 1 to 6 (mean of 5). More than one litter per year. Nests in or under logs, or in shallow holes in the ground.

TERRITORY/HOME RANGE: No information available on territory or home range.

FOOD HABITS: Eats much plant material, especially seeds, as well as insects and other invertebrates. Searches for food on ground, primarily near wet areas; forages in upland sites with tree cover.

OTHER: Like other shrews, secretive and solitary. Individuals active intermittently day and night throughout year.

REFERENCES: Jameson 1955, Tevis 1956, Ingles 1965.





Shrew-mole

M008 (*Neurotrichus gibbsii*)

STATUS: No official listed status. A rare species of local distribution in northern part of the western Sierra Nevada.

DISTRIBUTION/HABITAT: Recorded from a single locality within the western Sierra Nevada (Hall and Kelson 1959). Also known from Mt. Shasta area. Found in damp to wet, shaded ravines with silty soil of high humus content and accumulation of litter on surface. Also found in litter on forest floor and along margins of protected marshes, swamps, and bogs.

SPECIAL HABITAT REQUIREMENTS: Friable soils of high humus content; damp, protected sites with cover of surface litter, rotting logs or stumps, or ravines with deciduous growth.

BREEDING: In western Washington, breeds from at least February to September, with peak between March and May. Number of litters not known. Litter size ranges from 1 to 4 (mean of 3). Gestation period and other aspects of reproduction unknown.

TERRITORY/HOME RANGE: Apparently not territorial; the size of home ranges unknown. Gregarious and apparently travel in loose bands of up to 11 or more individuals (Dalquest and Orcutt 1942). Under normal conditions in good habitat, population density averages about 5 or 6 individuals per acre (0.4 ha).

FOOD HABITS: Eats variety of small animals, including earthworms, isopods, various insects, slugs, spiders, and centipedes. Searches for food on ground, within decaying logs, and beneath and within surface litter. Captive individuals ate variety of seeds, including those of conifers and several herbs and shrubs, and several types of fungi. Captive individuals consumed up to 14 g of earthworms in 12 hours (average body weight about 10 g) (Terry 1978).

OTHER: Probably more widespread in the northern Sierra Nevada than indicated by extant records.

REFERENCES: Dalquest and Orcutt 1942, Williams 1975, Terry 1978.





Broad-footed Mole

M009 (*Scapanus latimanus*)

STATUS: No official listed status. Common in suitable habitats.

DISTRIBUTION/HABITAT: Widespread at all elevations throughout the Sierra Nevada. Favors moist areas, especially near streams, bogs, and meadows.

SPECIAL HABITAT REQUIREMENTS: Moist areas with friable soils for burrowing; forest openings.

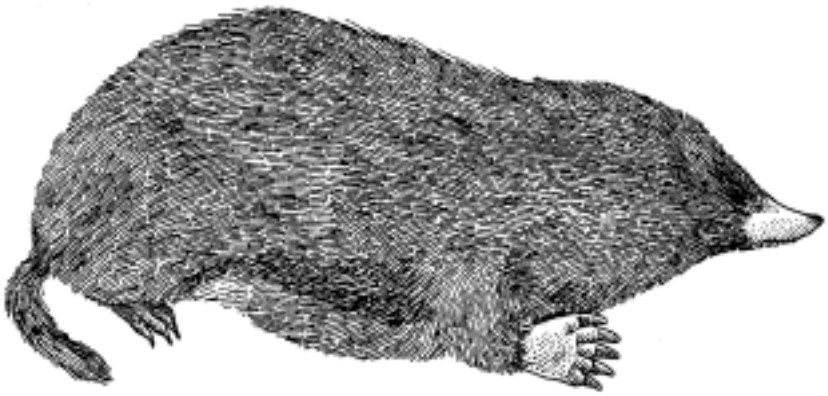
BREEDING: Breeds from March to May. Litter size from 2 to 5; one litter per year. Nests in portion of deep tunnel lined with grass and leaves.

TERRITORY/HOME RANGE: Highly territorial; home range and territory the same, size varying with food supply.

FOOD HABITS: Eats earthworms, insects (adults, larvae, and pupae) spiders, centipedes, and some plant matter. Tunnels beneath surface for food. Constantly patrols and expands these shallow tunnel systems.

OTHER: Provides a beneficial service by mixing and aerating the soil. Constructs two types of burrows: shallow burrows (which show as ridges on the surface) for feeding, and deeper tunnels. Solitary animal; active intermittently day and night throughout year.

REFERENCES: Scheffer 1923, Ingles 1965, Giger 1973.





Little Brown Myotis

M010 (*Myotis lucifugus*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Widely distributed and common from middle to high elevations; closely associated with water.

SPECIAL HABITAT REQUIREMENTS: Snags for roosting; caves for hibernation; permanent pools, ponds, or lakes for feeding and drinking.

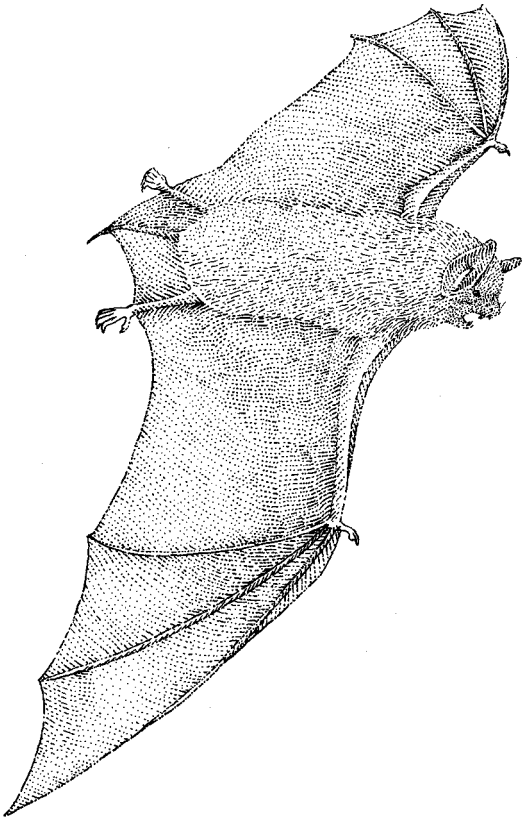
BREEDING: Young born from June to August, with peak in July. Litters of 1 or 2 (mean of 1); one litter per year. Buildings, snags, or other warm, dark retreats used as maternity colony sites. Maternity colonies of up to several hundred individuals usually located close to streams or lakes.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Captures flying insects on the wing. Food detected by echolocation; much foraging over water.

OTHER: Hibernates in winter; primarily a forest dwelling, mountain species.

REFERENCES: Grinnell 1918, Davis and Hitchcock 1956, Humphrey 1969, O'Farrell and Studier 1973.





Yuma Myotis

M011 (*Myotis yumanensis*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Widespread and locally common; closely associated with water. Most common in riparian habitats, from annual grasslands through ponderosa pine forests.

SPECIAL HABITAT REQUIREMENTS: Caves, crevices, snags, buildings, and mines used for resting and breeding colonies. Permanent water (ponds, lakes, pools) required as foraging sites.

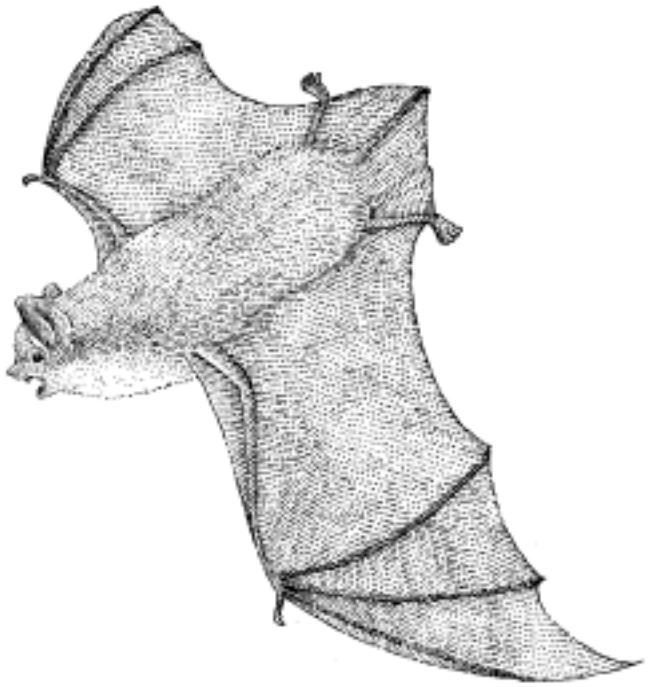
BREEDING: Young born in May and June, with peak in June. One litter per year; mean litter size 1. Buildings, bridges, caves, mines, or crevices used as maternity sites with colonies occasionally up to 1,000 individuals.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Insects taken in flight are major food. Most foraging over water; prey found through echolocation.

OTHER: Migrates from higher elevations in fall; forages low over water.

REFERENCES: Grinnell 1918, Sumner and Dixon 1953, Ingles 1965, Barbour and Davis 1969.





Long-eared Myotis

M012 (*Myotis evotis*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Uncommon; ranges throughout much of western slope of the Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS: Caves, snags, and trees used for roosting and breeding colonies; water.

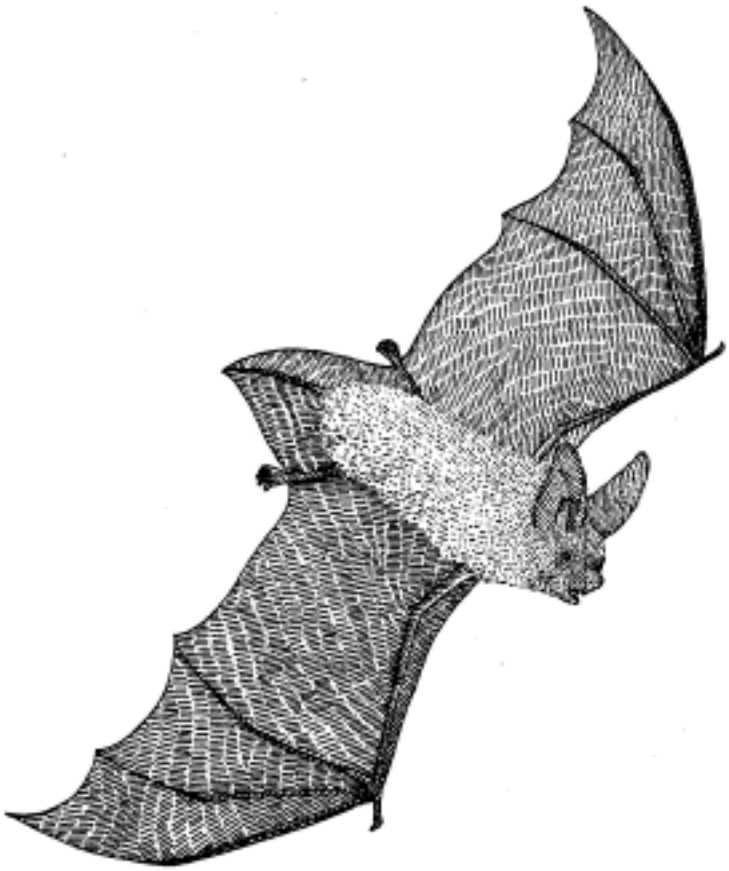
BREEDING: Young born from May to July, with peak in June. One litter per year; mean litter size 1. Maternity colonies of 12 to 30 females located in buildings, crevices in rocks, behind tree bark, or in snags.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Beetles, moths, and other insects taken in flight; prey located by echolocation; probably a foliage gleaner.

OTHER:

REFERENCES: Orr 1949, Sumner and Dixon 1953, Barbour and Davis 1969, Black 1974, Husar 1976.





Fringed Myotis

M013 (*Myotis thysanodes*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Irregularly distributed in the Sierra Nevada, with most known localities in digger pine-oak through black oak woodland habitats. Winter range unknown.

SPECIAL HABITAT REQUIREMENTS: Caves or rock crevices for roosting and breeding colonies; water.

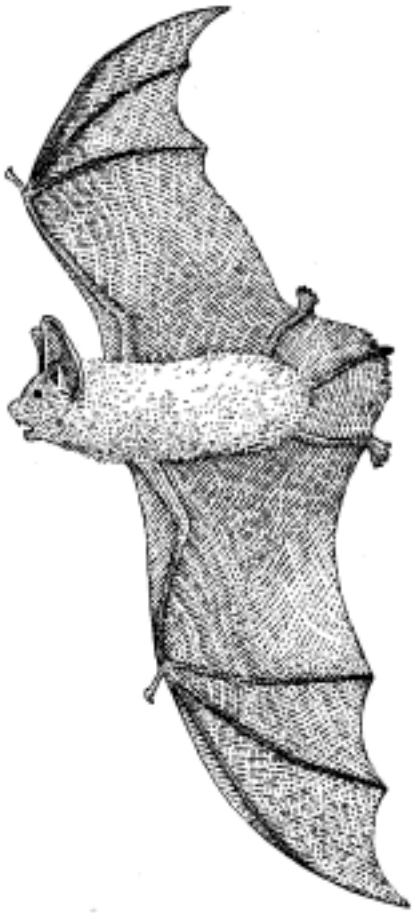
BREEDING: Young born from May to July, with peak in June. One litter per year (mean of 1). Maternity colonies of up to 200 individuals roost in caves, mines, rock crevices, or buildings.

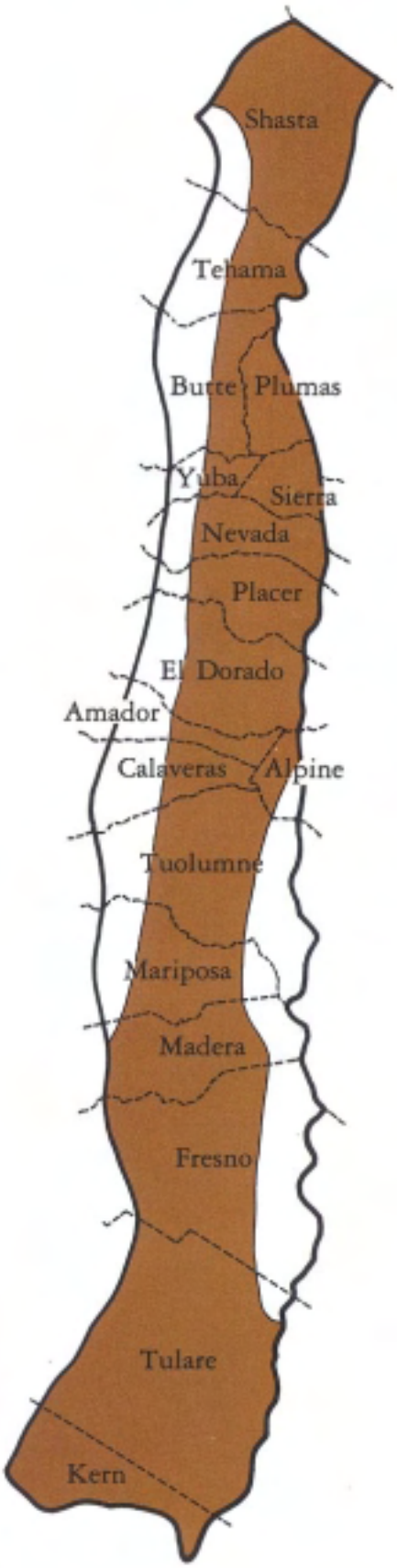
TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Beetles taken in flight are major food; prey found through echolocation; probably a foliage gleaner.

OTHER:

REFERENCES: Cockrum and Ordway 1959, Barbour and Davis 1969, O'Farrell and Studier 1973, Black 1974.





Long-legged Myotis

M014 (*Myotis volans*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Widespread and common as summer resident. Optimum to good habitat in open and moderately open stands of black oak woodland, riparian, and mixed-conifer habitats.

SPECIAL HABITAT REQUIREMENTS: Trees, snags, or crevices for roosting and breeding; water for feeding and drinking.

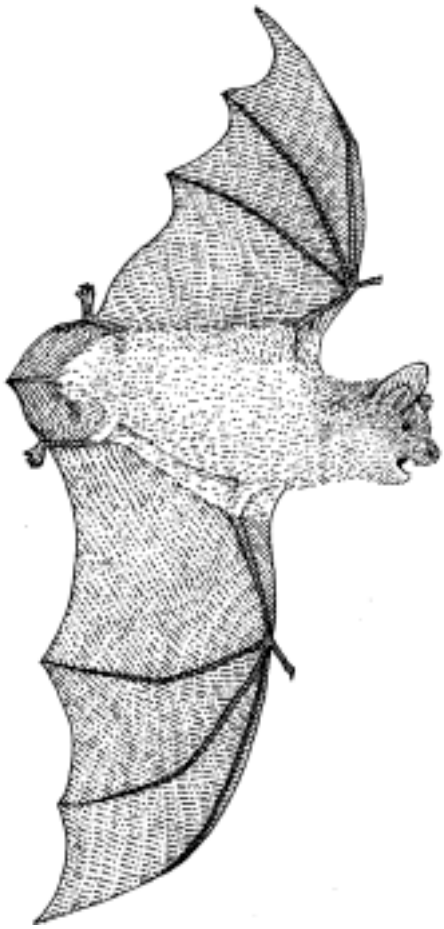
BREEDING: Young born during June and July. One litter per year (mean of 1). Maternity colonies of 100 individuals or more roost in tree crevices, snags, buildings, or rock crevices.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Eats insects, especially moths, captured in the air, over water and woodland openings. Prey found by echolocation.

OTHER: Probably migratory for short distances.

REFERENCES: Sumner and Dixon 1953, Ingles 1965, Barbour and Davis 1969, Black 1974.





California Myotis

M015 (*Myotis californicus*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Widespread throughout the western Sierra Nevada; usually found at elevations below 5000 ft (1500 m).

SPECIAL HABITAT REQUIREMENTS: Crevices in trees, snags, or rocks for roosting and breeding; water.

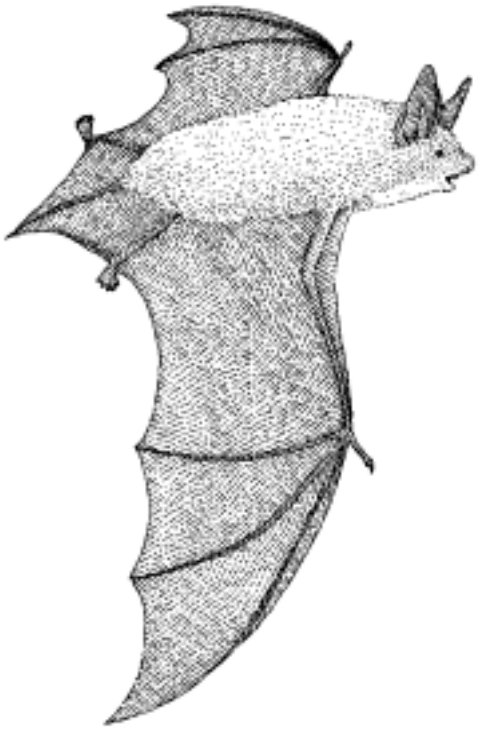
BREEDING: Young born in May and June; one litter per year (mean litter size 1). Roosts in buildings, bridges, holes in snags and trees, behind bark, and rock crevices.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Most food taken from air near ground; mainly flying insects, especially beetles and moths. Prey found by echolocation.

OTHER: Hibernates in winter; may be active on warm winter days at low elevations. Found singly or in small colonies; sexes found separately during warmer months. Flight slow and erratic, close to ground surface. Roosts during day in a variety of crevice-like places.

REFERENCES: Grinnell and Storer 1924, Krutzsch 1954a, Barbour and Davis 1969, Black 1974.





Small-footed Myotis

M016 (*Myotis leibii*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Widespread and locally common; generally most common in relatively arid upland habitats.

SPECIAL HABITAT REQUIREMENTS: Caves, mines, or rock crevices for roosting and breeding; water.

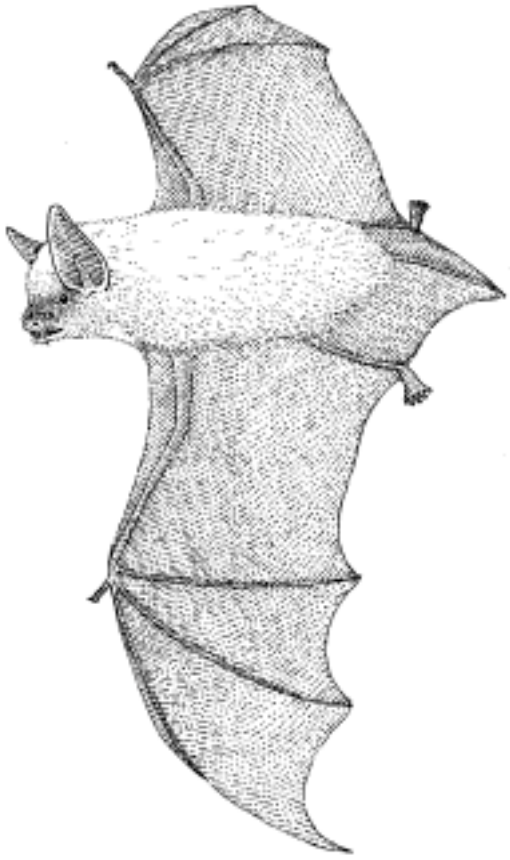
BREEDING: Young born from May to July, with peak in June. One litter per year; mean litter size 1. Buildings, caves, rock crevices, and mines used as maternity sites. Roosts in colonies or singly; maternity colonies of 12 to 20 adult females recorded.

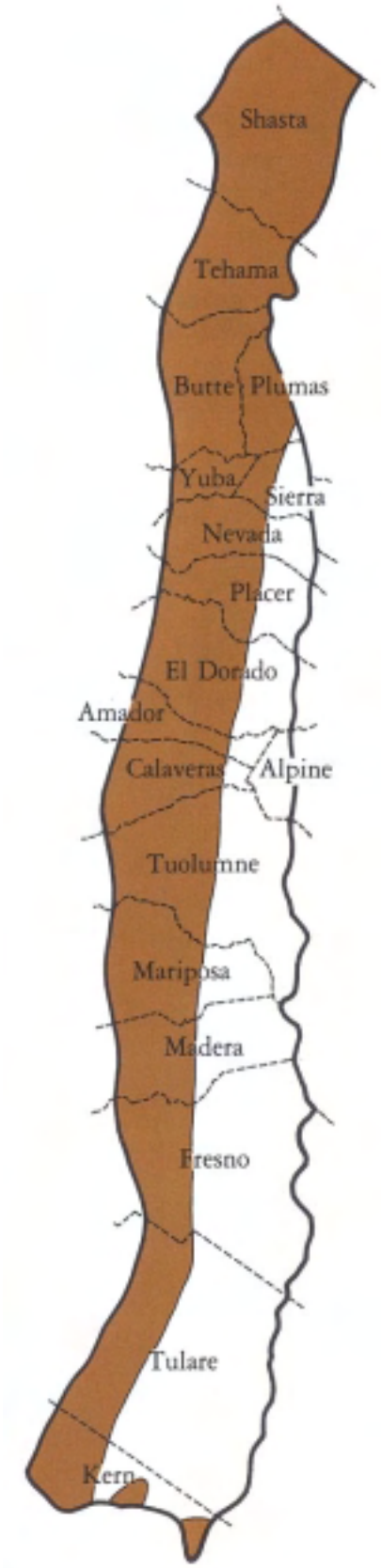
TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Takes moths, beetles, flies, ants, and other insects in flight; prey found by echolocation.

OTHER: Hibernates in winter.

REFERENCES: Cockrum 1952, Ingles 1965, Barbour and Davis 1969, Black 1974.





Silver-haired Bat

M017 (*Lasionycteris noctivagans*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Widespread along western slope of the Sierra Nevada. Optimum feeding habitat found in forested areas.

SPECIAL HABITAT REQUIREMENTS: Trees and snags for roosting and breeding; water for drinking.

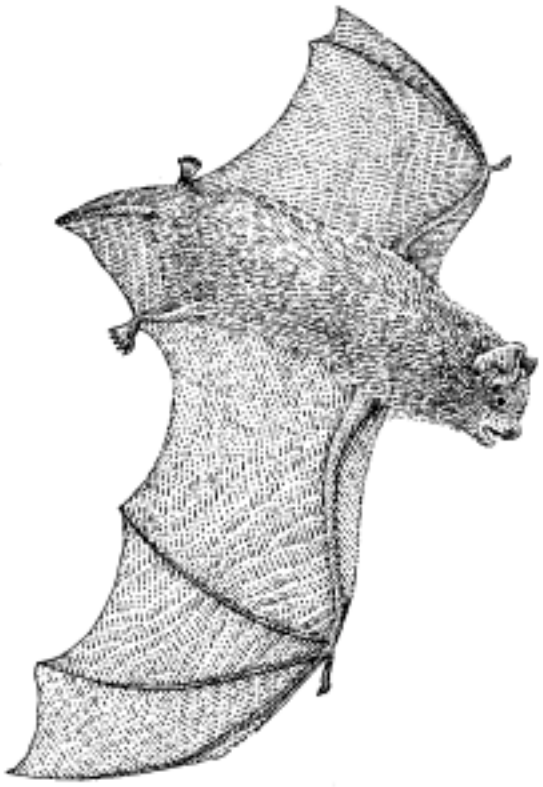
BREEDING: Young born in June and July. Litter size 1 or 2 (mean litter size 2); one litter per year. Usually roosts in solitude in snags, protected crevices in trees, and under bark. Females occasionally form small nursery colonies.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Finds insects, principally moths, through echolocation; prey captured in flight.

OTHER: A slow flier; usually flies close to the ground.

REFERENCES: Orr 1949, Barbour and Davis 1969.





Western Pipistrelle

M018 (*Pipistrellus hesperus*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Common, but irregularly distributed below ponderosa pine forests from Kern county north to southern Tehama County.

SPECIAL HABITAT REQUIREMENTS: Rock crevices for roosting and breeding; water.

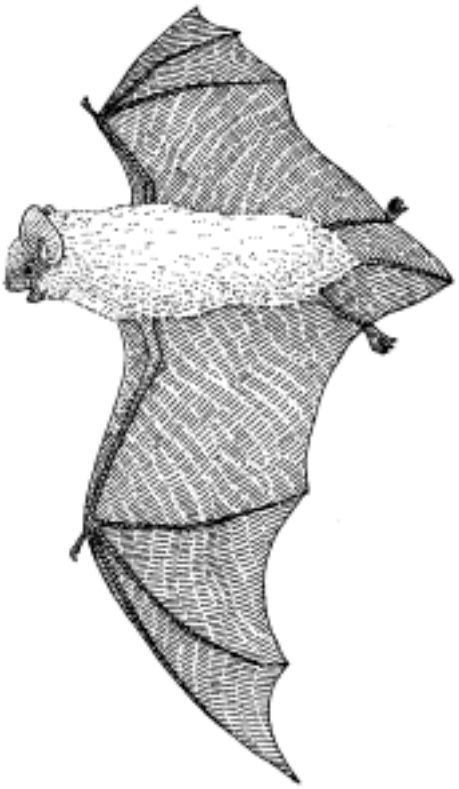
BREEDING: Young born in June and July. Litter size 1 or 2 (mean litter size 2); one litter per year. Roosts colonially in rock crevices. Maternity colonies of up to 12 individuals.

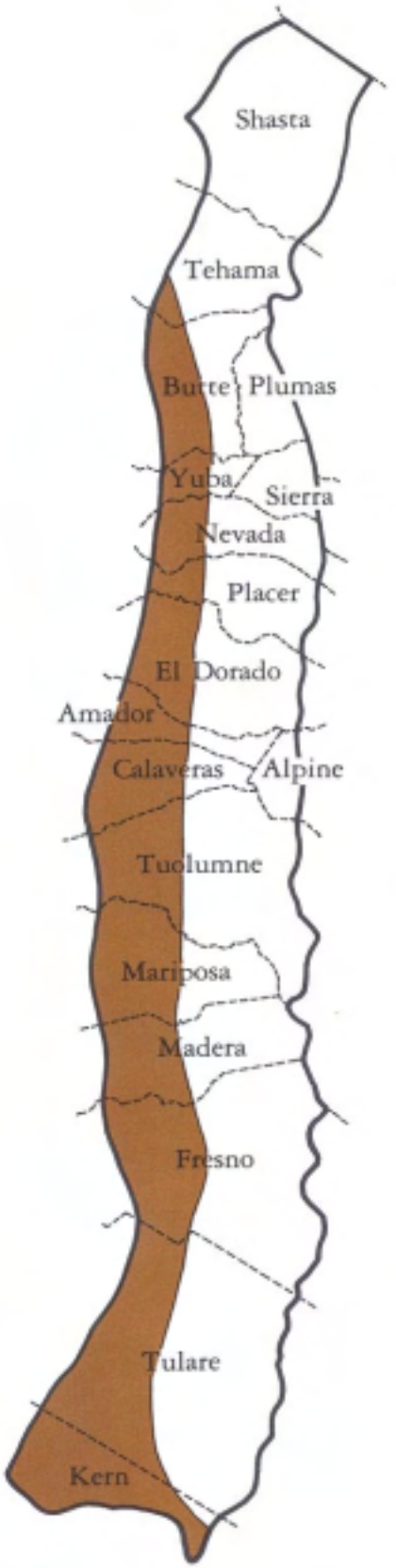
TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Insects, primarily moths, taken in flight; prey found by echolocation.

OTHER: Primarily found in arid habitats, but not far from water. Activity pattern crepuscular; flight begins early in evening. Active during warm spells in winter.

REFERENCES: Grinnell and Storer 1924, Sumner and Dixon 1953, Barbour and Davis 1969, Black 1974.





Big Brown Bat

M019 (*Eptesicus fuscus*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Widespread throughout western slope of the Sierra Nevada; forest openings and meadows (except alpine) optimum feeding habitats.

SPECIAL HABITAT REQUIREMENTS: Snags, trees, caves, crevices, or buildings for roosting and breeding colonies; water.

BREEDING: Young born from May to July, with peak in June. Litter size 1 or 2 (mean of 1). Buildings, caves, crevices, snags, or trees used for maternity sites.

TERRITORY/HOME RANGE: Unknown, but probably territorial.

FOOD HABITS: Feeds in flight, 13 to 66 ft (4 to 20 m) above the ground. Various insects, mainly beetles, for major food. Prey found by echolocation.

OTHER: Resident species; hibernates in winter. Individuals roost in colonies with other species. Can be found in large maternity colonies in summer and in small colonies (or solitary) in winter. Flies straight and steady.

REFERENCES: Krutzsch 1946, Dalquest 1948, Phillips 1966, Davis *et al.* 1968, Black 1972.





Red Bat

M020 (*Lasiurus borealis*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Found in wooded areas at lower elevations throughout the western Sierra Nevada. Prefers open to moderately dense stands of trees for roosting.

SPECIAL HABITAT REQUIREMENTS: Snags and trees for roosting and breeding; water.

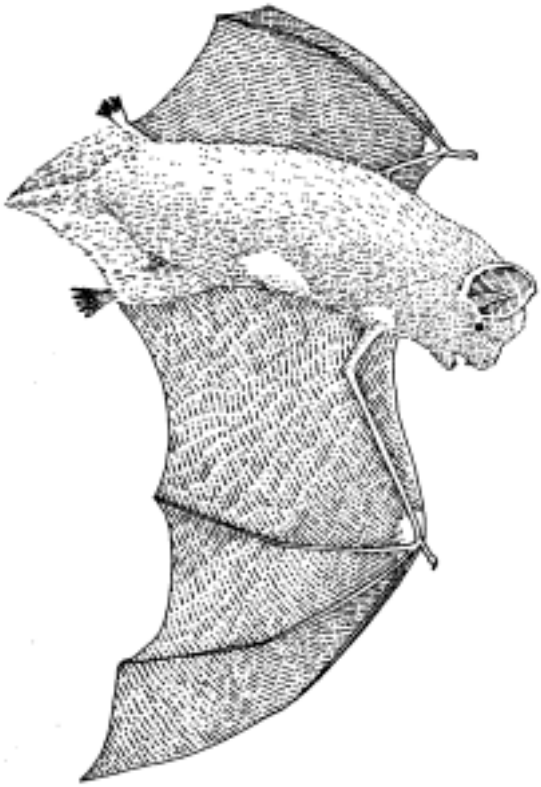
BREEDING: Young born in May and June, with peak in June. One litter per year; mean litter size 3 (range 1 to 4). Nursery sites located in trees.

TERRITORY/HOME RANGE: Unknown. Density of 1/acre (2.5/ha) estimated in study in Midwest (McClure 1942).

FOOD HABITS: Crickets, moths, beetles, cicadas, and other insects taken in flight.

OTHER: Solitary in summer; more colonial in winter. Often roosts in foliage near the ground; winters in western lowlands of California.

REFERENCES: Grinnell 1918, McClure 1942, Hamilton 1943, Jackson 1961, Constantine 1966.





Hoary Bat

M021 (*Lasiurus cinereus*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Widespread throughout western Sierra Nevada region. Breeding habitat in medium and large tree stages of conifer forests. Found throughout the Sierra Nevada during migration.

SPECIAL HABITAT REQUIREMENTS: Trees with dense foliage for roosting and breeding; water.

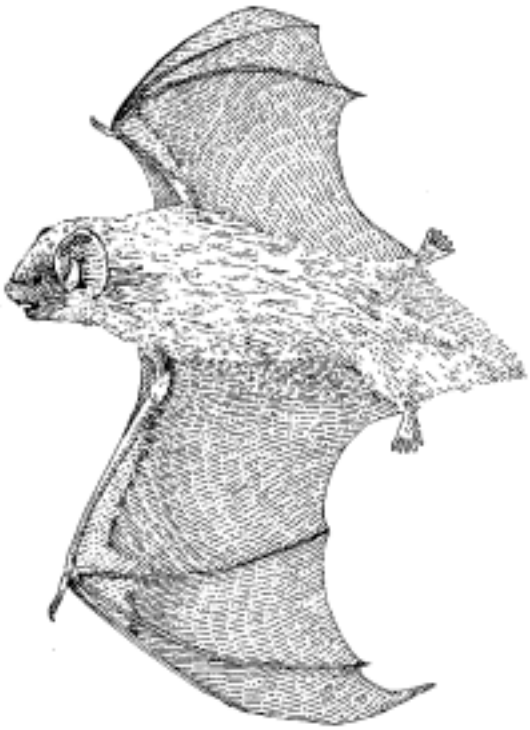
BREEDING: Litter size averages 2 (range from 1 to 4); one litter per year. Nests in tree foliage with well-developed canopy above, but open below.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Moths are main food, found through echolocation and taken in flight.

OTHER: Roosts singly in foliage of trees; migrates south in winter. Few females in the Sierra Nevada during reproductive season.

REFERENCES: Grinnell and Storer 1924; Provost and Kirpatrick 1952; Black 1972, 1974; Findley *et al.* 1975.





Spotted Bat

M022 (*Enderma maculatum*)

STATUS: Listed in the 1973 edition of *Threatened Wildlife of the United States*, but not officially listed as threatened or endangered.

DISTRIBUTION/HABITAT: Ranges from about Tuolumne to Kern Counties, from annual grasslands up to at least ponderosa pine zone.

SPECIAL HABITAT REQUIREMENTS: Little known, but probably secluded caves, crevices, or snags for roosting and breeding. Large placid pools, ponds, or lakes for drinking.

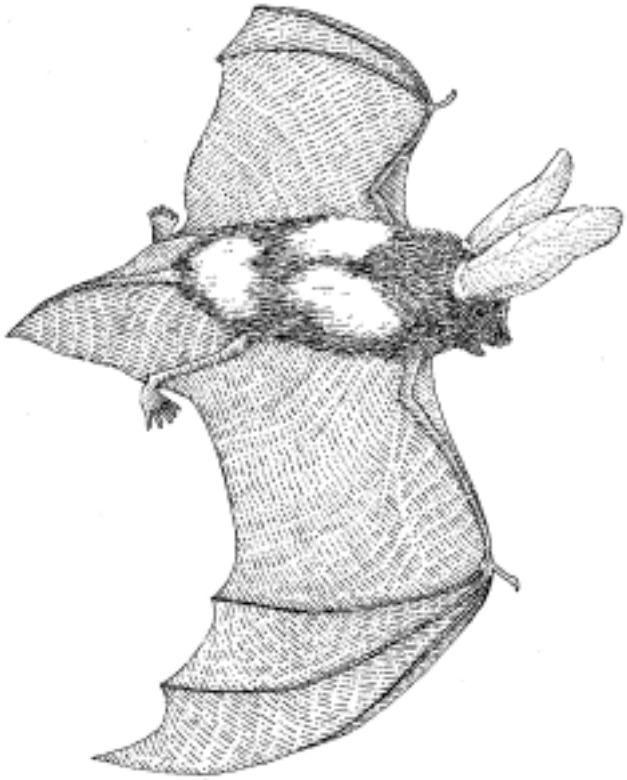
BREEDING: Young born in late spring and summer. Mean litter size 1. Roost site requirements largely unknown, but thought to be crevices in cliffs or secluded caves.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Moths and other insects found through echolocation and taken in flight.

OTHER: May occasionally enter buildings.

REFERENCES: Easterla 1965, Barbour and Davis 1969, Easterla and Easterla 1969, Findley *et al.* 1975, Watkins 1977.





Townsend's Big-eared Bat

M023 (*Plecotus townsendii*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Widespread in the western Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS: Caves or crevices for roosting and breeding; water. Especially intolerant of disturbances of maternity colonies and hibernacula by humans.

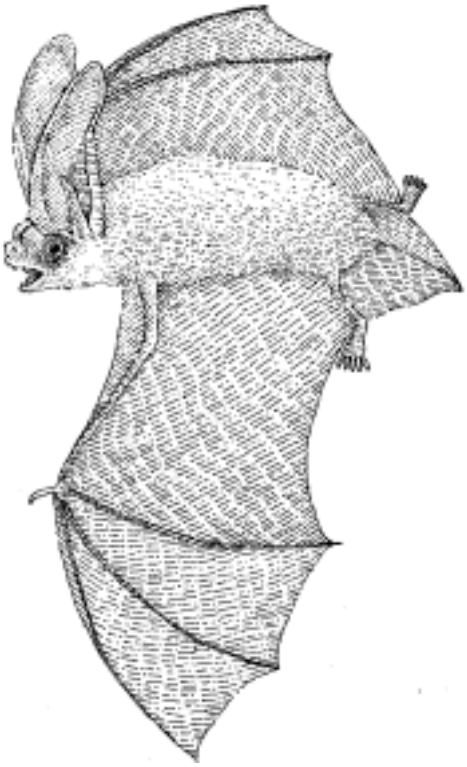
BREEDING: Young born from April to July, with peak in May. Mean litter size 1; one litter per year. Maternity colonies found in caves, mine tunnels, or occasionally in buildings.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Captures insects, mostly moths, in flight at night by echolocation.

OTHER: Males usually solitary in spring and summer, but hibernate colonially in caves and mines. Residents and can be found throughout range during any season.

REFERENCES: Dalquest 1947, Pearson *et al.* 1952, Barbour and Davis 1969.





Pallid Bat

M024 (*Antrozous pallidus*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Common in arid and semiarid areas at relatively low elevations throughout the western Sierra Nevada. Found from annual grasslands through mixed-conifer forests.

SPECIAL HABITAT REQUIREMENTS: Caves, crevices, or buildings for roosting and breeding colonies; water.

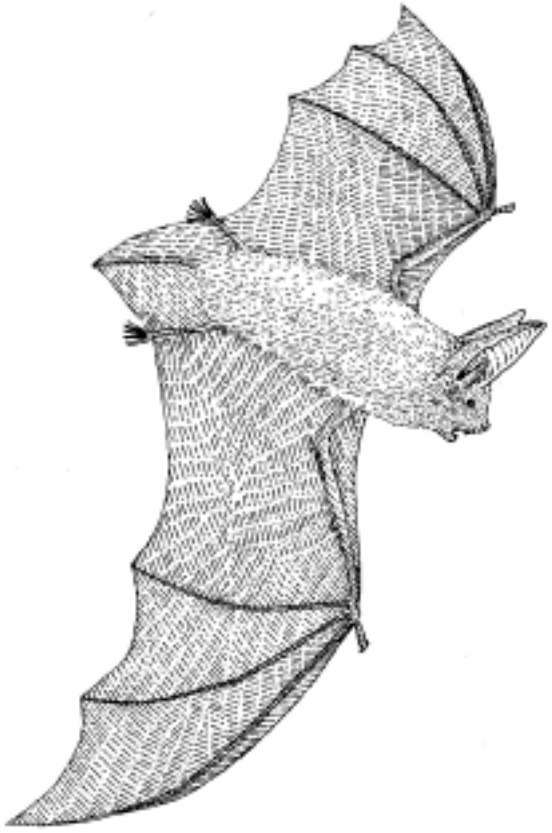
BREEDING: Young born from April to July. Litter size ranges from 1 to 3 (mean of 2); one litter per year. Pregnant females gather in maternity colony to give birth. Rock crevices, caves, buildings, and other areas of semidarkness with protection from above used as roost sites.

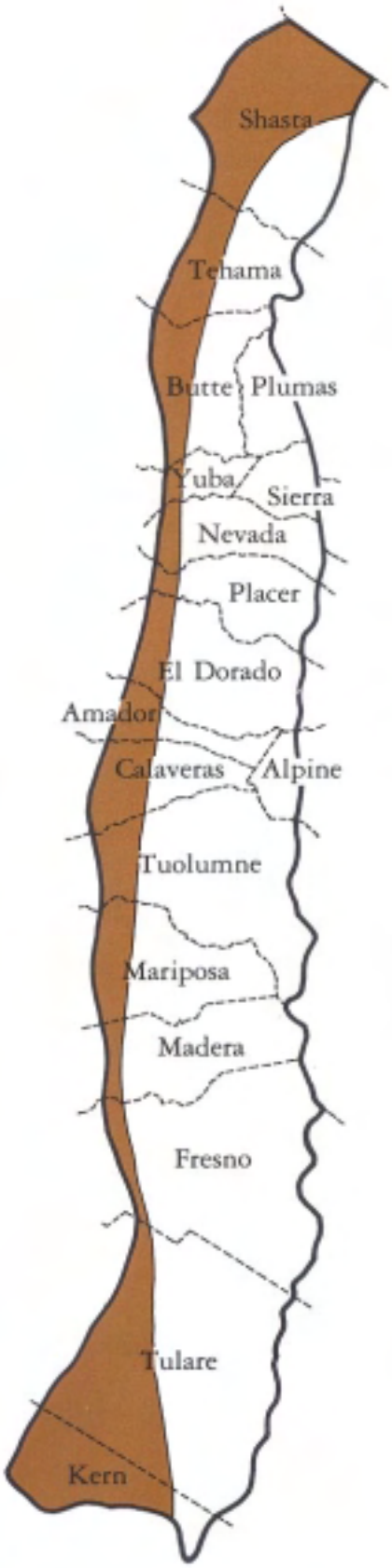
TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Beetles, moths, orthopterans, and other large insects, as well as scorpions and other invertebrates gleaned from surface of ground and from foliage. Echolocation used to find prey. Perches used when devouring prey.

OTHER: Females roost in colonies of usually less than 100, often associated in colonies with Brazilian free-tailed bats. May hibernate in winter. Separate day and night roosts often used.

REFERENCES: Sumner and Dixon 1953, Orr 1954, Ross 1967, O'Shea and Vaughan 1977.





Brazilian Free-tailed Bat

M025 (*Tadarida brasiliensis*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Widely distributed in California at low elevations. Optimum feeding habitats in annual grassland, chaparral, and meadows.

SPECIAL HABITAT REQUIREMENTS: Crevices, hollow trees, or man-made structures for roosting and breeding; water.

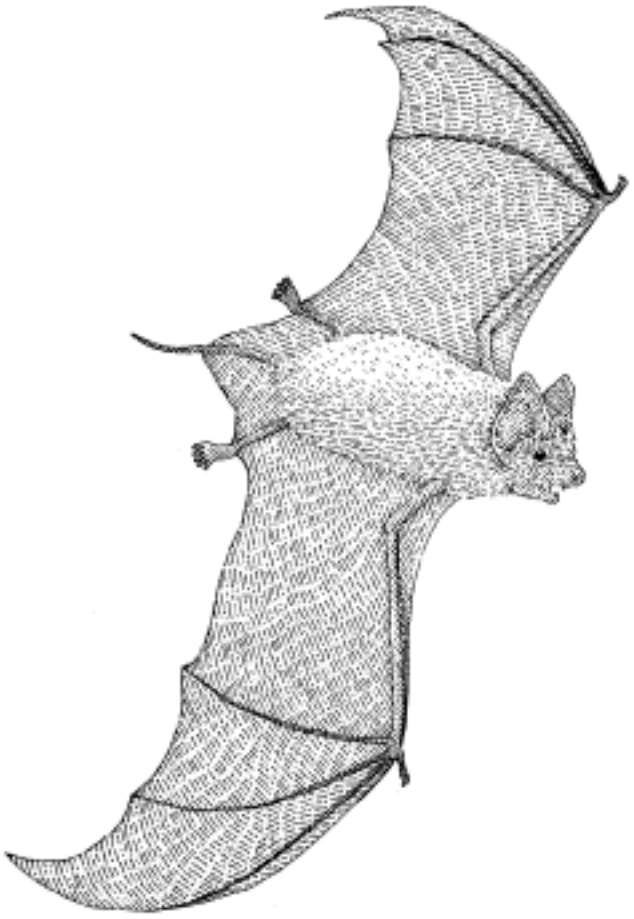
BREEDING: Young born from April to August, with peak in June. Litter size 1 or 2 (mean of 1). Maternity colonies located in cracks and crevices, buildings and other structures, such as bridges.

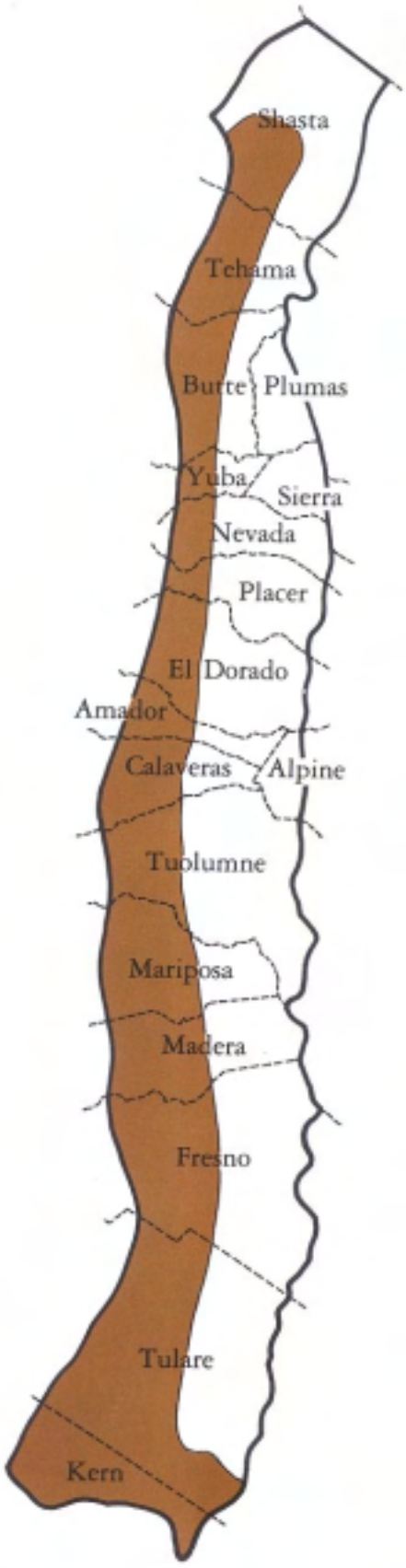
TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Small moths and other flying insects taken in flight. Prey found through echolocation. May sometimes travel long distances to feed; generally feeds at distances greater than 131 ft (40 m) above ground.

OTHER: Colonial and often found in large maternity colonies. Hibernates in winter.

REFERENCES: Krutzsch 1955, Davis *et al.* 1962, Barbour and Davis 1969.





Pika

M026 (*Ochotona princeps*)

STATUS: No official listed status. Fairly common in preferred habitat.

DISTRIBUTION/HABITAT: Found only in high mountains; confined to talus slopes with adjacent areas (especially alpine meadows) containing herbs and grasses.

SPECIAL HABITAT REQUIREMENTS: Talus slopes and forest openings.

BREEDING: Breeds from May through June or July, occasionally as late as September. Nests in deep crevices between rocks. Litter size from 1 to 5 (mean 2 or 3); one to three litters per year.

TERRITORY/HOME RANGE: Sedentary animal with small home range of 0.74 to 1.24 acre (0.3 to 0.5 ha) and territory of slightly smaller dimensions in Glacier National Park, Montana (Barash 1973).

FOOD HABITS: Eats variety of grasses and forbs, some shrubs. Forages among rocks and in alpine meadows. Dries food and stores it under rocks in small "hay piles" to eat in winter.

OTHER: Active all year, and intermittently day and night.

REFERENCES: Broadbooks 1965, Ingles 1965, Barash 1973.





Brush Rabbit

M027 (*Sylvilagus bachmani*)

STATUS: No official listed status. A game species; may be taken only during rabbit season.

DISTRIBUTION/HABITAT: Distrubuted along western edge of the Sierra Nevada, primarily in Chaparral. Also found in brushy areas of earlier successional stages of oak and pine woodlands.

SPECIAL HABITAT REQUIREMENTS: Large areas of dense cover, such as shrubs, thickets, or vines.

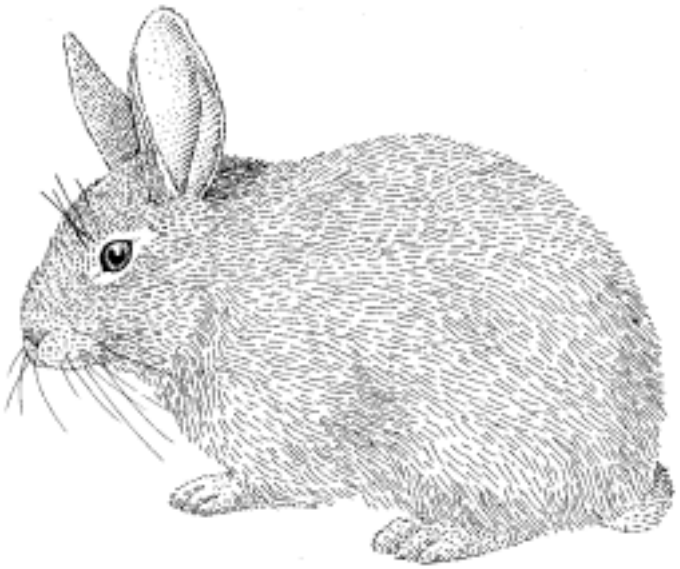
BREEDING: Two to four litters annually, averaging 3 or 4 young each, and ranging up to 6. Breeds from January to August, with peak from March to June. Gestation 28 to 30 days. Nests on ground (in cover) or in a burrow.

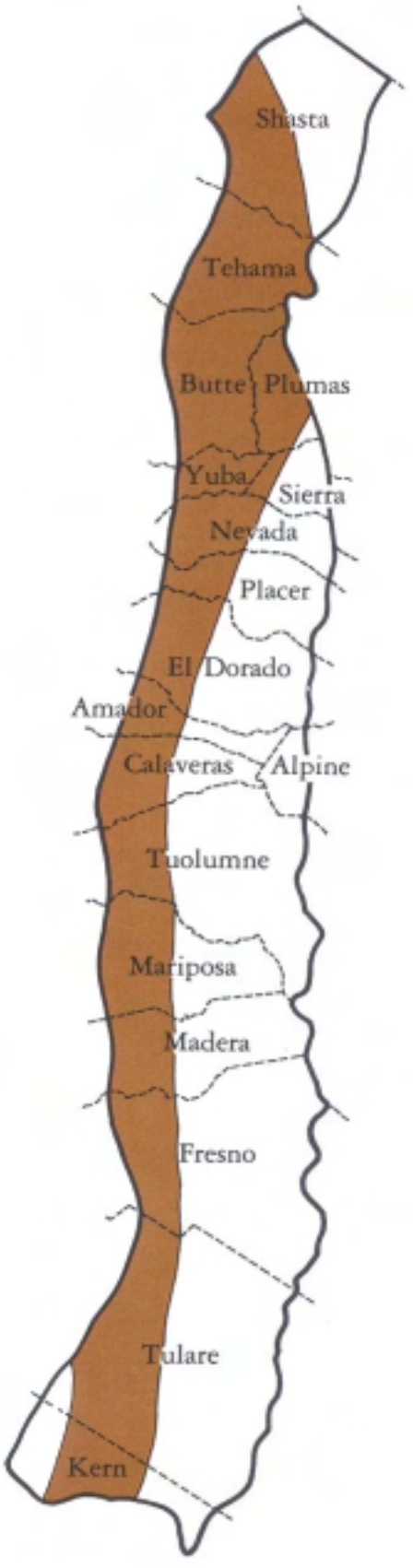
TERRITORY/HOME RANGE: Basically sedentary, with home range sizes of 0.1 to 8 acres (0.04 to 3.2 ha). Near Corvallis, Oregon, home range sizes varied from 0.5 to 2 acres (0.2 to 0.8 ha) (Chapman 1971).

FOOD HABITS: Eats grasses (foxtails, soft chess, oats, and others), forbs, and some browse (Ceanothus and others); often feeds in the open, but near brush cover.

OTHER: Crepuscular and active all year.

REFERENCES: Shields 1960, Chapman and Harman 1972, Chapman 1974.





Desert Cottontail

M028 (*Sylvilagus audubonii*)

STATUS: No official listed status. Widespread; common game species.

DISTRIBUTION/HABITAT: Found only along western and southern edges of the Sierra Nevada at lower elevations of grasslands, chaparral, oak savannah, and early successional stages of digger pine-oak. Avoids dense stands; prefers areas of mixed grass and brush.

SPECIAL HABITAT REQUIREMENTS: Dense cover in scattered patches.

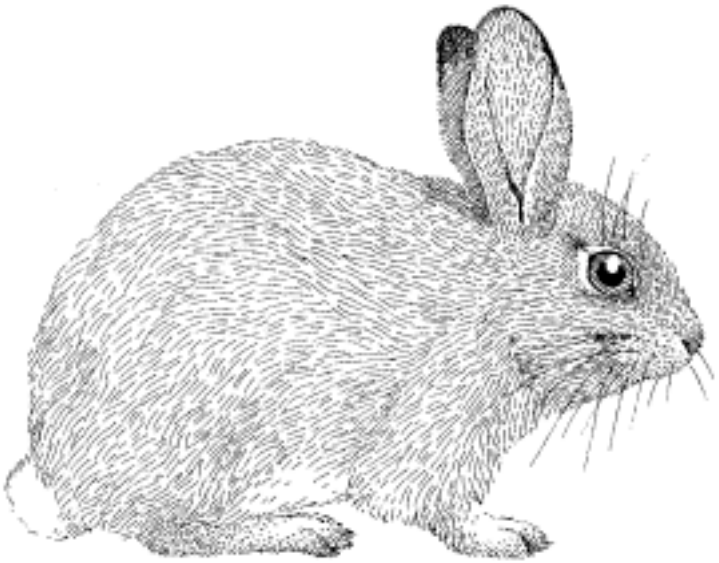
BREEDING: Two to four litters per year (average of 3 or 4 young in each; 6 not uncommon). Breeds from October through June, with peak activity from March to May. Nests in burrows or in cover on the ground.

TERRITORY/HOME RANGE: Probably not territorial. Sedentary animals; home ranges average from 7.4 to 9.9 acres (3 to 4 ha). In Madera County, range seldom more than 14.8 acres (6 ha) (Fitch 1947).

FOOD HABITS: Eats grasses (brome, fescue) and forbs (filaree, clover, tarweed, turkey mullein) obtained by feeding on the ground, usually near cover.

OTHER: Crepuscular and active all year. Found in more open habitats than *S. bachmani.*

REFERENCES: Ingles 1941, 1965; Fitch 1947.





Snowshoe Hare

M029 (*Lepus americanus*)

STATUS: No official listed status. A game species, protected by closed season and bag limits. Varies from common to uncommon.

DISTRIBUTION/HABITAT: Found in higher elevational zones of the middle and northern Sierra Nevada in riparian deciduous, alpine meadows, and conifer forests. Prefers earlier successional stages in pine or fir stands.

SPECIAL HABITAT REQUIREMENTS: Thickets of alder, willow, young conifers, or ceanothus-manzanita chaparral, and hollow logs.

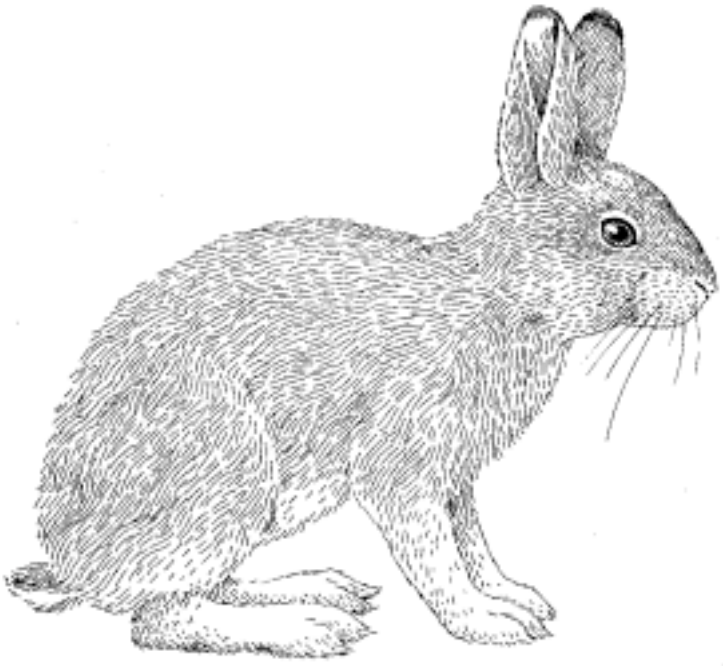
BREEDING: One to three litters per year; each litter contains 2 to 4 (as many as 8) young. Breeds from March to August, with peak in May and June. Gestation about 37 days. Open nests of grass and fur in depressions in ground.

TERRITORY/HOME RANGE: May be territorial during breeding season, but this not well established. In Alaska, home ranges varied from 9.9 to 24.7 acres (4.0 to 10.0 ha) with averages of 12.3 to 14.8 acres (5 to 6 ha) (O'Farrell 1965).

FOOD HABITS: Eats grasses, forbs, and shrubs; twigs and bark of shrubs and young trees eaten in winter. Feeds in meadows and other openings and at forest edges.

OTHER: Crepuscular and active all year. Most molt to a white coat in winter and a brown coat in summer.

REFERENCES: Adams 1959, O'Farrell 1965, Ingles 1965.





White-tailed Jackrabbit

M030 (*Lepus townsendii*)

STATUS: No official listed status. A game species not taken in large numbers by hunters. Uncommon in California; geographic range small.

DISTRIBUTION/HABITAT: Limited to the high Sierra Nevada (and the eastern slope). Found in all stages of red fir and lodgepole pine forests, but prefers early grass-forb successional stages. Alpine and mountain meadows important habitats.

SPECIAL HABITAT REQUIREMENTS: Scattered shrubs in open areas.

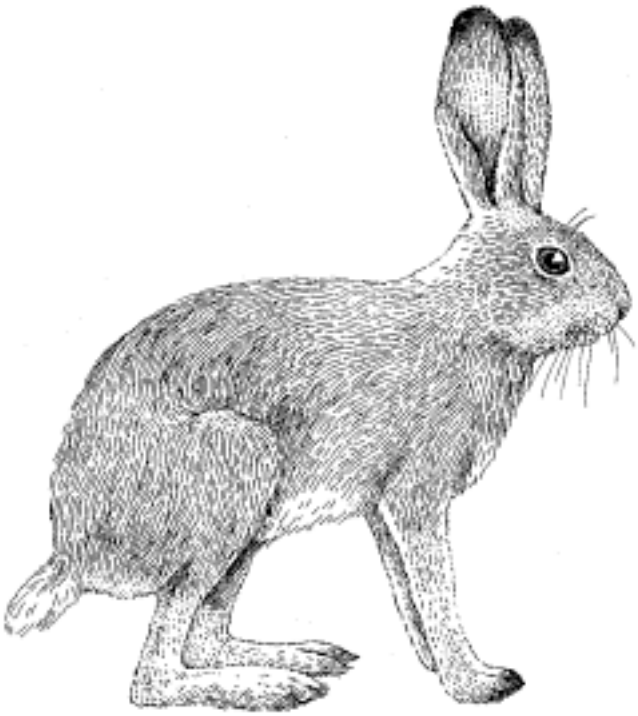
BREEDING: Usually one litter of 3 to 6 young (average of 4) per year. No burrows used; young concealed in vegetation. Gestation 43 days.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Eats mainly shrubs (cream bush, sagebrush, and others) in winter and spring, grasses and forbs in summer and fall.

OTHER: Mainly nocturnal; occasionally diurnal. Migrates to lower elevations in winter. More selective in food habits than black-tailed jackrabbits, thus giving the latter species a competitive advantage where both occur. Populations fluctuate in certain areas, but average densities of 21/mi² (8/km²) recorded in Colorado (Flinders and Hansen 1972).

REFERENCES: Orr 1940, Bear and Hansen 1966, Flinders and Hansen 1972.





Black-tailed Jackrabbit

M031 (*Lepus californicus*)

STATUS: No official listed status. Common species with widespread range. Increasing in popularity as game species.

DISTRIBUTION/HABITAT: Found in all elevational zones of the Sierra Nevada. Not found in pine or fir forests, except in early successional stages of grasses, shrubs, and seedlings. Prefers open grasslands or early stages of chaparral.

SPECIAL HABITAT REQUIREMENTS: Scattered shrubs in open areas.

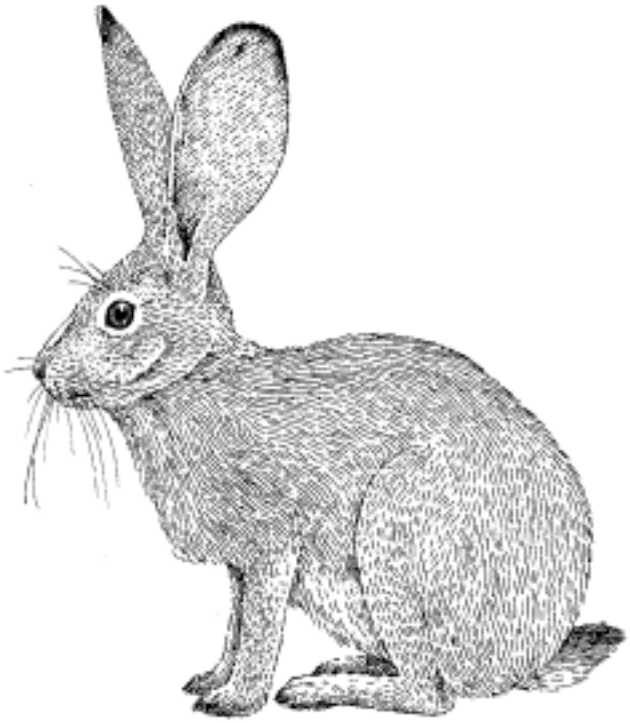
BREEDING: Breeds all year, but peak is from March to June. Usually more than one litter per year (3 or 4 young per litter). Nests placed under shrubs and in dense stands of grass; burrows not generally used. Gestation about 43 days.

TERRITORY/HOME RANGE: Home ranges probably 4.9 to 24.7 acres (2 to 10 ha), but not well documented. Not territorial.

FOOD HABITS: Eats many kinds of grasses, forbs, shrubs, and cultivated crops.

OTHER: Crepuscular, diurnal, and active all year. An important food source for coyotes and some raptors, as densities may reach 260/mi^2 (100/km^2), based on study in Utah (Flinders and Hansen 1972).

REFERENCES: Orr 1940, Lechleitner 1958, Flinders and Hansen 1972.





Mountain Beaver

M032 (*Aplodontia rufa*)

STATUS: No official listed status. Scattered distribution and uncommon in the Sierra Nevada.

DISTRIBUTION/HABITAT: Prefers riparian habitats with thick undergrowth. Also found in wooded areas, old burns, and logged areas with considerable herbaceous growth. Not aquatic.

SPECIAL HABITAT REQUIREMENTS: Thick vegetation near water.

BREEDING: Breeds in March and April (mean litter size 3 or 4). Only one litter per year. Gestation 28 to 30 days. Young born in nest in burrow, located 1 to 5 ft (0.3 to 1.5 m) below ground, in area heavily overgrown with vegetation and strewn with rocks, or fallen logs, or both.

TERRITORY/HOME RANGE: Home range small; varied from 0.1 to 0.5 acre (0.04 to 0.2 ha) (mean of 0.25 acre [0.1 ha]) near Montesano, Washington (Martin 1971). Territoriality not known.

FOOD HABITS: Cuts vegetation to take to burrows; some food stored in hay piles. Occasionally climbs trees and clips branches or strips bark, but main food items are shrubs and forbs-thimbleberry, blackberry, dogwood, ferns, and lupine. Main foraging in heavy undergrowth, in burrows, and on ground surface.

OTHER: Active all year.

REFERENCES: Godin 1964, Ingles 1965, Martin 1971.





Alpine Chipmunk

M033 (*Eutamias alpinus*)

STATUS: No official listed status. Restricted in range, but common.

DISTRIBUTION/HABITAT: Geographic range limited to the high Sierra Nevada, in lodgepole pine forests, but generally above timberline in alpine meadows. Prefers talus slopes, areas of stunted pines (krumholz), and downed logs.

SPECIAL HABITAT REQUIREMENTS: Talus and downed logs.

BREEDING: Little information available; most breeding probably in July. Litter size from 3 to 6; one litter per year.

TERRITORY/HOME RANGE: Little information available. Probably territorial, defending immediate area of nests. Usually nests within crevices of talus slopes and other rocky areas.

FOOD HABITS: Feeds on seeds of sedges, grasses, and pines; also eats fungi. Feeds on ground and among logs and rocks; caches food.

OTHER: Hibernates from November to April; may be active day and night in summer.

REFERENCES: Grinnell and Storer 1924, Johnson 1943, Heller 1971, Heller and Gates 1971, Heller and Poulson 1972.





Least Chipmunk

M034 (*Eutamias minimus*)

STATUS: No official listed status. Restricted distribution in the western Sierra Nevada, but common in the eastern Sierra Nevada and Great Basin.

DISTRIBUTION/HABITAT: Found in two small areas near the Sierra Nevada Crest in Fresno and Tulare Counties, in lodgepole pine forests and alpine meadows in dry, exposed habitats.

SPECIAL HABITAT REQUIREMENTS: Open areas with stumps, logs, or rocks, and with brush.

BREEDING: Breeds in June and July, little data available. Litter size from 3 to 8 (average 6). One litter per year. Nests found under stumps, logs, or rocks.

TERRITORY/HOME RANGE: Little information available; probably territorial, defending vicinity of nests. Home ranges varied from 0.5 to 3.7 acres (0.2 to 1.5 ha) in Montana (Martinsen 1968).

FOOD HABITS: Eats seeds, nuts, and fruits, and some insects. Searches for food on the ground, among rocks, logs, and stumps and in low shrubs. Caches food.

OTHER: Hibernates from November to April; may be active day and night.

REFERENCES: Ingles 1965, Forbes 1966, Martinsen 1968.





Yellow Pine Chipmunk

M035 (*Eutamias amoenus*)

STATUS: No official listed status. Common resident of the Sierra Nevada.

DISTRIBUTION/HABITAT: Widespread in all pine and fir forests from ponderosa pine to lodgepole pine. Prefers shrub-seedling-sapling stages of all timber types. Most abundant in open ponderosa pine forests.

SPECIAL HABITAT REQUIREMENTS: Shrubs, slash piles, or stumps in open forests.

BREEDING: Breeds from April to July, with peak activity in May and June. Litter size 4 to 8. One litter per year born in underground burrows. Gestation about 1 month.

TERRITORY/HOME RANGE: Home ranges in the Cascade Mountains averaged 1.0 to 3.8 acres (0.4 to 1.5 ha) (Broadbooks 1970b). Defends area immediately surrounding den.

FOOD HABITS: Feeds mainly on seeds of conifers, shrubs, forbs, and grasses. Some fungi, fruit, and insects also eaten. Forages primarily on ground, but occasionally climbs trees. Stores food in caches underground for use during winter. Cheek pouches used to carry food to storage sites.

OTHER: Often found associated with the golden-mantled ground squirrel.

REFERENCES: Johnson 1943; Broadbooks 1958, 1970a, 1970b; Heller 1971; States 1976.





Allen's Chipmunk

M036 (*Eutamias senex*)

STATUS: No official listed status. Uncommon to common in different areas of the Sierra Nevada.

DISTRIBUTION/HABITAT: Widespread in all coniferous forests. Prefers dense chaparral and forested areas with substantial shrub understories.

SPECIAL HABITAT REQUIREMENTS: Needs brush and logs, stumps, snags, rocks, or litter.

BREEDING: Unknown.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Unknown.

OTHER: Diurnal; probably hibernates from November to March. Specifically distinct from *E. townsendii* (Sutton and Nadler 1974). Little recorded on biology of species.

REFERENCES: Tevis 1956, Ingles 1965, Storer and Usinger 1971, Sutton and Nadler 1974.





Sonoma Chipmunk

M037 (*Eutamias sonomae*)

STATUS: No official listed status. Common within its range.

DISTRIBUTION/HABITAT: Range barely extends into the western Sierra Nevada in northern Shasta County. Prefers dense chaparral and shrub-seedling-sapling stages of digger pine-oak, black oak woodland, and ponderosa pine forests.

SPECIAL HABITAT REQUIREMENTS: Trees-shrubs; logs, stumps, snags, rocks, or litter.

BREEDING: Breeds from February to July. Individuals mature at 1 year. One litter of 3 to 7 per year. Nests in logs, stumps, and burrows. Gestation about 1 month.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Feeds on acorns, fungi, and seeds of shrubs-manzanita, ceanothus, and gooseberry. Searches for food on the ground; food cached in many different places (scatter hoarding). Seeds often buried.

OTHER: Diurnal when active, but den-up during cold spells in winter. Primarily found along coast where populations coevolved with coastal chaparral plant communities.

REFERENCES: Johnson 1943, Ingles 1965, Smith 1977.





Merriam's Chipmunk

M038 (*Eutamias merriami*)

STATUS: No official listed status. Locally common at lower elevations in the southern Sierra Nevada.

DISTRIBUTION/HABITAT: Widespread from Tuolumne to Kern Counties. Found in all plant communities with substantial shrub understory from blue oak savannah to Jeffrey pine. Prefers heavy brush with associated oaks and rock outcrops.

SPECIAL HABITAT REQUIREMENTS: Trees-shrubs; logs, stumps, snags, rocks, or litter.

BREEDING: Breeds from April to June. Individuals sexually mature at 1 year and produce one litter of 3 to 8 per year. Nests found in rotting logs, stumps, and in burrows. Gestation about 1 month.

TERRITORY/HOME RANGE: Solitary; probably defends the area in immediate vicinity of den. Home range size unknown.

FOOD HABITS: Feeds on acorns and seeds of manzanita and other chaparral species. Searches for and gathers food on the ground, in shrubs, and on stumps, logs, and dead trees. Caches for later use.

OTHER: Unlike other *Eutamias* species in the Sierra Nevada, competing species absent over most of range (Callahan 1977).

REFERENCES: Swarth 1919, Grinnell and Storer 1924, Johnson 1943.





Long-eared Chipmunk

M039 (Eutamias quadrimaculatus)

STATUS: No official listed status. Uncommon to common in different parts of range.

DISTRIBUTION/HABITAT: Widespread in higher chaparral areas, and in ponderosa pine and mixed-conifer forests. Usually associated with patches of brush with substantial canopy cover.

SPECIAL HABITAT REQUIREMENTS: Logs, stumps, snags, rocks, or litter.

BREEDING: Breeds in May and June. Litter size averages 4 (range 3 to 8). Nests in trees, logs, stumps, and cavities of snags. Gestation about I month; one litter per year.

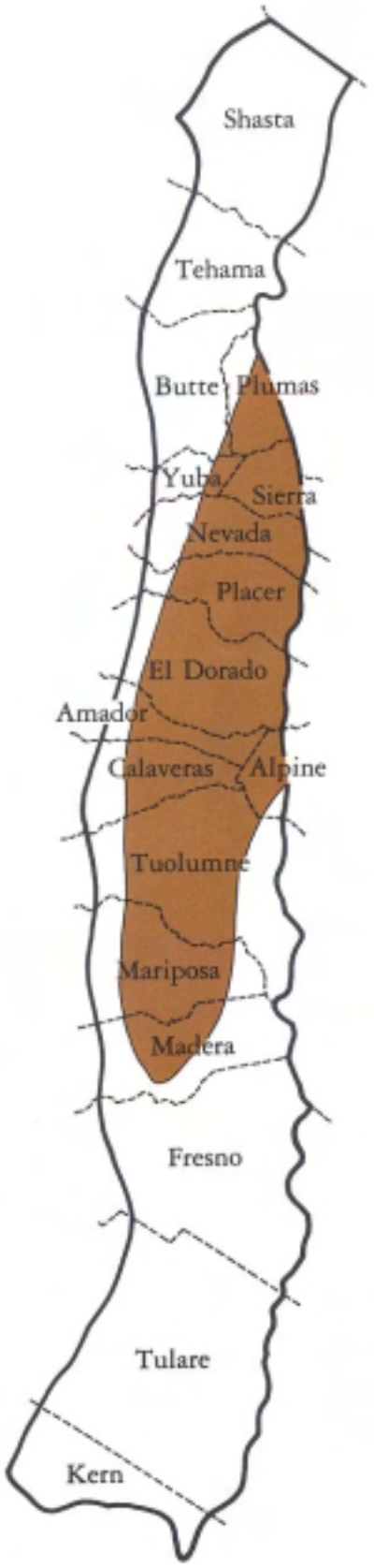
TERRITORY/HOME RANGE: Solitary and probably territorial in vicinity of nest. Home ranges in Madera County varied from 0.74 to 4.9 acres (0.3 to 2.0 ha) (Storer *et al.* 1944).

FOOD HABITS: Eats primarily seeds, fruits, and fungi. Searches for food on ground, in shrubs, and on logs, stumps, and snags. Caches food for later use.

OTHER: Diurnal when active; hibernates from November to March.

REFERENCES: Holdenreid 1940, Storer *et al*. 1944, Tevis 1955, Sutton and Dunford 1974.





Lodgepole Chipmunk

M040 (*Eutamias speciosus*)

STATUS: No official listed status. Common over range in the Sierra Nevada.

DISTRIBUTION/HABITAT: Widespread in mixed-conifer, Jeffrey pine, red fir, and lodgepole pine forests. Prefers pole-medium tree and large tree stages of coniferous forests.

SPECIAL HABITAT REQUIREMENTS: Trees-shrubs; logs, stumps, snags, rocks, or litter.

BREEDING: Breeds in June and July. Litter size averages 5 (range 3 to 7). Nests found in logs, stumps, and hollows in trees and snags. Gestation about 1 month; one litter per year.

TERRITORY/HOME RANGE: Probably territorial in immediate vicinity of nest. Home ranges in the Sierra Nevada varied form 2.5 to 4.9 acres (1.0 to 2.0 ha) (Roberts 1962).

FOOD HABITS: Eats fungi, flowers, and seeds of shrubs, forbs, grasses, and pines. Searches for food and harvests on ground, in shrubs and trees, and in logs and stumps. Caches food in trees or buries for later use.

OTHER: Diurnal when active; hibernates from November to March. Densities of up to 2/acre (5/ha) reported. Never far from trees; expert climbers. Burying seeds aids in reforestation.

REFERENCES: Orr 1949, Heller 1971, Heller and Gates 1971, Heller and Poulson 1972.





Yellow-bellied Marmot

M041 (*Marmota flaviventris*)

STATUS: No official listed status. Common and widespread in suitable habitats.

DISTRIBUTION/HABITAT: Found in the high Sierra Nevada, in Jeffrey pine, red fir, and lodgepole pine forests in association with rocky areas and meadows.

SPECIAL HABITAT REQUIREMENTS: Rocky outcrops or talus slopes; forest openings.

BREEDING: Breeds from March to July, with peak in May and June. Litter size from 3 to 8 (average of 4 to 6). One litter per year. Nests located in burrows among rocks or tree roots.

TERRITORY/HOME RANGE: Territory size ranges from 0.5 to 4.9 acres (0.2 to 2 ha) (mean of 1.2 to 1.7 acres [0.5 to 0.7 ha]). In Colorado, home range sizes varied from 4.9 to 24.7 acres (2 to 10 ha) (Armitage 1974).

FOOD HABITS: Forages in meadows and among rocks. Eats green grasses and forbs.

OTHER: Hibernates from October to April, living on accumulated fat deposits. Usually found in loose colonies; active day and night.

REFERENCES: Nee 1969, Armitage 1974, Barash 1974, Svendsen 1974..





Belding's Ground Squirrel

M042 (*Spermophilus beldingi*)

STATUS: No official listed status. Common throughout its high mountain range.

DISTRIBUTION/HABITAT: Restricted to high mountain habitats, primarily meadows and early successional stages of red fir and lodgepole pine forests.

SPECIAL HABITAT REQUIREMENTS: Forest openings with friable soils for burrowing.

BREEDING: Breeds from June to August, with peak in July. One litter per year averages 8 young (range 4 to 12). Young born in underground nest; burrows often dug between boulders.

TERRITORY/HOME RANGE; No data on territory. Home range size at Tioga Pass, Mono County, averaged 1.5 acres (0.6 ha) for males, and slightly smaller for females (Morton *et al*. 1974). Individuals usually found in colonies.

FOOD HABITS: Feeds on grasses, forbs, seeds, bulbs, and nuts. Forages on ground surface.

OTHER: Hibernates from September to April.

REFERENCES: Grinnell and Dixon 1919, Hall 1946, Morhardt and Gates 1974, Morton *et al*. 1974, Loehr and Risser 1977.





California Ground Squirrel

M043 (*Spermophilus beecheyi*)

STATUS: No official listed status. Common in the Sierra Nevada.

DISTRIBUTION/HABITAT: Widespread throughout almost all habitats and successional stages. Prefers openings and disturbed areas, particularly along roads and in grazed meadows.

SPECIAL HABITAT REQUIREMENTS: Forest openings and soil suitable for burrowing.

BREEDING: Breeds from April to July, with peak in May and June. One litter per year, with range of 3 to 15 young (mean of 6). Young remain underground for first 6 weeks of life.

TERRITORY/HOME RANGE: Probably not territorial. Home ranges vary from 1 to 4.9 acres (0.4 to 2.0 ha); individual home ranges may overlap considerably. Often lives in colonies; primarily active during day. Dens often found near rock outcrops.

FOOD HABITS: Varied diet. Feeds on fruits and seeds, twigs of shrubs and trees, stems and leaves of grasses and forbs, and some insects and carrion. Forages mainly on ground, but climbs bushes and small trees. Food stored for winter at high elevations, and for summer at low elevations.

OTHER: Hibernates at high elevations and estivates at lower elevations. Numbers increase with overgrazing or other disturbances that initiate secondary succession.

REFERENCES: Grinnell and Dixon 1919, Linsdale 1946, Fitch 19486.





Golden-mantled Ground Squirrel

M044 (*Spermophilus lateralis*)

STATUS: No official listed status. Common throughout middle and higher elevations.

DISTRIBUTION/HABITAT: Widespread from ponderosa pine forests to alpine meadows. Prefers more open areas, reaching its greatest abundance in open forests lacking a dense understory.

SPECIAL HABITAT REQUIREMENTS: Logs, stumps, or rocks for ground cover.

BREEDING: Breeds from May to August, with peak in June and July. One litter per year averages 4 or 5 young (range 2 to 8).

TERRITORY/HOME RANGE: Little information; probably territorial. Home ranges from 1 to 2.5 acres (0.5 to 1.0 ha). Locates burrow entrances under rocks, stumps, and logs. Densities of 0.4 to 1.2/acre (1 to 3/ha) recorded.

FOOD HABITS: Variable diet, including nuts, seeds and fruits, insects and carrion, and grasses and herbs. Forages on the ground, in and on logs and stumps, and in shrubby vegetation. Transports food in cheek pouches, and stores it in food caches.

OTHER:, Hibernates from October to April; may be active day and night during summer, although usually diurnal.

REFERENCES: Gordon 1943; Tevis 1955, 1956; McKeever 1946b; MacClintock 1970.





Western Gray Squirrel

M045 (*Sciurus griseus*)

STATUS: No official listed status. A game species locally common in the Sierra Nevada.

DISTRIBUTION/HABITAT: Found from the blue oak savannah up through Jeffrey pine forests along the entire length of the Sierra Nevada. Prefers mature stages of all plant communities.

SPECIAL HABITAT REQUIREMENTS: Mature trees and snags with nest cavities. Oak of some species required for permanent populations.

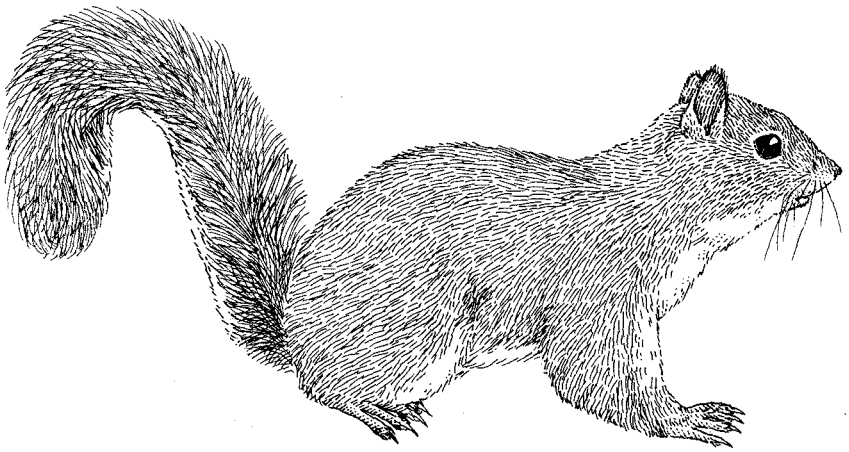
BREEDING: Breeds from February to June. Annual litter of 2 to 5 young born in late winter or early spring; gestation 44 days. Nests in holes in trees (winter) and outer branches of hardwoods (summer).

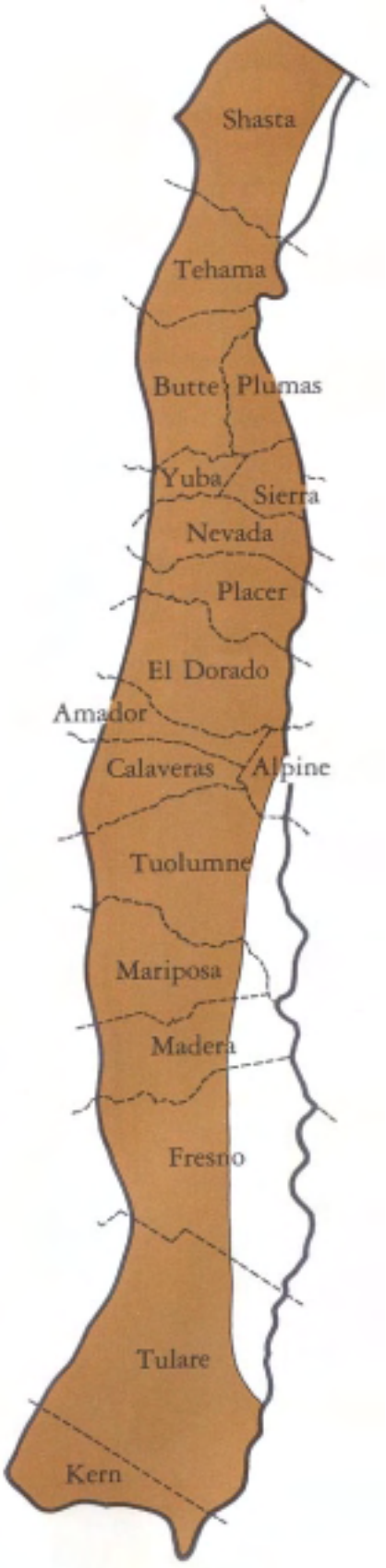
TERRITORY/HOME RANGE: Home ranges in the Sierra Nevada foothills varied from 0.5 to 1.8 acres (0.2 to 0.7 ha) for females, and from 1.3 to 2.5 acres (0.5 to 1.0 ha) for males (Ingles 1947). Lactating females incompatible, and defend territories of 0.3 to 0.8 acre (0.1 to 0.3 ha). Home ranges of males overlap considerably.

FOOD HABITS: Feeds mainly on acorns of California white oak and California black oak, and on pine seeds, green leaves, fungi, and mistletoe berries. Gathers food on ground and in trees. Stores some foods, especially acorns, for future use.

OTHER: Diurnal; does not hibernate. Densities of up to 1.6/acre (4/ha) recorded.

REFERENCES: Ingles 1947, Steinecker and Browning 1970, Asserson 1974.





Douglas' Squirrel

M046 (*Tamiasciurus douglasii*)

STATUS: No official listed status. A game species. Sparse to common in different areas of its range in the Sierra Nevada.

DISTRIBUTION/HABITAT: Widespread in all conifer forests from ponderosa pine up through lodgepole pine. Prefers large tree stages with substantial crown closure; avoids areas with considerable shrub understory.

SPECIAL HABITAT REQUIREMENTS: Snags or trees with nest holes; conifer seeds for food.

BREEDING: Breeds from May to October, with peak from April to July. Usually one litter per year (occasionally two); range from 3 to 8 young (average of 4 or 5). Nests in woodpecker holes or cavities in mature trees. Gestation 36 to 40 days.

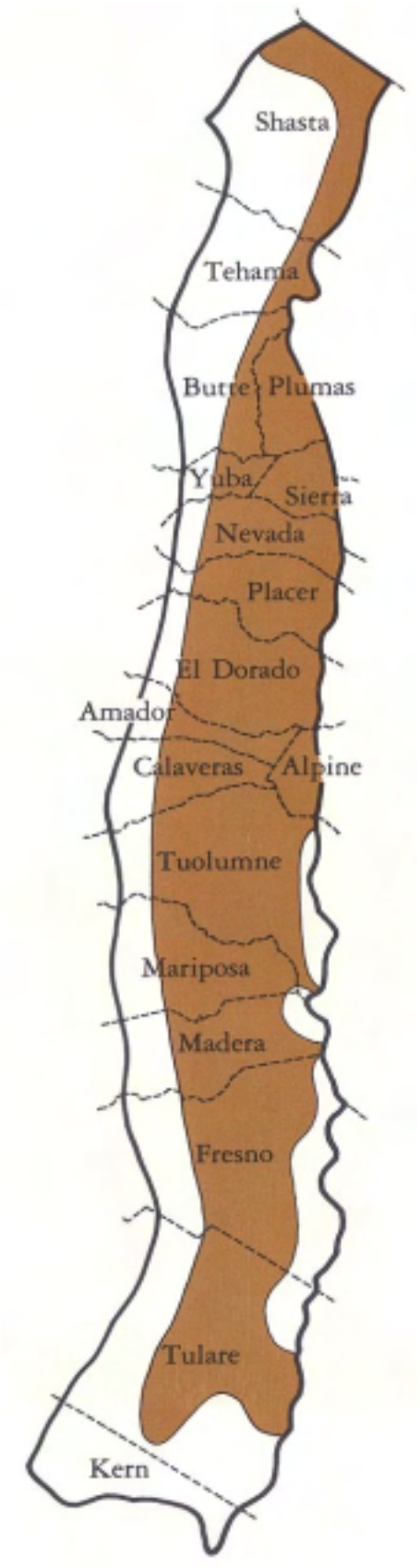
TERRITORY/HOME RANGE: Territories in the central Sierra Nevada varied from 0.5 to 4.0 acres (0.2 to 1.6 ha) (Hartesveldt *et al.* 1970).

FOOD HABITS: Feeds mainly on conifer seeds, fungi, flowers, and leaf buds. Gathers food on ground and in trees, where cones are cut and dropped to ground. Defends food sources and places middens, for use during winter, in damp or wet sites. Conifer seeds the winter staple.

OTHER: Diurnal and active all year. Good habitat supports densities approaching 0.8/acre (2/ha).

REFERENCES: McKeever 1964a, Ingles 1965, Smith 1970.





Northern Flying Squirrel

M047 (*Glaucomys sabrinus*)

STATUS: No official listed status. Not a game species; may not be killed or captured, according to current regulations. Locally common in the Sierra Nevada.

DISTRIBUTION/HABITAT: Widespread from ponderosa pine through lodgepole pine forests. Prefers mature tree stages in all habitats.

SPECIAL HABITAT REQUIREMENTS: Snags and trees with nest holes.

BREEDING: Breeds in May and June. Litter size from 1 to 6 (average of 4). Nests in holes in trees.

TERRITORY/HOME RANGE: Home range size of a mother-young group in the Sierra Nevada was 4.9 acres (2 ha) (MacClintock 1970).

FOOD HABITS: Eats seeds, nuts and fruits, fungi, insects, and baby birds and eggs in summer; lichens and mosses important staples in winter. Searches for and gathers food on ground and in trees. Does not store food.

OTHER: Nocturnal; gregarious during winter. Glides for distances up to 150 ft (46 m). Furry membranes extend from ankles to wrists. Large owls prey on flying squirrels as they glide from tree to tree.

REFERENCES: Cowan 1936, Cowan and Guiguet 1965, MacClintock 1970.





Botta's Pocket Gopher

M048 (*Thomomys bottae*)

STATUS: No official listed status. Abundant throughout length of the Sierra Nevada below about 5000 ft (1520 m).

DISTRIBUTION/HABITAT: Widespread; found wherever soils friable. Prefers grass-forb stages of all communities.

SPECIAL HABITAT REQUIREMENTS: Friable soils deep enough for burrowing
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BREEDING: Breeds from October to June, with peak from March to May. Litter size 3 to 12 (average of 5). Up to three litters per year born in underground burrows; gestation 18 or 19 days.

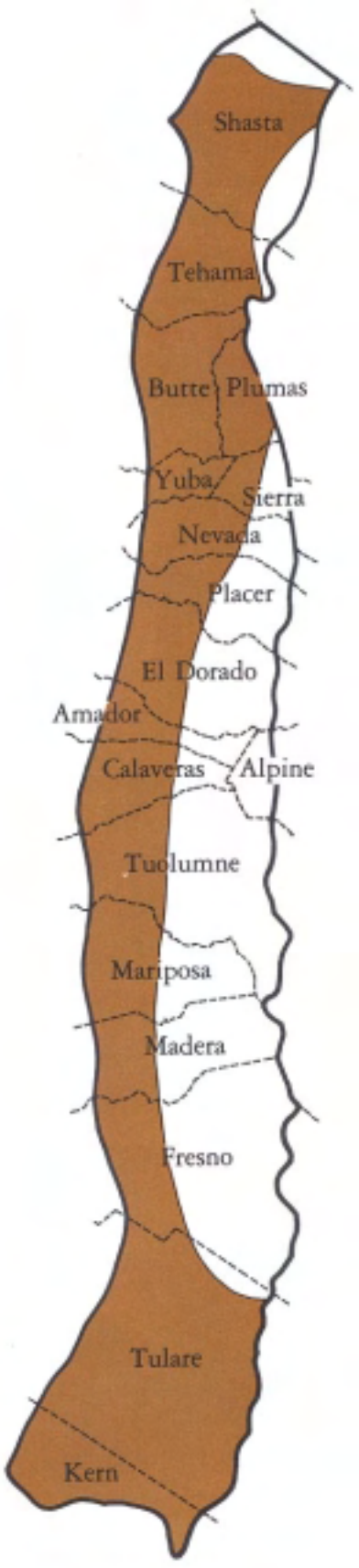
TERRITORY/HOME RANGE: Territorial and solitary, except during breeding season.

FOOD HABITS: Herbivorous: feeds mainly on roots, tubers, bulbs, and stems and leaves of forbs and grasses. Shrubs and tree seedlings sometimes eaten, occasionally damaging to young conifer plantations.

OTHER: Active all year. Soil plugs, pushed into tunnels in snow, settle on surface during thaw and help retard runoff of snowmelt. Burrowing activities aid in mixing and building of forest and meadow soils. Densities may reach 1.6/acre (4/ha).

REFERENCES: Howard and Childs 1959, Ingles 1965, Barnes 1973, Capp 1976.





Mountain Pocket Gopher

M049 (*Thomomys monticola*)

STATUS: No official listed status. Abundant within its range in California.

DISTRIBUTION/HABITAT: Widespread at elevations above 5000 ft (1520 m). Inhabits meadows and open coniferous forests from the ponderosa pine zone to the Sierra Nevada Crest. Prefers grass-forb stages of all habitat types.

SPECIAL HABITAT REQUIREMENTS: Friable soil for burrowing; forest openings.

BREEDING: Mates from May to September, with peak from June to August. Litter size 2 to 8 (average of 3 or 4). Usually one litter per year.

TERRITORY/HOME RANGE: Pocket gophers in Fresno County had territories of up to 0.5 acre (0.2 ha) (Ingles 1952).

FOOD HABITS: Feeds underground on roots, tubers, and bulbs, and aboveground on stems and leaves of forbs and grasses. Shrubs and tree seedlings sometimes eaten, damaging young conifer plantations.

OTHER: Active all year. Soil pushed into tunnels in snow, exposed during spring thaw, helps retard runoff. Burrowing activities aid in mixing and building of soils, and percolation of water.

REFERENCES: Ingles 1949, 1952; Volland 1974.





Little Pocket Mouse

M050 (*Perognathus longimembris*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Limited to extreme southeastern portion of the Sierra Nevada in Kern and Tulare Counties. Found only in open grasslands bordering the Mojave Desert.

SPECIAL HABITAT REQUIREMENTS: Medium or large forest openings.

BREEDING: Breeds from April to September; one or two litters per year. Litter size 3 to 7 (average 4). Nests constructed in underground burrows.

TERRITORY/HOME RANGE: Territory unknown, but most species solitary. Home range averaged 0.8 acre (0.33 ha) in Nevada (O'Farrell 1978).

FOOD HABITS: Feeds primarily on the seeds of annual and perennial grasses and forbs; stores some for later use.

OTHER: Nocturnal. Plug burrow entrances during day. May hibernate in cold weather or when food is scarce.

REFERENCES: Hall 1946, Maza *et al.* 1973.





Great Basin Pocket Mouse

M051 (*Perognathus parvus*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Found only in extreme northeastern portion of Sierra Nevada. Primarily a Great Basin species, but found within ponderosa pine and Jeffrey pine forests in a small area of Shasta County. Prefers grass-forb stages of all plant communities.

SPECIAL HABITAT REQUIREMENTS: Friable soils and open areas.

BREEDING: Breeds from May to July, with peak of activity in June. Litter size 3 to 8 (average 5). Nests usually located in burrows under sagebrush or other shrubs.

TERRITORY/HOME RANGE: Unknown. Most species solitary.

FOOD HABITS: Feeds mostly on seeds of forbs, grasses, and shrubs. Insects eaten and may be principal food at times when abundant. Searches for and gathers food on ground; may store food in nest.

OTHER: Nocturnal; plugs entrances to burrows during day.

REFERENCES: Smith 1942, Hall 1946, Ingles 1965, O'Farrell 1975.





Yellow-eared Pocket Mouse

M052 (*Perognathus xanthonotus*)

STATUS: No official listed status. Common in limited area of Kern Gap.

DISTRIBUTION/HABITAT: Found only in extreme southeastern portion of the western Sierra Nevada, in vicinity of Walker Pass, Kern County. Undoubtedly more wide-ranging along eastern front of the southern Sierra Nevada, but no published records. Found on variety of soil types in open, grassy areas in piñon-juniper and Joshua tree associations. All known specimens collected between 4000 and 5300 ft (1220-1616 m) elevation.

SPECIAL HABITAT REQUIREMENTS: Open areas with friable soils for burrowing.

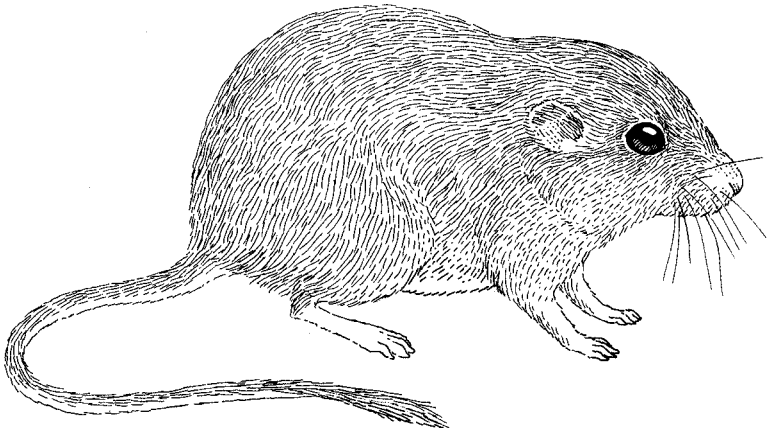
BREEDING: Unknown.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Unknown. In general, granivorous; but many pocket mice, including the closely related Great Basin pocket mouse, supplement diets with insects and young portions of grasses and forbs.

OTHER: Closely related to and possibly conspecific with populations of Great Basin pocket mouse, which ranges farther north along eastern front of the Sierra Nevada.

REFERENCES: Ingles 1965, Williams 1978.





California Pocket Mouse

M053 (*Perognathus californicus*)

STATUS: No official listed status. Common throughout its range in the Sierra Nevada.

DISTRIBUTION/HABITAT: Widespread at lower elevations from El Dorado to Kern Counties. Prefers brushy areas in digger pine-oak and chaparral communities.

SPECIAL HABITAT REQUIREMENTS: Friable soils; shrubs-grass-forbs.

BREEDING: Breeds from April to July. Litter size 2 to 7; born in nests in burrows dug in soft soil.

TERRITORY/HOME RANGE: Unknown. Most species of pocket mice solitary.

FOOD HABITS: Feeds mostly on seeds of annual grasses and forbs. Searches for and gathers food on ground. Some food stored.

OTHER: Nocturnal; becomes torpid during cold weather or when food is scarce.

REFERENCES: Ingles 1965, Tucker 1966, Burt and Grossenheider 1976.





Heermann's Kangaroo Rat

M054 (*Dipodomys heermanni*)

STATUS: No official listed status. Locally common in its range in the Sierra Nevada.

DISTRIBUTION/HABITAT: Widespread at lower elevations. Prefers grass-forb stages of chaparral and oak-savannah. Favors bare ground; populations enhanced by fire and grazing.

SPECIAL HABITAT REQUIREMENTS: Friable soil; forest openings. Loose, dry earth near burrows required for "dusting" to keep fur from becoming excessively oily.

BREEDING: Breeds from February to August, with peak in April. Litter size 2 to 5 (average 4). Two or three litters per year common; females of first litter may have two litters of their own before winter. Nests in burrows that may have up to six entrances.

TERRITORY/HOME RANGE: Unknown. Most kangaroo rats solitary and territorial.

FOOD HABITS: Feeds on seeds, forbs, and green grasses. Some stored. Herbage eaten primarily during winter and spring. Can survive without drinking water.

OTHER: Nocturnal. Populations fluctuate widely from year to year; reach densities up to 6/acre (15/ha).

REFERENCES: Tappe 1941, Fitch 1948a, Patton *et al.* 1976.





California Kangaroo Rat

M055 (*Dipodomys californicus*)

STATUS: No official listed status. Common in suitable habitat within range in the Sierra Nevada.

DISTRIBUTION/HABITAT: Open areas generally below 1310 ft (400 m) in elevation, but found as high as about 4270 ft (1300 m) in dry, open sites in Shasta County. Usually found in grassland habitats, but also in clearings among chaparral on the lower slopes of foothills.

SPECIAL HABITAT REQUIREMENTS: No published information available for the western Sierra Nevada; requires friable soils in open habitats in southern Oregon (Bailey 1936). Soft, fine sands or loose, dry silts required for dust bathing.

BREEDING: In southern Oregon, breeds from April to September (Bailey 1936), but breeding season probably indicated earlier in southern part of range. Two to 4 young per litter.

TERRITORY/HOME RANGE: Unknown. Most kangaroo rats solitary and territorial.

FOOD HABITS: Eats primarily seeds. New growth of grasses and forbs apparently eaten. Berries and seeds of manzanita, ceanothus, rabbit bush, lupine, bur-clover, wild oats, and small tubers (unidentified) recorded from cheek pouches of individuals from Oregon.

OTHER: Considered a race of Heermann's kangaroo rat before report of Patton *et al.* (1976). The two species apparently not closely related. Inferences on biology of California kangaroo rat, based on studies of *D. Heermanni*, may not be valid.

REFERENCES: Bailey 1936, Patton *et al.* 1976.





Beaver

M056 (*Castor canadensis*)

STATUS: No official listed status. May be trapped only during designated season. Common as introduced populations in the Sierra Nevada.

DISTRIBUTION/HABITAT: Scattered colonies found in the central to northern Sierra Nevada, primarily at lower elevations. Restricted to riparian deciduous habitats along streams, ponds, lakes, and wet meadows.

SPECIAL HABITAT REQUIREMENTS: Sufficient amounts of permanent water near food supplies of aspen, willow, alder, or cottonwood.

BREEDING: Breeds from April to July, with peak in May. Litter size 2 to 8 (average 3). Kits born in nests in holes in banks or in lodges built of sticks, twigs, and mud in ponds.

TERRITORY/HOME RANGE: In the MacKenzie Delta of Canada, home ranges as large as 494 acres (200 ha) (Aleksiuk 1968). Defended territories of 25 to 125 acres (10 to 50.5 ha).

FOOD HABITS: Eats cambial layers of aspen, cottonwood, alder, and willow in winter; leaves, grasses, roots, cattails, rules, and pond lillies in summer. Cuts trees and shrubs by gnawing. Stores food underwater for winter.

OTHER: Largest rodent in North America; active all year. Colonies often of family groups of paired adults, yearlings, and young of year. Deep water required where winter freezing occurs. Building of dams creates habitats for many species of wildlife. Dams not built where water deep.

REFERENCES: Tappe 1942, Hall 1960, Ingles 1965.





Western Harvest Mouse

M057 (*Reithrodontomys megalotis*)

STATUS: No official listed status. Rare to common in different areas of the Sierra Nevada.

DISTRIBUTION/HABITAT: Found at all elevations in grass-forb stages of all plant communities.

SPECIAL HABITAT REQUIREMENTS:

BREEDING: Breeds all year at lower elevations, and from early spring to late fall at higher elevations. Litter size 1 to 9 (average 4). Sexually mature at 2 months of age. Can produce five litters per year. Bird-like nests built in stands of grass or weeds and occasionally in woodpecker holes.

TERRITORY/HOME RANGE: Home range along California coast ranged from 0.5 to 1.7 acres (0.2 to 0.7 ha) and averaged 1.0 acre (0.4 ha) (Brant 1962).

FOOD HABITS: Searches for and gathers food on the ground and in bushes. Eats seeds and fruits of grasses, forbs, and shrubs.

OTHER: Nocturnal; often uses runways of meadow mice (voles) when foraging. Densities up to 13/acre (32/ha) recorded.

REFERENCES: Pearson 1960, Brant 1962, Ingles 1965.





California Mouse

M058 (*Peromyscus californicus*)

STATUS: No official listed status. Not common in the Sierra Nevada.

DISTRIBUTION/HABITAT: Found from southern Tuolumne County to Kern County, generally below 5000 ft (1520 m). Usually closely associated with distribution of California bay trees in mesic oak-woodland communities. Favors chaparral and other brushy communities.

SPECIAL HABITAT REQUIREMENTS: Trees-shrubs, rotten logs, litter, stumps, or snags.

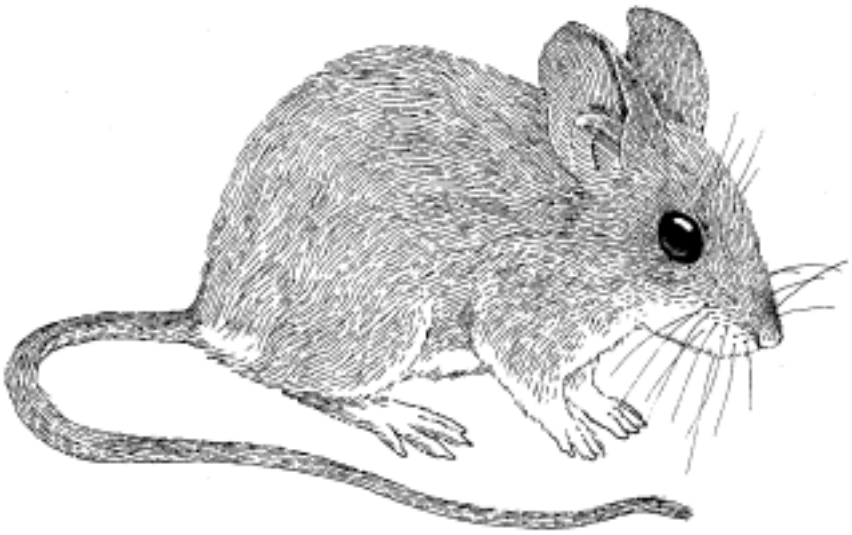
BREEDING: Breeds all year, with peak activity from April to October. Litter size 1 to 3 (average 2). Several litters per year. Gestation 22 to 25 days. Often constructs stick nests, similar to those of woodrats.

TERRITORY/HOME RANGE: California mice in the San Francisco Bay area showed aggressive behavior near the nest (McCabe and Blanchard 1950).

FOOD HABITS: Eats primarily seeds, especially those of California bay tree, toyon berries, acorns, fungi, and insects. Gathers food by searching on the ground and in bushes and trees.

OTHER: Most specialized of the four species of deer mice found in the Sierra Nevada. A good climber; inefficient burrower; may be limited by availability of adequate cover. Densities up to 50/acre (125/ha) recorded in oak-laurel woodlands.

REFERENCES: McCabe and Blanchard 1950; Ingles 1965; Merritt 1974, 1978.





Deer Mouse

M059 (*Peromyscus maniculatus*)

STATUS: No official listed status. Most numerous native mammal in North America; common to abundant in the Sierra Nevada.

DISTRIBUTION/HABITAT: Found throughout the Sierra Nevada in all plant communities and successional stages.

SPECIAL HABITAT REQUIREMENTS:

BREEDING: Breeds from March to December, with peak from May to September. Litters born in grass-lined nests in rotting logs, among rocks, and in burrows; range from 3 to 7 young (average 5). Gestation 22 to 25 days; three or four litters per year.

TERRITORY/HOME RANGE: Home ranges averaged 0.25 to 0.50 acre (0.1 to 0.2 ha) (Storer *et al.* 1944).

FOOD HABITS: Eats primarily seeds, fruits, leaves, insects, and fungi. Insects most important in spring. Gathers food primarily on ground; large caches stored for winter use.

OTHER: An integral part of the forest food chain-serves as prey for raptors, snakes, and predatory mammals. Nocturnal; active all year. Exerts important controls on populations of insect pests of forest trees. Densities can reach 25 to 62/acre (10 to 25/ha). Where reduction of natural predators leads to population buildups, can become serious pests.

REFERENCES: Storer *et al.* 1944, Jameson 1952, King 1968, Sadleir 1974.





Brush Mouse

M060 (*Peromyscus boylii*)

STATUS: No official listed status. Common to abundant in its range in the Sierra Nevada.

DISTRIBUTION/HABITAT: Found throughout the Sierra Nevada, from mixed-conifer belt down through blue oak savannah. Avoids open meadows, grasslands, and areas lacking a substantial shrub understory. Prefers shrub-seedling-sapling stage of all habitat types.

SPECIAL HABITAT REQUIREMENTS: Trees-shrubs; logs, litter, or rocks necessary for excape cover and nesting sites.

BREEDING: Mates from early April to mid-July, with peak during June. Gestation 22 to 25 days. Litters of 2 to 5 (average 3 or 4) born in grass-lined nests in rotting logs, burrows, or among rocks. One to three litters per year.

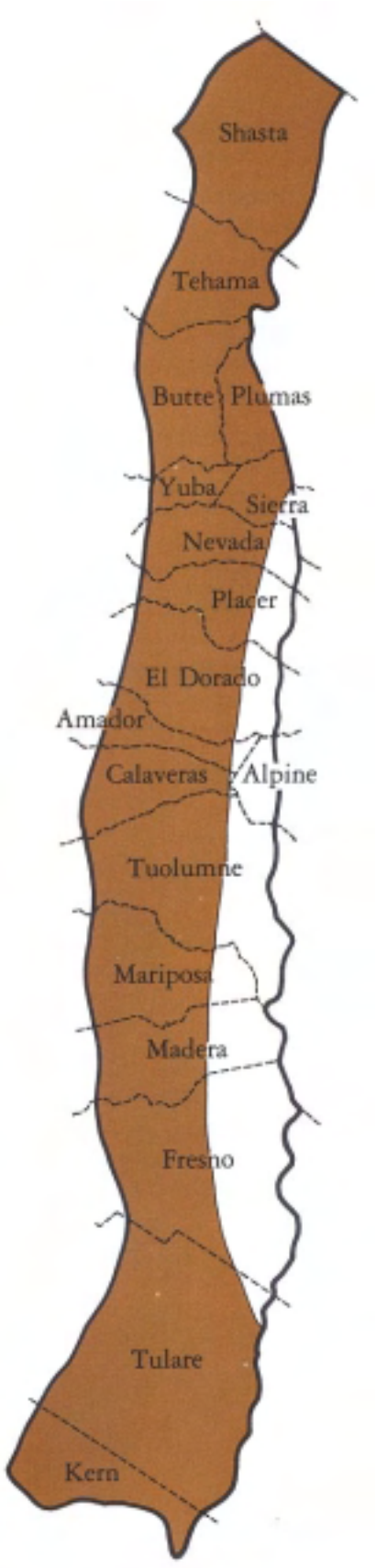
TERRITORY/HOME RANGE: Home ranges averaged 0.25 to 0.50 acre (0.1 to 0.2 ha) at Bass Lake, Madera County (Storer *et al.* 1944).

FOOD HABITS: Eats seeds, leaves, fungi, fruits, and insects; forages among ground litter.

OTHER: Nocturnal. Provides part of the diet of raptors, snakes, and many predatory mammals. Active all year; serves as important biological control of some insect pests of forest trees.

REFERENCES: Storer *et al.* 1944, Jameson 1951, Ingles 1965.





Piñon Mouse

M061 (*Peromyscus truei*)

STATUS: No official listed status. Widespread; common throughout range in California.

DISTRIBUTION/HABITAT: Abundant in woodland and brushland habitats below ponderosa pine forests. Generally limited to habitats containing some species of pygmy conifer.

SPECIAL HABITAT REQUIREMENTS: Thickets of brush, or small trees or rocks, or both.

BREEDING: Breeds from March to June. One litter per year; litter size 3 to 6 (average 4). Nests in trash or holes in trees, among brush, or in rock crevices.

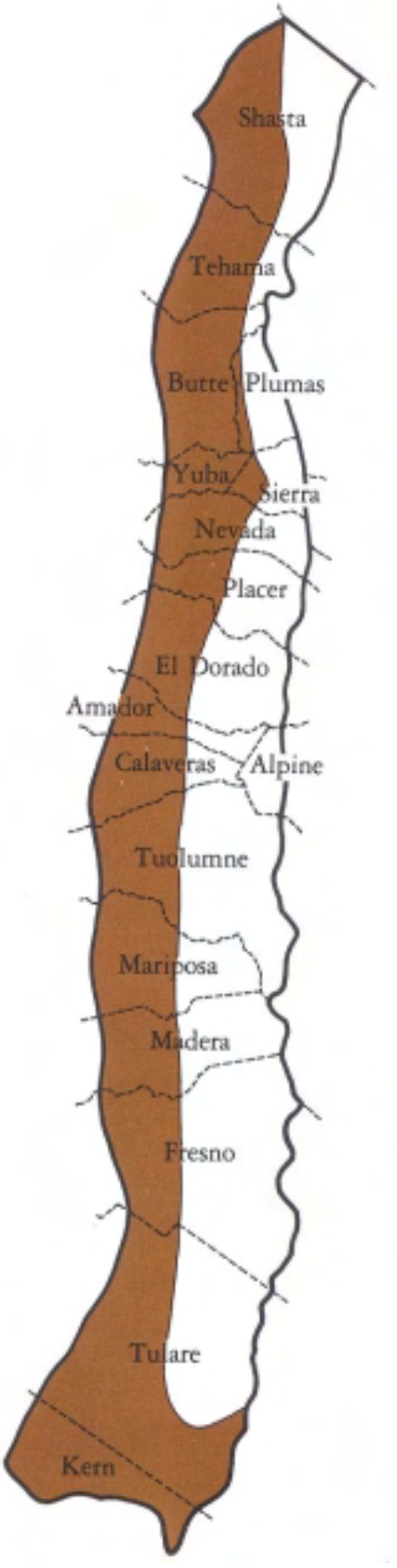
TERRITORY/HOME RANGE: In Colorado, mean home range size 1.1 acres (0.45 ha) (Douglas 1969). Territory restricted to vicinity of nest (McCabe and Blanchard 1950).

FOOD HABITS: Forages on ground and in shrubs; sometimes caches food. Eats primarily seeds, insects, acorns, and leaves.

OTHER: Nocturnal; often climbs small trees to forage, nest, and escape from predators. Population densities from 1/acre (2.5/ha) in oak-bay woodlands to 35/acre (60/ha) in chaparral (Merritt 1974).

REFERENCES: McCabe and Blanchard 1950, Lawrence 1966, Douglas 1969, Merritt 1974.





Dusky-footed Woodrat

M062 (*Neotoma fuscipes*)

STATUS: No official listed status. Common throughout range in California.

DISTRIBUTION/HABITAT: Widespread along entire western slope of the Sierra Nevada, from digger pine-oak belt up through mixed-conifer forests. Avoids cultivated land, open grassland, and pure chaparral stands.

SPECIAL HABITAT REQUIREMENTS: Trees-shrubs; litter for building nest houses.

BREEDING: Breeds from March to September, with peak in May and June. Litter size 1 to 4 (average 2 or 3). Large stick nests located either on ground or in trees.

TERRITORY/HOME RANGE: Home ranges not larger than 1.25 acres (0.5 ha) at Hastings Reserve, Monterey County (Linsdale and Tevis 1951).

FOOD HABITATS: Searches ground for acorns, fruits, seeds, grasses, forbs, and fungi. Also eats stems and leaves of shrubs. Climbs trees in search of browse.

OTHER: Active all year. Stick-nest piles may be 6 ft (1.8 m) high and may provide shelter for many other species of animals.

REFERENCES: Vestal 1938, Linsdale and Tevis 1951, Hooven 1959, Cranford 1977.





Bushy-tailed Woodrat

M063 (*Neotoma cinerea*)

STATUS: No official listed status. Common within range in California.

DISTRIBUTION/HABITAT: Widespread in suitable rocky habitat in upper elevation coniferous forests. Prefers early successional stages of Jeffrey pine, red fir, and lodgepole pine forests.

SPECIAL HABITAT REQUIREMENTS: Talus slopes and other rocky areas for nest sites.

BREEDING: Breeds from April to September, with peak in June and July. Average 3 young per litter (range 2 to 4). Rock crevices usually selected as nest sites.

TERRITORY/HOME RANGE: Sedentary; remains close to den year-round.

FOOD HABITS: Gathers fruits, nuts, berries, and fungi; also eats stems and leaves of shrubs and herbs.

OTHER: Primarily nocturnal; active all year. Frequently prey of owls, snakes, and predatory mammals. Nests often constructed of huge piles of litter, dung, bones, and other objects.

REFERENCES: Dixon 1919, Ingles 1965.





Western Red-backed Vole

M064 (*Clethrionomys occidentalis*)

STATUS: No official listed status.

DISTRIBUTION/HABITAT: Restricted to altitudes between 3600 to 6235 ft (1100 to 1900 m). Associated with conifer forests having abundant ground cover and litter. Spotty distribution within this region.

SPECIAL HABITAT REQUIREMENTS: Logs, snags, stumps, or other litter.

BREEDING: Breeds from June to August. Litter size 2 to 4. Nests placed under logs, roots, or boulders.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Eats primarily green vegetation, twigs, seeds, fungi, and insects. Forages on ground and in low shrubs.

OTHER: Primarily nocturnal. Densities may reach 4/acre (10/ha).

REFERENCES: Tevis 1956, Gashwiler 1959, Ingles 1965.





Heather Vole

M065 (*Phenacomys intermedius*)

STATUS: No official listed status. Uncommon within its range.

DISTRIBUTION/HABITAT: Found in alpine and subalpine areas at elevations of 6562 to 9843 ft. (2000 to 3000 m). Associated plants include heathers and huckleberries.

BREEDING: Breeds from June to September. Mean litter size 5 (range 2 to 8). Females breed in first year; males do not breed until second year.

TERRITORY/HOME RANGE: Unknown.

FOOD HABITS: Forages on the ground; caches some food. Eats primarily bark and twigs of willow and other shrubs during winter; herbaceous plants, seeds, berries, and twigs in summer.

OTHER: Builds grass nests under snow in winter.

REFERENCES: Shaw 1924, Edwards 1955, Foster 1961.





Montane Vole

M066 (*Microtus montanus*)

STATUS: No official listed status. Widespread within the Sierra Nevada and common in some locations.

DISTRIBUTION/HABITAT: Ranges in altitude from 4900 to 12,500 ft. (1500 to 3800 m); found in wet areas and mountain meadows.

SPECIAL HABITAT REQUIREMENTS: Grasses or sedges, or both.

BREEDING: Breeds from March to November. More than one litter per year. Mean litter size 5 (range 1 to 9).

TERRITORY/HOME RANGE: Mean home range 0.25 acre (0.1 ha). Size of territory, if any, unknown.

OTHER: Constructs underground burrows and builds grass nests under snow in winter. Does not hibernate. Population size fluctuates from year to year.

REFERENCES: Jenkins 1948, Anderson 1959, Ingles 1965, Negus *et al*. 1977.





California Vole

M067 (*Microtus californicus*)

STATUS: No official listed status. Widespread and common.

DISTRIBUTION/HABITAT: Found throughout most of California, from the Pacific Coast to the Sierra Nevada to an elevation of about 3940 ft (1200 m) in grassy areas.

SPECIAL HABITAT REQUIREMENTS: Grasses or sedges, or both.

BREEDING: Breeds throughout year, reaching peaks whenever food and cover are abundant. Two to five litters each year. Mean litter size 4 (range of 1 to 9).

TERRITORY/HOME RANGE: Mean home range size in Monterey County is 0.37 acre (0.15 ha), ranging from 0.25 to 2.5 acres (0.1 to 1.0 ha) (Fisler 1962). Territorial behavior weak; size of defended area unknown.

FOOD HABITS: Eats primarily leafy portions of grasses, sedges, and herbs. Feeds on ground, clipping grasses and forbs to form network of runways leading from burrow.

OTHER: Presence of voles often may be confirmed by their runways. Runways constructed by clipping grass stems close to surface of ground. Populations cyclic for a period of 3 to 4 years, with peak population densities reaching 200/acre (500/ha). Does not hibernate.

REFERENCES: Fisler 1962, Batzli and Pitelka 1970, Krebs 1970, Gill 1977.





Long-tailed Vole

M068 (*Microtus longicaudus*)

STATUS: No official listed status. Widespread and common in suitable habitats.

DISTRIBUTION/HABITAT: Found throughout California at higher elevations in mixed-conifer, Jeffrey pine, red fir, and lodgepole pine forests.

SPECIAL HABITAT REQUIREMENTS: Grasses, sedges, or forbs.

BREEDING: Breeds from March to November; litter size 1 to 10 (mean of 5). Three or four litters per year. Nests usually in underground burrows.

TERRITORY/HOME RANGE: No information available on territorality. Home range size in El Dorado County varied from 0.25 to 9.9 acres (0.1 to 4 ha) (mean of 0.5 acre [0.2 ha]) (Jenkins 1948).

FOOD HABITS: Forages over ground (activities not confined to runways in summer.). Eats grasses, and grass-like plants, bulbs, and bark of small twigs. Constructs tunnels under snow.

OTHER: Does not hibernate. Populations relatively stable compared with those of other voles. Less restricted to runways and dense grasses than other *Microtus.*

REFERENCES: Jenkins 1948, Ingles 1965, Burt and Grossenheider 1976.





Muskrat

M069 (*Ondatra zibethicus*)

STATUS: No official listed status. Furbearer, protected by closed season during warmer months. Native to northeastern California, but introduced and range expanded in parts of the western Sierra Nevada.

DISTRIBUTION/HABITAT: Locally abundant along western edge of the Sierra Nevada, from Tulare County to Shasta County, with sparser populations at higher elevations. Riparian deciduous areas provide optimum habitat. Found in or near aquatic habitats.

SPECIAL HABITAT REQUIREMENTS: Permanent streams, ponds, or lakes; succulent grasses or sedges, or both.

BREEDING: Breeds from March to August, with peak from April to June. Two or three litters per year. Young range from 1 to 11, with mean of 4 to 6. Burrows made in banks, and houses of cattails and rules, located in open water, used as nest sites.

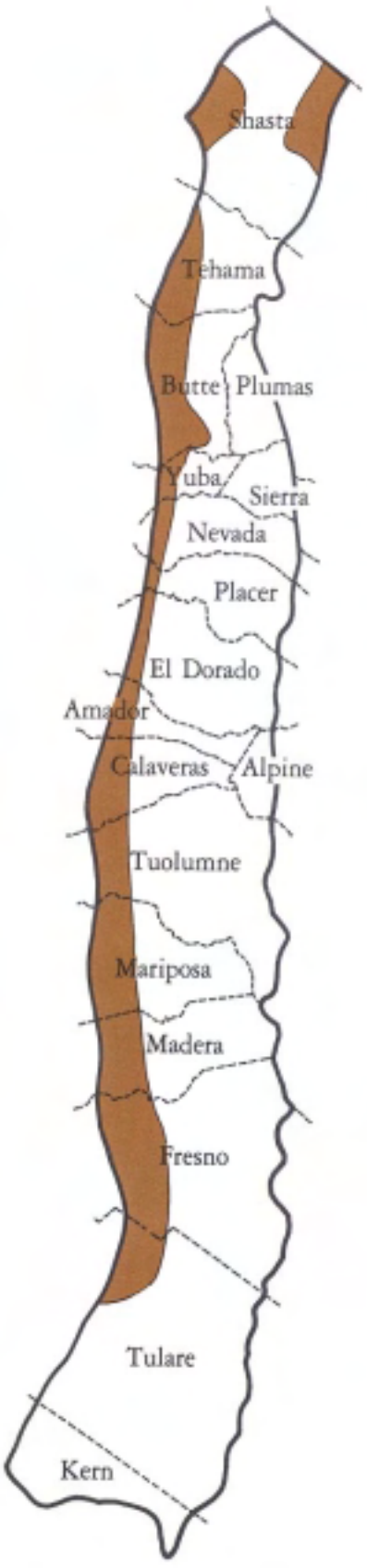
TERRITORY/HOME RANGE: Usually sedentary; home ranges occasionally as large as 500 acres (200 ha). Defends nest area.

FOOD HABITS: Forages on banks of streams and in marshes for cattails and other aquatic plants.

OTHER: Active all year; nocturnal and diurnal.

REFERENCES: Grinnell *et al.* 1937, Errington 1963, Earhart 1969.





Western Jumping Mouse

M070 (*Zapus princeps*)

STATUS: No official listed status. Common locally.

DISTRIBUTION/HABITAT: Found throughout the Sierra Nevada from mixed-conifer zone upward in areas with herbaceous cover along edges of rivers, streams, lakes, meadows, and other wet areas. Found in all successional stages.

SPECIAL HABITAT REQUIREMENTS: Moist soil.

BREEDING: Breeds from June through July. Litter size from 2 to 7 (mean of 5). Nests placed in small depressions in ground and lined with grass; cover of grass or other vegetation placed over depression.

TERRITORY/HOME RANGE: Sedentary. Home range size averages 0.62 acre (0.25 ha) for females and 0.74 acre (0.3 ha) for males. Ranges may extend from 328 to 1300 ft. (100 to 400 m) along grassy banks and wet areas. Densities of 0.4/acre (1/ha) reported (Brown 1967, Myers 1969).

FOOD HABITS: Feeds on seeds of grasses and forbs. Harvests from ground.

OTHER: Hibernates from about September to May.

REFERENCES: Krutzsch 1954b; Brown 1967, 1970.





Porcupine

M071 (*Erethizon dorsatum*)

STATUS: No official listed status. Common over widespread range in the Sierra Nevada, although uncommon in some areas.

DISTRIBUTION/HABITAT: Found throughout the Sierra Nevada from digger pine-oak belt up to the lodgepole pine forests. Avoids chamise chaparrel and oak savannah areas; prefers medium- and old-age conifer stands of less than 70 percent crown closure

SPECIAL HABITAT REQUIREMENTS: Forests containing shrubs and grasses or herbs.

BREEDING: One litter per year born between March and June, with peak from April through May. One young (rarely 2) born among rocks, in caves, hollow logs, snags, or in the burrows of other animals.

TERRITORY/HOME RANGE: Ranges generally smallest in winter, averaging 12.4 acres (5.0 ha). Studies in New York and Minnesota, respectively, provide data on home range sizes (Shapiro 1949, Marshall et al. 1962).

FOOD HABITS: Feeds on herbs, shrubs, fruits, and buds when available in spring and summer, and twigs, leaves, and cambium layer of conifers, especially pines, throughout year. Forages on ground or in shrubs and trees. Clips leaves and twigs, and debarks trees.

OTHER: Known to be preyed upon by mountain lions, bobcats, fishers, and wolverines. Sometimes controlled because of damage to trees. Densities up to 26/mi^2 (10/km^2). Does not hibernate.

REFERENCES: Taylor 1935, Curtis 1941, Woods 1973.





Coyote

M072 (*Canis latrans*)

STATUS: No official listed status. Common resident of the Sierra Nevada.

DISTRIBUTION/HABITAT: Widespread throughout the Sierra Nevada; found in almost every plant community and successional stage. Prefers habitat of grass-forb and shrub-seedling-sapling stages of all plant communities.

SPECIAL HABITAT REQUIREMENTS: Rock outcrops, caves, hollow stumps or logs, or deep, loose soil for den sites.

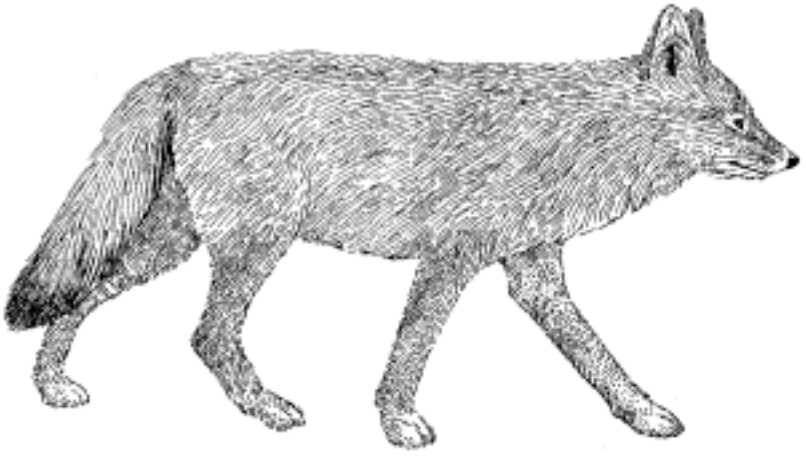
BREEDING: Females begin breeding during their second year and mate from February to May, with peak in April and May. Three to 15 young per litter (average 6 or 7); one litter per year. Gestation 63 days.

TERRITORY/HOME RANGE: In Sierra County, home ranges varied from 2470 to 24,700 acres (1000 to 10,000 ha) (Hawthorne 1972). Movements varied according to season.

FOOD HABITS: Eats mice, ground squirrels, gophers, rabbits, insects, carrion, fruits, and occasionally birds and deer fawns. Prey chased and captured in the open, or dug out of ground.

OTHER: May be active during day or night. Population densities know to vary from 0.02 to 1.2 individuals per 100 acres (40 ha). Two or more coyotes often cooperate while hunting.

REFERENCES: Gier 1968, Hawthorne 1972, Connolly and Longhurst 1975, Bekoff 1977.





Red Fox

M073 (*Vulpes vulpes*)

STATUS: No official listed status. Designated as fully protected furbearer by the California Department of Fish and Game. Populations highly vulnerable to disturbances, especially to overgrazing of alpine meadows.

DISTRIBUTION/HABITAT: Populations scattered in the Sierra Nevada; found primarily in upper elevation forests associated with the Sierra Nevada Crest. During summer, prefers mature Jeffrey pine, lodgepole pine, and red fir forests, interspersed with meadows. In winter, prefers mixed-conifer and ponderosa pine forests.

SPECIAL HABITAT REQUIREMENTS: Rock outcrops, hollow logs and stumps, or loose deep soil needed for den sites; forest openings.

BREEDING: Mates in late January and February; litters of 4 to 6 born in May and June. Dens found in rocky areas, talus, hollow stumps and logs and burrows.

TERRITORY/HOME RANGE: In the Midwest, home ranges were 321 to 5113 acres (130 to 2070 ha) (means of 494 to 1976 acres [200 to 800 ha]) (Ables 1975).

FOOD HABITS: Eats small rodents, squirrels, marmots, woodrats, pikas, rabbits, and insects. Also eats birds and berries. Hunts during day and night; stalks and pounces on prey.

OTHER: Separate population found in Sacramento Valley believed introduced from the East in 1880's. Four color phases recognized: black (rare), silver, red, and cross. *Vulpes* considered subgenus of *Canis* by some (Williams 1979).

REFERENCES: Grinnell *et al.* 1937, Ables 1975, Gray 1975, Schempf and White 1975.





Gray Fox

M074 (*Urocyon cinereoargenteus*)

STATUS: No official listed status. Furbearer, may be taken only during trapping season, with license. Rare to common in widespread range in the Sierra Nevada.

DISTRIBUTION/HABITAT: Found throughout lower foothill elevations; prefers chaparral and shrub-seedling-sapling stages of oak and digger pine woodlands; avoids dense and mature forests.

SPECIAL HABITAT REQUIREMENTS: Caves, hollow logs, snags, or rock crevices in talus for dens.

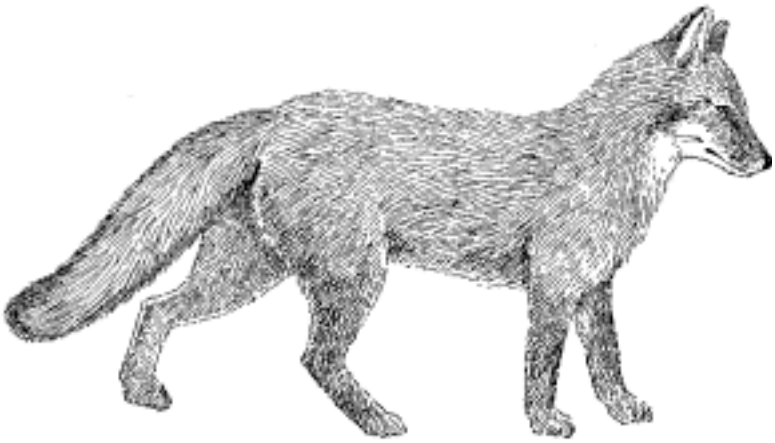
BREEDING: Breeds at 1 year of age and has one litter per year. Two to 7 young per litter are produced (average 3 or 4). Breeds from February to June, with peak from March to May. Dens found in rocky areas, crevices in cliffs, burrows, hollow logs, snags, and even buildings.

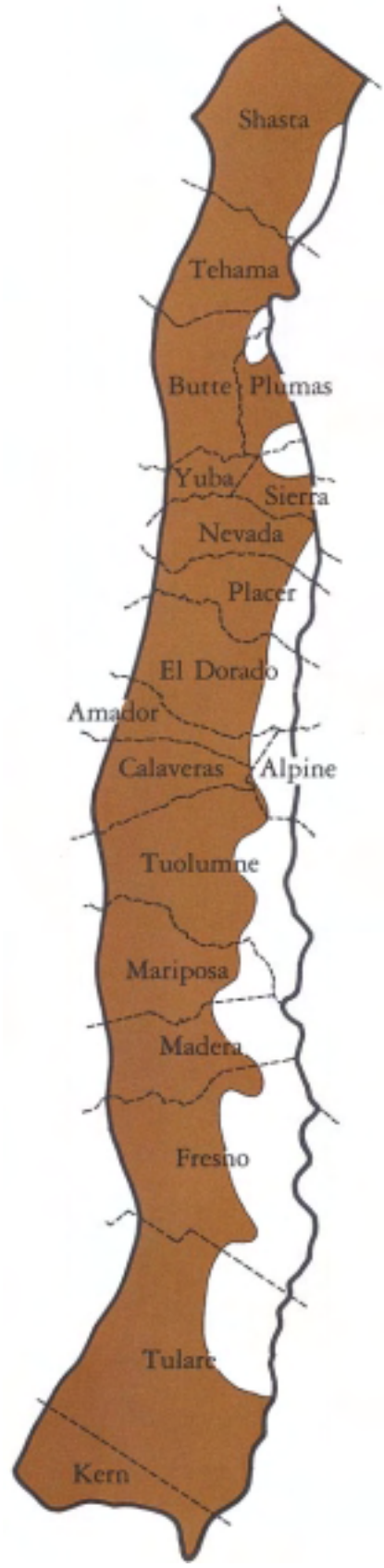
TERRITORY/HOME RANGE: Home ranges probably encompass up to 3.8 mi^2 (10 km^2), but average most likely between 0.2 to 1.2 mi^2 (0.5 to 3.0 km^2).

FOOD HABITS: Diet of mice, gophers, rabbits, woodrats, some birds, insects, fruits, and berries. Main hunting technique involves ambushing prey. Forages on ground and in shrubs; will climb trees.

OTHER: Crepuscular and nocturnal; active all year. Densities may reach 2.6 to 5 animals/mi^2 (1 or 2/km^2). In spring and summer, often associated in family aggregations. *Urocyon* considered conspecific with *Canis* by some (see Williams 1979).

REFERENCES: Grinnell *et at.* 1937, Lord 1961. Trapp and Hallberg 1975.





Black Bear

M075 (*Ursus americanus*)

STATUS: No official listed status. A big game species; common resident of the Sierra Nevada.

DISTRIBUTION/HABITAT: Widespread from digger pine-oak belt to alpine meadows. Prefers mature forests mixed with brushfields and meadows. Various habitats used, depending on availability of food (for example, mast crops and berries).

SPECIAL HABITAT REQUIREMENTS: Windfalls, excavated holes, or uprooted or hollow trees essential for den sites.

BREEDING: Mates in early summer; cubs born 7.5 months later in the winter den. Females first breed at 3 years of age and thereafter every second year. A 3-year-old female usually has 1 cub; twins and triplets common after that age.

TERRITORY/HOME RANGE: Home ranges of bears studied in Trinity County varied from 1235 to 6175 acres (500 to 2500 ha) (Piekielek and Burton 1975).

FOOD HABITS: Omnivorous and opportunistic. Diet of roots, fruits, nuts, grasses, insects, fish, small rodents, and carrion. Often tears apart rotting wood to locate insects and other animals; occasionally climbs trees in search of food.

OTHER: Den for much of winter; do not go into deep torpor. Can be aroused from dormancy at any time if sufficiently disturbed; may be active at any time of year. Suitable den sites may be a limiting factor affecting bear populations.

REFERENCES: Bray and Barnes 1967, Poelker and Hartwell 1973, Piekielek and Burton 1975.





Ringtail

M076 (*Bassariscus astutus*)

STATUS: No official listed status. A fully protected furbearer in California.

DISTRIBUTION/HABITAT: A permanent resident, widely distributed, varying in abundance from common to uncommon. Optimum habitats, provided crown closure less than 40 percent and special habitat requirements met: blue oak savannah, digger pine-oak, chaparral (with less than 50 percent shrub canopy cover), and riparian deciduous forests.

SPECIAL HABITAT REQUIREMENTS: Rock crevices or hollow trees or snags
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BREEDING: Young born in May and June (usual litter size 3 or 4). One litter per year. Rock piles, caves, abandoned burrows, holes in trees, woodrat nests, and occasionally human dwellings are den sites.

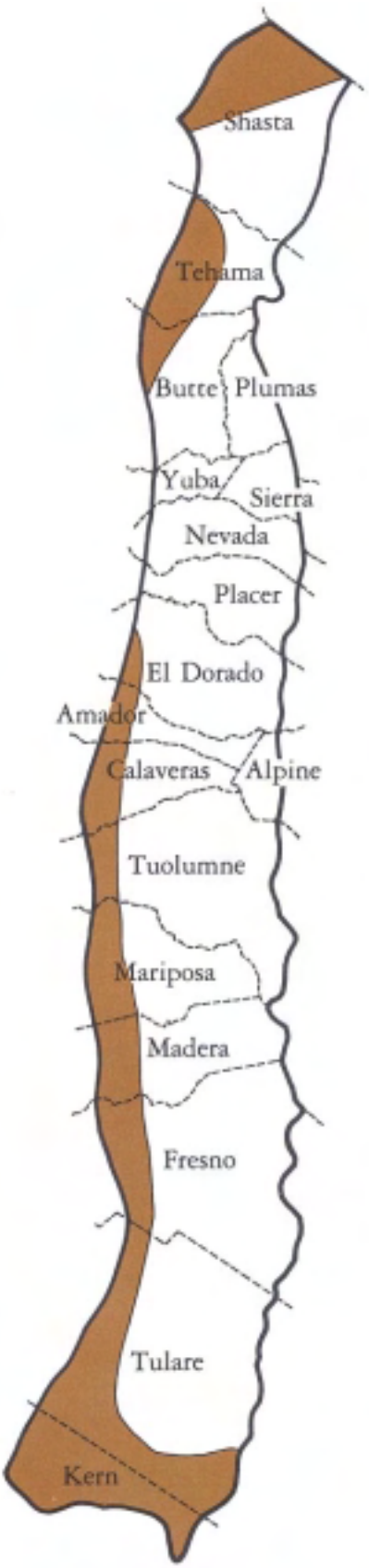
TERRITORY/HOME RANGE: Home ranges in Tuolumne County estimated to be 1250 to 1500 acres (500 to 600 ha) (Grinnell *et al.* 1937). A study in Texas found densities of 15.5/mi² (6/km²) (Taylor 1954). May be colonial.

FOOD HABITS: Forages on ground, among rocks, and in trees. Rodents, especially mice and woodrats, are primary foods, but some birds, reptiles, insects, and fruits also eaten.

OTHER: Nocturnal; active all year. Usually not found more than 0.6 mile (1.0 km) from water.

REFERENCES: Grinnell *et al.* 1937, Taylor 1954, Ingles 1965.





Raccoon

M077 (*Procyon lotor*)

STATUS: No official listed status. Rare to common in different parts of widespread range. A trapping license required to take this forbearer.

DISTRIBUTION/HABITAT: Found in all types of habitats; generally associated with riparian or wetland areas in low to middle elevational zones.

SPECIAL HABITAT REQUIREMENTS: Suitable den sites (hollow trees, logs, snags) and water.

BREEDING: One litter per year; from 2 to 7 young (mean of 4). Young born between March and May. Gestation 63 days. Den sites in holes in trees, under rocks, in hollow logs, in ground burrows, or sometimes in thick vegetation.

TERRITORY/HOME RANGE: Does not seem to defend areas beyond immediate vicinity of den. Home ranges averaged about 250 acres (100 ha) in Ohio (Urban 1970).

FOOD HABITS: In spring, feeds mainly on animals, such as crayfish, fish, frogs, and small mammals; in summer and fall, also eats fruits, seeds, acorns, insects, and other invertebrates. Forages primarily on ground and in shallow water.

OTHER: Often common near human settlements, where densities can average 155 animals/mi^2 (60/km^2). Populations occasionally reach high densities and may need some control.

REFERENCES: Grinnell *et al.* 1937, Stuewer 1943, Ingles 1965.





Marten

M078 (*Marten americana*)

STATUS: No official listed status. A fully protected furbearer; listed as sensitive by the Forest Service's Region 5.

DISTRIBUTION/HABITAT: Widespread; common to rare in different areas. Optimum habitat provided by red fir and lodgepole pine forests with more than 40 percent crown closure and varying amounts of shrub understory. Good habitat in large tree stages of mixed-conifer and Jeffrey pine forests.

SPECIAL HABITAT REQUIREMENTS: Snags; talus.

BREEDING: Mates in summer; young born the next spring. Long gestation results from delayed implantation of embryos. One litter per year; mean litter size 3 (range 1 to 4). Tree or snag cavities, hollow stumps, or rocky slopes with caves are nest sites.

TERRITORY/HOME RANGE: Size of home ranges varied in Montana from 0.03 to 2 mi^2 (0.08 to 5.2 km^2), with a mean of 0.2 to 1. 5 mi^2 (0. 5 to 3:9 km^2) (Hawley and Newby 1957). Size of territory unknown.

FOOD HABITS: Searches for and captures tree squirrels, chipmunks , mice, rabbits, pikas, and occasionally birds. Also eats some fruits. Forages in trees, tree cavities, on rock slopes, and ground. Feeds in summer in meadows and forest openings.

OTHER: Active all year during day and night. May move to lower elevations in winter. Uses cavities in large trees or snags for shelter and nesting.

REFERENCES: Grinnell *et al*. 1937; de Vos 1952; Newberry 1973a; Schempf and White 1975, 1977.





Fisher

M079 (*Marten pennanti*)

STATUS: No official listed status. A fully protected forbearer in California; on the Forest Service's Region 5 sensitive list.

DISTRIBUTION/HABITAT: Uncommon to rare throughout range. Optimum habitat in large tree stages, regardless of crown closure, in red fir and lodgepole pine forests. Good habitat in large tree stages, with more than 70 percent crown closure, in ponderosa pine, mixed-conifer, and Jeffrey pine forests.

SPECIAL HABITAT REQUIREMENTS: Snags or hollow trees for nest sites.

BREEDING: Mates in summer; young born the next spring. Long gestation because of delayed implantation of embryos. Mean litter size 2, range from 1 to 5. One litter per year. Nests in tree holes, rock slides, hollow logs, and snags.

TERRITORY/HOME RANGE: Home ranges in Ontario, Canada estimated to average 10 mi^2 (26 km^2) (de Vos 1952). Size of territory unknown.

FOOD HABITS: Eats squirrels, porcupines, woodrats, mice, marmots, mountain beavers, rabbits, and some birds, insects, and berries. Searches for and pursues prey on the ground, in burrows, and in trees.

OTHER: Active all year during day and night. Cavities in large trees and snags used for shelter and nesting.

REFERENCES: Grinnell *et al*. 1937; de Vos 1952; Schempfand White 1975, 1977.





Ermine

M080 (*Mustela erminea*)

STATUS: No official listed status. A furbearer; capture requires trapping license; limited trapping season. Locally common, but rare in southern part of range.

DISTRIBUTION/HABITAT: Found at higher elevations in the middle and northern Sierra Nevada, in pine and fir forests. Prefers mature, dense timber for breeding and resting; meadows or other open areas for hunting.

SPECIAL HABITAT REQUIREMENTS: Ground litter, logs, stumps, or snags for den sites; forest openings.

BREEDING: Young born in April or May; average 4 young (as many as 13 reported). Dens located among tree roots, under rocks, in hollow logs and snags, and burrows.

TERRITORY/HOME RANGE: Home ranges varied from 25 to 37 acres (10 to 15 ha) (Butt and Grossenheider 1976).

FOOD HABITS: Major food is voles (*Microtus*); also eats mice, shrews, and chipmunks. Small but agile predator, searches for and pursues prey in logs, stumps, dead wood, tunnels, and burrows.

OTHER: Diurnal and nocturnal; active all year. Pelage white in winter. Populations often cyclic, patterned after prey's population cycles. Densities may reach 21/mi^2 (8/km^2) at high point of cycles.

REFERENCES: Hall 1951, Ingles 1965.





Long-tailed Weasel

M081 (*Mustela frenata*)

STATUS: No official listed status. Fairly common over most of the western Sierra Nevada. A furbearer; protected by trapping season.

DISTRIBUTION/HABITAT: Found throughout all habitats from foothill grasslands to alpine meadows. Prefers meadows and other open areas, and young sapling stages of timber.

SPECIAL HABITAT REQUIREMENTS: Suitable den sites (ground cover, logs, stumps, snags, or burrows); forest openings.

BREEDING: Mates in July or August; gestation long (179 days), with young born in April or May. Four to 8 young (average 6) born in burrows under roots, rocks, logs, in hollow trunks of trees and snags, and sometimes in burrows of other animals.

TERRITORY/HOME RANGE: May range over areas from 25 to 125 acres (10 to 50 ha), but average size of home range is 25 to 49 acres (10 to 20 ha) (Quick 1951, Burt and Grossenheider 1976).

FOOD HABITS: Major predator of voles and other mice. Also eats chipmunks, woodrats, gophers, some birds and insects, and vegetation. Obtains prey by searching in logs, stumps, dead wood, tunnels, and burrows.

OTHER: Diurnal and nocturnal; active throughout year. Molts to a white pelage in winter at higher elevations. In good habitat, average densities may be 2.6/mi^2 (1/km^2), and may range as high as 18/mi^2 (7/km^2) in favorable habitats.

REFERENCES: Grinnell *et al.* 1937, Quick 1951, Ingles 1965.





Mink

M082 (*Mustela vison*)

STATUS: No official listed status. Rather uncommon, but widespread. A furbearer, may be taken only during trapping season.

DISTRIBUTION/HABITAT: A variety of habitats, but primarily riparian and wetland.

SPECIAL HABITAT REQUIREMENTS: Permanent source of water, and suitable burrowing sites.

BREEDING: Single litter of 2 to 10 (mean of 5) born between February and May. Most births in April. Gestation from 38 to 85 days, depending on time of mating. Age at first breeding usually 1 year. Den sites include burrows, hollow logs, tree stumps, and rock crevices.

TERRITORY/HOME RANGE: May range over areas up to 1240 acres (500 ha), but home range sizes in Montana varied between 49 and 185 acres (20 and 75 ha) (Mitchell 1961).

FOOD HABITS: Pursues fishes, frogs, crayfish, mice, muskrats, rabbits, and some birds in shallow water and on land, near water.

OTHER: Generally nocturnal; active all year. Relatively tolerant of human activities. Densities may reach 23/mi^2 (9/km^2).

REFERENCES: Grinnell *et al.* 1937, Mitchell 1961, Schempf and White 1974.





Wolverine

M083 (*Gulo gulo*)

STATUS: Listed as Rare by the State of California; a fully protected furbearer. Historically, never present in large numbers; numbers thought to be increasing in California.

DISTRIBUTION/HABITAT: Distribution scattered, mostly near timberline. Optimum habitat in large tree stages with moderate to dense canopy cover in red fir and lodgepole pine forests, and in alpine meadows.

SPECIAL HABITAT REQUIREMENTS: Low human disturbance; rocky areas, caves, logs, or snags as den sites.

BREEDING: Mates in summer; 1 to 4 young (mean of 3) born the next spring. Long gestation because of delayed implantation of embryos. One litter per year. Excavates burrows under shelving rock or in logs, caves, or snags.

TERRITORY/HOME RANGE: In Montana, distances between locations of 3.1 to 8.1 miles (5 to 13 km) with daily movements of up to 20 miles (32 km) reported (Hornocker and Hash 1976).

FOOD HABITS: A solitary hunter; forages on ground, in trees, burrows, and rock piles for carrion or live prey. Captures prey by digging animal out of its burrow, by pursuit and capture, or by ambush. Prey include marmots, gophers, squirrels, rats, mice, birds, insects, and occasionally ungulates. Fruits also eaten.

OTHER: Active by day and night all year. Often found above timberline. Scant data on home range, movements, and habitat requirements.

REFERENCES: Grinnell *et al.* 1937; Hornocker and Hash 1976; Schempf and White 1975, 1977.





Badger

M084 (*Taxidea taxus*)

STATUS: No official listed status. A furbearer; protected by a closed season. Uncommon, but widely distributed throughout the western Sierra Nevada.

DISTRIBUTION/HABITAT: Grass-forb stages of all habitats except riparian deciduous are optimum.

SPECIAL HABITAT REQUIREMENTS: Open areas with friable soils.

BREEDING: From 1 to 5 young (mean litter size 2) born between February and May. One litter per year. Deep, friable soil for burrow excavation and a dependable supply of rodents.

TERRITORY/HOME RANGE: In Minnesota, home range sizes varied from 100 to 500 acres (40 to 200 ha) (Sargeant and Warner 1972). Territory size unknown; densities of 0.4 to 3.4/mi^2 (0.15 to 1.30/km^2) recorded in northeastern Colorado (Flinders and Hansen 1975).

FOOD HABITS: Digs out or chases ground squirrels, gophers, rats, mice, and chipmunks from burrows. Also eats ground nesting birds and their eggs, lizards, and snakes.

OTHER: Diurnal and nocturnal; spends much time underground.

REFERENCES: Grinnell *et al.* 1937, Sargeant and Warner 1972, Long 1973.





Western Spotted Skunk

M085 (*Spilogale gracilis*)

STATUS: No official listed status. Common locally, but not frequently seen.

DISTRIBUTION/HABITAT: Found in several habitats from annual grasslands through ponderosa pine zone. Prefers chaparral and shrub-seedling-sapling stage of pine-oak woodlands.

SPECIAL HABITAT REQUIREMENTS: Rock outcrops, ground burrows, hollow logs, stumps, snags, or brush piles for den sites.

BREEDING: One litter per year; 4 to 7 young (mean of 6), born in May and June. Dens in any sheltering cavity in rock outcrops, burrows, hollow logs, stumps and snags, and brush piles. Gestation as long as 120 days.

TERRITORY/HOME RANGE: Territoriality not known, but home ranges may vary from 25 to 160 acres (10 to 65 ha) (Burt and Grossenheider 1976).

FOOD HABITS: Eats mostly insects and small rodents, also some reptiles, amphibians, birds, eggs, and plant matter. Food obtained by searching, digging, and climbing. Areas searched include ground surface, stumps, snags, and logs.

OTHER: Usually nocturnal and crepuscular. Does not hibernate, but may den up for several days at a time in winter: den sites, therefore, a key component of habitat. Densities may reach 13/mi² (5/km²).

REFERENCES: Grinnell *et al.* 1937, Crabb 1948, Haley 1975.





Striped Skunk

M086 (*Mephitis mephitis*)

STATUS: No official listed status. Usually common within its range.

DISTRIBUTION/HABITAT: Prefers shrubby areas in annual grasslands, chaparral, and pine-oak woodlands of the Sierra Nevada. Prefers younger successional stages in forests, but may be found in all stages and canopy covers.

SPECIAL HABITAT REQUIREMENTS: Suitable den sites (rock piles, logs, snags, and burrows).

BREEDING: One litter per year; 2 to 10 young (mean of 6), born between April and June (peak in May). Dens located mostly in rock piles; old burrows, hollow logs, stumps, and snags also used.

TERRITORY/HOME RANGE: Home ranges from 74 to 2000 acres (30 to 800 ha), but in Illinois averaged 1000 acres (400 ha) (Storm 1972). Extent of territoriality unknown.

FOOD HABITS: Feeds mainly on large insects and small rodents, but eats some carrion, birds, eggs, and plant matter. Food obtained by digging in soil and searching on ground surface and in hollow stumps, snags, and logs.

OTHER: Chiefly nocturnal and crepuscular. Does not hibernate, but may den up for several days at a time, especially in winter. Densities may reach 259/mi^2 (100/km^2).

REFERENCES: Grinnell *et al.* 1937, Verts 1967, Storm 1972.





River Otter

M087 (*Lutra canadensis*)

STATUS: No official listed status. Usually fairly rare, but individuals may be locally common. Fully protected; may not be hunted.

DISTRIBUTION/HABITAT: Patchy distribution in the Sierra Nevada. Found only near permanent water. Foothill zones preferred to higher regions.

SPECIAL HABITAT REQUIREMENTS: Large streams, lakes, or rivers essential.

BREEDING: Sexually mature at 2 years; males reach peak at from 5 to 7 years. Gestation period as long as 1 year because of delayed implantation of embryos. Single litter of 1 to 5 cubs (mean of 2) born in April or May. Dens located in burrows dug by other animals, cavities among roots of trees, hollow logs, or thickets of vegetation.

TERRITORY/HOME RANGE: May travel up to 15 miles (25 km) following stream or lake edges. Deposits scent (sign posting) to mark territories.

FOOD HABITS: Fish, crayfish, amphibians, aquatic invertebrates, and some mammals. Some trout taken, but slower fishes (for example, sculpins and squawfish) preferred. Most food acquired by pursuit in the water and on nearby banks.

OTHER: Diurnal and nocturnal; active all year. Social animals; may remain in family groups for 8 months.

REFERENCES: Grinnell *et al.* 1937, Liers 1951, Newberry 19736, Haley 1975, Kirk 1975.





Mountain Lion

M088 (*Felis concolor*)

STATUS: No official listed status. Legislative moratorium on hunting this species in effect in California. Estimated population level in California between 1000 and 2500 individuals.

DISTRIBUTION/HABITAT: Widespread, with greatest densities in the central and southern Sierra Nevada. Found throughout all habitat types and successional stages.

SPECIAL HABITAT REQUIREMENTS: Suitable den sites in rock crevices or caves; deer for food.

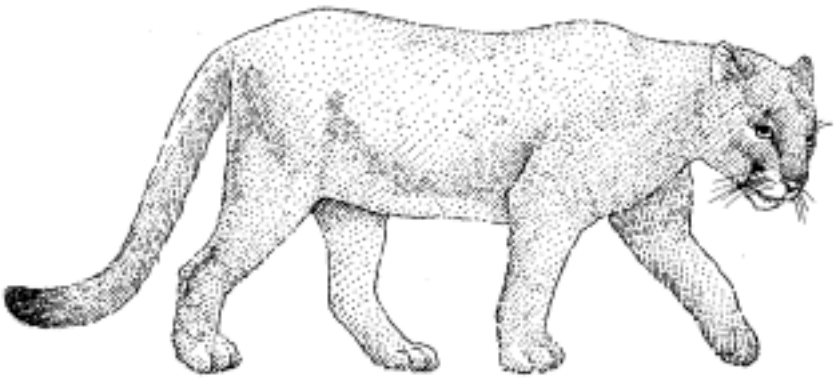
BREEDING: Breeds at any time of the year, with peak in April. Litter size from 1 to 5 (mean of 2). One litter every 2 years. A den required to raise young.

TERRITORY/HOME RANGE: Home ranges may overlap considerably; vary in size from 5 to 20 mi^2 (13 to 52 km^2) for females, and 25 to 96 mi^2 (65 to 250 km^2) for males in the Salmon River drainage, Idaho (Hornocker 1970).

FOOD HABITS: Deer are primary food; also porcupines, rabbits, and rodents. Captures prey by stalking or ambush in areas of rocky or brushy cover.

OTHER: Active all year during day and night. Usually closely associated with deer.

REFERENCES: Hornocker 1970, Sitton and Wallen 1976, Koford 1977.





Bobcat

M089 (*Fells rufus*)

STATUS: No official listed status. A furbearer, may be taken only in designated season.

DISTRIBUTION/HABITAT: Widespread with densities from locally common to uncommon. Found in nearly all habitats and successional stages. Shrub-seedling-sapling stages of woodlands and forests, and all stages of chaparral are optimum habitats.

SPECIAL HABITAT REQUIREMENTS: Rocky areas, caves, or logs.

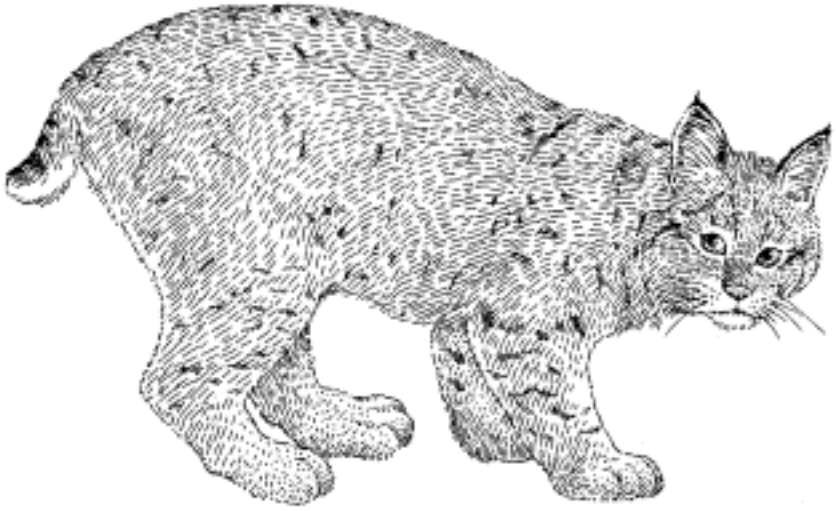
BREEDING: Breeds from January to June, with peak from February to May. Litter size from 1 to 6 (mean of 3); one litter per year. A den site in small caves, crevices, under logs, or dense brush required for raising young.

TERRITORY/HOME RANGE: Home range varies in size, depending on prey availability. In Idaho, home ranges were from 1 mi^2 (2.6 km^2) to 41 mi^2 (105 km^2) (Bailey 1974).

FOOD HABITS: Stalks or ambushes prey on ground in brushy and rocky areas. Feeds on rats, mice, squirrels, and other rodents, a few birds, reptiles, and invertebrates.

OTHER: Active all year, during both night and day.

REFERENCES: Young 1958, Provost *et al.* 1973, Bailey 1974.





Wild Horse

M090 (*Equus caballus*)

STATUS: No official listed status. Species fully protected. Only one small population in the Sierra Nevada.

DISTRIBUTION/HABITAT: Found in grassland, chaparral, and oak woodland habitats in Tehama County in the western Sierra Nevada.

SPECIAL HABITAT REQUIREMENTS: Needs grasses and water.

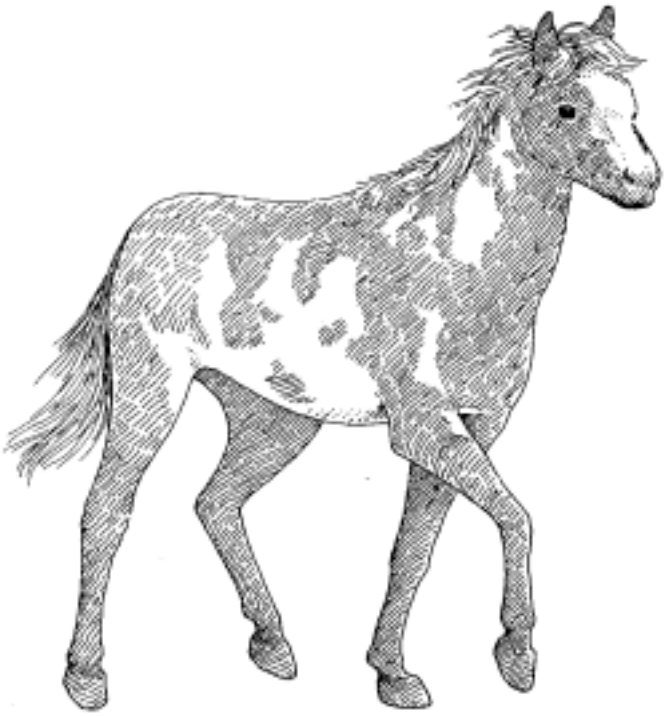
BREEDING: Groups composed of harems-1 dominant stallion, 1 or 2 immature stallions, 1 to 12 adult mares with yearlings and foals, and 1 to 3 immature mares. One foal born to a mare annually, between March and July; majority of births in May. Mares give birth in seclusion, usually during nighttime.

TERRITORY/HOME RANGE: Space not defended; but stallion defends harem. In Wyoming, home ranges varied from 740 to 7910 acres (300 to 3200 ha) (mean of 3710 acres [1500 ha]) (Feist and McCullough 1975).

FOOD HABITS: Grasses, forbs, and shrubs are major foods.

OTHER: Grouped in harems, or in bachelor herds of 1 to 8 or more stallions.

REFERENCES: Feist and McCullough 1975, 1976; Zarn *et al.* 1977.





Wild Pig

M091 (*Sus scrofa*)

STATUS: No official listed status. Introduced from Europe; a big game animal in California.

DISTRIBUTION/HABITAT: Distribution spotty in the Sierra Nevada. Found at lower elevations in annual grasslands and oak woodlands, but mostly in denser stands of chaparral and digger pine-oak forests with canopy closures of at least 50 percent.

SPECIAL HABITAT REQUIREMENTS: Water and shrubs.

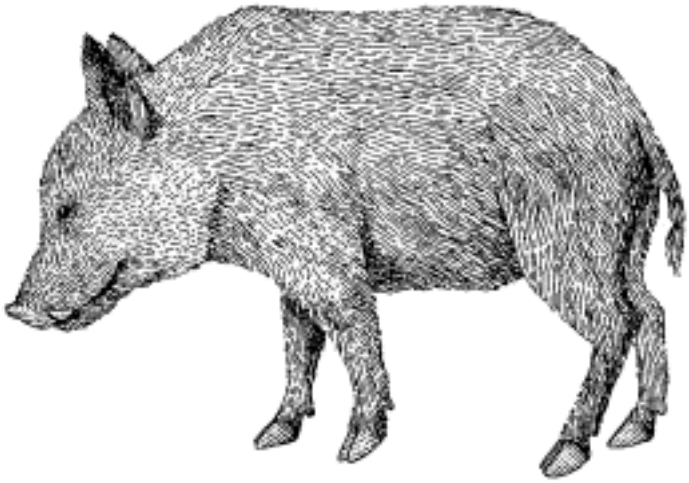
BREEDING: One or two litters per year, up to 11 per litter (mean of 4). Main breeding season from October through June; some may breed at any time of year. Gestation lasts 4 months.

TERRITORY/HOME RANGE: Sedentary; stays with food and water supplies until diminished. Travels from 0.6 to 3 miles (1 to 5 km), and occasionally up to 12 miles (20 km) over several months; not territorial (Pine and Gerdes 1973).

FOOD HABITS: Acorns, berries, fruit, forbs, grasses, cultivated grains, bulbs, roots, earthworms, snakes, lizards, and carrion. Obtains food by rooting in soil, in rotted logs, and by more conventional means.

OTHER: Because of food habits, can be agricultural pests. Densities vary from at least 1.3 to 4/mi^2 (0.5 to 1.5/km^2).

REFERENCES: California Department of Fish and Game 1970, Pine and Gerdes 1973, Nelson and Hooper 1976. Barrett 1978.





Wapiti

M092 (*Cervus elaphus*)

STATUS: No official listed status. Currently protected from hunting, except for occasional hunts by special permit.

DISTRIBUTION/HABITAT: Only population within the western Sierra Nevada introduced into Shasta County. Prefers meadows and grasslands with surrounding cover for shelter.

SPECIAL HABITAT REQUIREMENTS: Dense cover for shelter; grasses.

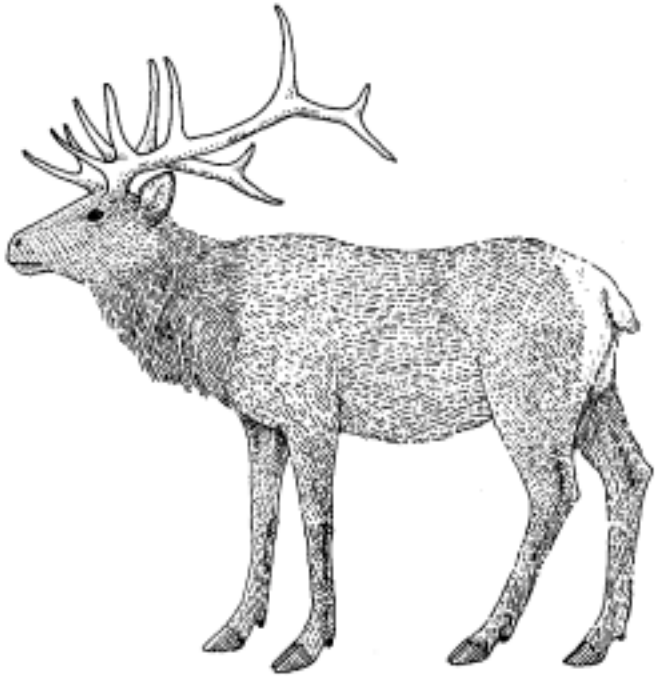
BREEDING: Breeds from April to June, with peak in May. Usually only 1 calf, but twins not uncommon. Cows must be at least 2 years old to give birth, usually in a secluded area with good cover. Gestation 255 days.

TERRITORY/HOME RANGE: Not territorial, but home range up to 20 mi^2 (50 km^2) in the Rocky Mountians (Hieb 1977).

FOOD HABITS: Diet primarily grasses, forbs, browse, and some mast.

OTHER: Population of 50 elk introduced into Shasta County in 1913; now numbers 350.

REFERENCES: Murie 1951, Mackie 1970, Hieb 1977.





Mule Deer

M093 (*Odocoileus hemionus*)

STATUS: No official listed status. A big game species.

DISTRIBUTION/HABITAT: Widespread and common; numbers may be declining. Shrub-seedling-sapling stages of most habitats best.

SPECIAL HABITAT REQUIREMENTS: Trees-shrubs for cover on winter range.

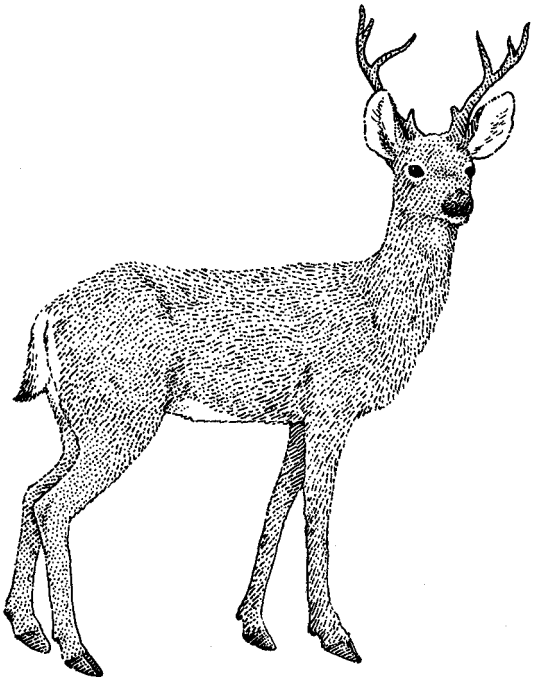
BREEDING: Mates from mid-September through December, with peak in October and November. Usually 1 or 2 (rarely 3) fawns born in May, June, or early July (average 1.5 fawns from each doe). Scattered areas of dense cover near meadows and glades, with nearby lush feed, as fawning sites.

TERRITORY/HOME RANGE: Typical home range covered 0.4 to 1.1 mi^2 (1 to 3 km^2), but varied from 0.2 to 1.9 mi^2 (0.5 to 5.0 km^2) in Lake County (Taber and Dasmann 1958). Statewide, densities of 18 to 60/mi^2 (7 to 23/km^2) typical, with range from 5 to 104/mi^2 (2 to 40/km^2) (Longhurst *et al.* 1952). Not territorial.

FOOD HABITS: Tender new growth of various shrubs-ceanothus, cherry, mountain mahogany, many forbs, and some grasses.

OTHER: Yearlings breed when habitat conditions excellent. Most herds migratory, follow definite routes between summer and winter ranges. May be active at any hour of day.

REFERENCES: Longhurst *et al.* 1952, Taylor 1956, Taber and Dasmann 1958.





Mountain Sheep

M094 (*Ovis canadensis*)

STATUS: Designated Rare by the California Department of Fish and Game. Few isolated populations in the Sierra Nevada; numbers may be decreasing.

DISTRIBUTION/HABITAT: Southern end of the Sierra Nevada in perennial range and alpine meadows in summer; east side of the Sierra Nevada in winter.

SPECIAL HABITAT REQUIREMENTS: Rocky areas adjacent to meadows to protect young lambs; minimal disturbance from humans.

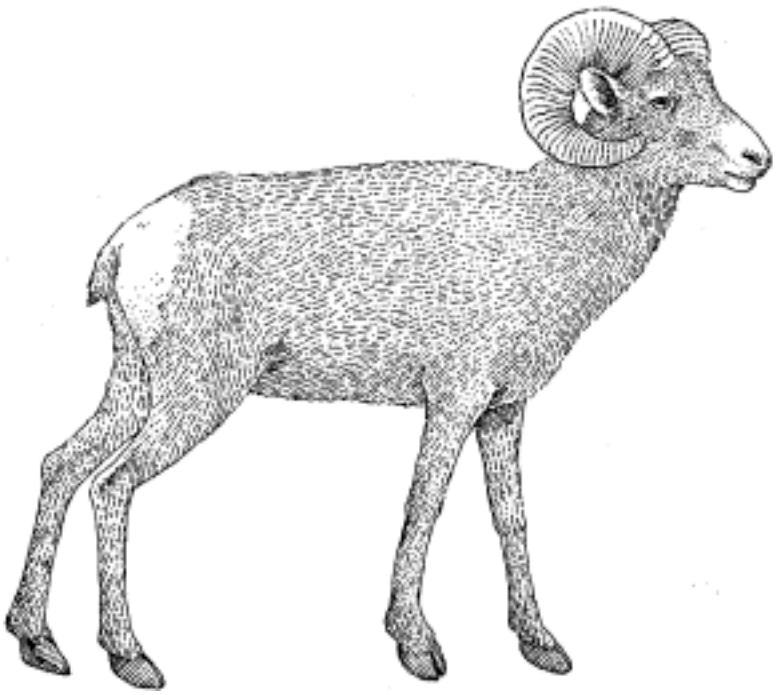
BREEDING: One or two lambs born in May or June in broken, rugged cliffs where protected from predators. Gestation 180 days.

TERRITORY/HOME RANGE: Not territorial; herds may range over 60 to 155 mi^2 (150 to 400 km^2) (Dunaway 1970).

FOOD HABITS: Eats alpine shrubs and forbs in summer; shrubs and perennial grasses in winter.

OTHER: Good quality range critical.

REFERENCES: Packard 1946, McCullough and Schneegas 1966, Dunaway 1970, Geist 1971, Hicks and Elder 1979.





Literature Cited

Ables, E. D.
1975. Ecology of the red fox in North America. *In* The Wild Canids. M. W. Fox, ed. p. 216-236. Van Nostrand Reinhold, New York.

Adams, L.
1959. An analysis of a population of snowshoe hares in northwestern Montana. Ecol. Monogr. 29:141-170.

Aleksiuk, M.
1968. Scent mound communication, territoriality, and population regulation in beaver (*Castor canadensis* Kuhl). J. Mammal. 49:759-762.

Anderson, S.
1959. Distribution, variation, and relationships of the montane vole, *Microtus montanus.* Univ. Kansas Publ., Mus. Nat. Hist. 9:415-511.

Armitage, K.B.
1974. Male behavior and territoriality in the yellow-bellied marmot. J. Zool. London 172:233-265.

Asserson, W. C., III.
1974. Western gray squirrel study in Kern County, California. Calif. Fish and Game, Wildl. Manage. Branch. Admin. Rep. 74-1. 32 p.

Bailey, T. N.
1974. Social organization in a bobcat population. J. Wildl. Manage. 38:435-446.

Bailey, V.
1936. The mammals and life zones of Oregon. N. Amer. Fauna 55:1-416.

Barash, D. P.
1973. Territorial and foraging behavior of pika (*Ochotona princeps*) in Montana. Amer. Midl. Nat. 89:202-207.

Barash, D. P.
1974. The evolution of marmot societies: a general theory. Science 185:415-420.

Barbour, R. W., and W. H. Davis.
1969. Bats of America. 286 p. Univ. Kentucky Press, Lexington.

Barnes. V. G., Jr.
1973. Pocket gophers and reforestation in the Pacific Northwest: a problem analysis. U.S. Dep. Inter., Bur. Sport Fish. Wildl. Spec. Sci. Rep. Wildl. 155:1-18.

Barrett, R. H.
1978. The feral hog on the Dye Creek Ranch, California. Hilgardia 46:283-355.

Batzli, G. O. , and F. A. Pitelka.
1970. Influence of meadow mouse populations on California grassland. Ecology 51:1027-1039.

Bear, G. D., and R. M. Hansen.
1966. Food habits, growth and reproduction of white-tailed jackrabbits in southern Colorado. Colorado State Univ. Agric. Exp. Stn. Tech. Bull. 90:1-59.

Bekoff, M.
1977. *Canis latrans.* Mammal Species 79:1-9.

Black, H. L.
1972. Differential exploitation of moths by the bats *Eptesicus fuscus* and *Lasiurus cinereus.* J. Mammal. 53:598-601.

Black, H.L.
1974. A north temperate bat community: structure and prey populations. J. Mammal. 55:138-157.

Brant, D. H.
1962. Measures of the movements and population densities of small rodents. Univ. Calif. Publ. Zool. 62:105-184.

Bray, O. E., and V. G. Barnes, Jr.
1967. A literature review on black bear populations and activities. Colorado Coop. Res. Unit, Colorado State Univ., Fort Collins, 34 p.

Broadbooks, H. E.
1958. Life history and ecology of the chipmunk, *Eutamias amoenus,* in eastern Washington. Misc. Publ. Mus. Zool.. Univ. Michigan 103:1-42.

Broadbooks, H. E.
1965. Ecology and distribution of pikas of Washington and Alaska. Amer. Midl. Nat. 73:299-335.

Broadbooks, H. E.
1970a. Home ranges and territorial behavior of the yellow pine chipmunk (*Eutamias amoenus*). J. Mammal. 51:310-326.

Broadbooks, H. E.
1970b. Populations of the yellow pine chipmunk, *Eutamias amoenus.* Amer. Midl. Nat. 83:472-488.

Brown, L. N.
1967. Seasonal activity patterns and breeding of

the western jumping mouse (*Zapus princeps*) in Wyoming. Amer. Midl Nat. 78:460-470.

Brown, L. N.
1970. Population dynamics of the western jumping mouse (*Zapus princeps*) during a four year study. J. Mammal. 51:651-658.

Burt, W. H., and R. P. Grossenheider.
1976. A field guide to the mammals, 3d ed. 289 p. Houghton Mifflin Co., Boston.

California Department of Fish and Game.
1970. Feral animals in California. 12 p. (Mimeo.)

Callahan, J. R.
1977. Diagnosis of *Eutamias obscurus* (Rodentia: Sciuridae). J. Mammal. 58:188-201.

Capp, J. C.
1976. Increasing pocket gopher problems in reforestation. Proc. Seventh Vertebr. Pest Conf., p. 222-228.

Chapman, J. A.
1971. Orientation and homing of the brush rabbit (*Sylvilagus bachmani*). J. Mammal. 52:686-699.

Chapman, J. A.
1974. *Sylvilagus bachmani.* Mammal. Species 34:1-4.

Chapman, J. A., and A. L. Harman.
1972 The breeding biology of a brush rabbit population. J. Wildl. Manage. 36:816-823.

Clothier, R. R.
1955. Contribution to the life history of *Sorex vagrans* in Montana. J. Mammal. 36:214-221.

Cockrum, E.L.
1952. Mammals of Kansas. Univ. Kansas Publ., Mus. Nat. Hist. 7:1-303.

Cockrum, E. L., and E. Ordway.
1959. Bats of the Chiricahua mountains, Cochise County, Arizona. Amer. Mus. Novitates 1938:1-10.

Conaway, C. H.
1952. Life history of the water shrew (*Sorex palustris navigator*). Amer. Midl. Nat. 48:219-248.

Connolly. G. E., and W. M. Longhurst.
1975. The effects of control on coyote populations. Bull. Univ. Calif., Div. Agric. Sci. 1872:1-37.

Constantine, D. G.
1966. Ecological observations on lasiurine bats in Iowa. J. Mammal. 47:34-41.

Cowan, I. McT.
1936. Nesting habits of the flying squirrel (*Glaucomys sabrinus*). J. Mammal. 17:58-60.

Cowan, I. McT., and C. J. Guiguet.
1965. The mammals of British Columbia. Handb. British Columbia Prov. Mus. 11:1-414.

Crabb, W. D.
1948. The ecology and management of the prairie spotted skunk in Iowa. Ecol. Monogr. 18:201-232.

Cranford, J. A.
1977. Home range and habitat utilization by *Neotoma fuscipes* as determined by radiotelemetry. J. Mammal. 58:165-172.

Curtis, J. D.
1941. The silvicultural significance of the porcupine. J. For. 39:583-594.

Dalquest, W. W.
1947. Notes on the natural history of the bat *Corynorhinus rafinesquii* in California. J. Mammal. 28:17-30.

Dalquest, W. W.
1948. Mammals of Washington. Univ. Kansas Publ., Mus. Nat. Hist. 2:1-444.

Dalquest, W. W., and D. R. Orcutt.
1942. The biology of the least shrew-mole, *Neurotrichus gibbsii minor*. Amer. Midl. Nat. 27:387-401.

Davis, R. B., C. F. Herreid, II, and H. L. Short.
1962. Mexican free-tailed bats in Texas. Ecol. Monogr. 32:311-346.

Davis, W. H., and H. B. Hitchcock.
1956. Biology and migration of the bat, *Myotis lucifugus,* in New England. J. Mammal. 46:296-313.

Davis, W. H., R. W. Barbour, and M. D. Hassell.
1968. Colonial behavior of *Eptesicus fuscus.* J. Mammal. 49:44-50.

de Vos, A.
1952. Ecology and management of fisher and marten in Ontario. Tech. Bull., Ontario Dep. Lands and Forests, 90 p.

Dixon, J.
1919. Notes on the natural history of the bushy-tailed woodrats of California. Univ. Calif. Publ. Zool. 21:49-74.

Douglas, C. L.
1969. Comparative ecology of pinyon mice and deer mice in Mesa Verde National Park,

Colorado. Univ. Kansas Publ, Mus. Nat. Hist. 18:421-504.

Dunaway, D. J.
1970. Status of bighorn sheep populations and habitat studies on the Inyo National Forest. Trans., 1970 Desert Bighorn Council, p. 127-146.

Earhart, C. M.
1969. The influence of soil texture on the structure, durability, and occupancy of muskrat burrows in farm ponds. Calif. Fish and Game 55:179-196.

Easterla, D. A.
1965. The spotted bat in Utah. J. Mammal. 46:665-668.

Easterla, P., and D. Easterla.
1969. America's rarest mammal. Nat. Wildl. 7(5):15-18.

Edwards, R. Y.
1955. The habitat of the boreal *Phenacomys*. Murrelet 36:35-38.

Errington, P. L.
1963. Muskrat populations. 665 p. Iowa State Univ. Press, Ames.

Feist, J. D., and D. R. McCullough.
1975. Reproduction in feral horses. J. Reprod. Fert., Suppl. 23:13-18.

Feist, J. D., and D. R. McCullough.
1976. Behavior patterns and communication in feral horses. Zeitschrift fur Tierpsychology. 41:337-371.

Findley, J. S., A. H. Harris, D. E. Wilson, and C. Jones.
1975. Mammals of New Mexico. 360 p. Univ. New Mexico Press, Albuquerque.

Fisler, G. F.
1962. Homing in the California vole, *Microtus californicus*. Amer. Midl. Nat. 68:357-368.

Fitch, H. S.
1947. Ecology of a cottontail rabbit (*Sylvilagus auduboni*) population in central California. Calif. Fish and Game 33:159-189.

Fitch, H. S.
1948a. Habits and economic relationships of the Tulare kangaroo rat. J. Mammal. 29:5-35.

Fitch, H.S.
1948b. The ecology of the California ground squirrel on grazing land. Amer. Midl. Nat. 39:513-596.

Flinders, J. T., and R. M. Hansen.
1972. Diets and habitats of jackrabbits in northeastern Colorado. Sci. Ser. Dep. Range Sci., Colorado State Univ. 12:1-29.

Flinders, J. T., and R. M. Hansen.
1975. Spring population responses of cottontails and jackrabbits to cattle grazing shortgrass prairie. J. Range Manage. 28:290-293.

Forbes, R. B.
1966. Studies of the biology of Minnesotan chipmunks. Amer. Midl. Nat. 76:290-308.

Foster, J. B.
1961. Life history of the *Phenacomys* vole. J. Mammal. 42:181-198.

Gashwiler, J. S.
1959. Small mammal study in west-central Oregon. J. Mammal. 40:128-139.

Geist, V.
1971. Mountain sheep. 383 p. Univ. Chicago Press, Chicago.

Gier, H. T.
1968. Coyotes in Kansas. Agric. Exp. Stn., Kansas State Univ., Bull. Agric. and Appl. Sci. 393:1-118.

Giger, R. D.
1973. Movements and homing in Townsend's mole near Tillamook, Oregon. J. Mammal. 54:648-659.

Gill, A. E.
1977. Food preferences of the California vole, *Microtus californicus*. J. Mammal. 58:229-233.

Godin, A. J.
1964. A review of the literature of the mountain beaver. U.S. Fish and Wildl. Serv., Spec. Sci. Rep., Wildl. 78:1-52.

Gordon, K.
1943. The natural history and behavior of the western chipmunk and the mantled ground squirrel. Oregon State Monogr., Studies Zool. 5:1-104.

Gray, R. L.
1975. Sacramento Valley red fox survey. Calif. Dep. Fish and Game, Nongame Wildl. Invest., job II-1.2, Progress Rep. 10 p. (Mimeo.)

Grinnell, H. W.
1918. A synopsis of the bats of California. Univ. Calif. Publ., Zool. 17:223-404.

Grinnell, J., and J. Dixon.
1919. Natural history of the ground squirrels of California. Bull. State Comm. Hort. Calif. 7:597-708.

Grinnell, J., and T. I. Storer.
1924. Animal life in the Yosemite. 741 p. Univ.

Calif. Press, Berkeley.
Grinnell, J., J. S. Dixon, and J. M. Linsdale.
1937. The fur-bearing mammals of California. 2 vols., 771 p. Univ. Calif. Press, Berkeley.
Haley, D.
1975. Sleek and savage. 128 p. Pacific Search Books, Seattle, Wash.
Hall, E. R.
1946. Mammals of Nevada. 710 p. Univ. Calif Press, Berkeley.
Hall, E. R.
1951. American weasels. Univ. Kansas Publ., Mus. Nat. Hist. 4:1-466.
Hall, E. R., and K. R. Kelson.
1959. The mammals of North America. 2 vols., 1162 p. Ronald Press, New York.
Hall, J. G.
1960. Willow and aspen in the ecology of beaver on Sagehen Creek, California. Ecology 41:484-497.
Hamilton, W. J., Jr.
1943. The mammals of eastern United States. 432 p. Comstock Publ. Assoc., Ithaca, New York.
Hartesveldt, R. J., H. T. Harvey, H. S. Shellhammer, and R. E. Stecker.
1970. Giant sequoia ecology. Dep. Biol., San Jose State College, San Jose, Calif , 48 p. (Mimeo.)
Hawes, M. L.
1977. Home range, territoriality, and ecological separation in sympatric shrews, *Sorex vagrans* and *Sorex obscurus.* J. Mammal. 58:354-367.
Hawley, V. D., and F. E. Newby.
1957. Marten home ranges and population fluctuations. J. Mammal. 38:174-184.
Hawthorne, V. M.
1972. Coyote food habits in Sagehen Creek basin, northeastern California. Calif. Fish and Game 58:4-12.
Heller, H. C.
1971. Altitudinal zonation of chipmunks (*Eutamias*): interspecific aggression. Ecology 52:312-319.
Heller, H. C., and D. M. Gates.
1971. Altitudinal zonation of chipmunks (*Eutamias*): energy budgets. Ecology 52:424-433.
Heller, H. C., and T. Poulson
1972. Altitudinal zonation of chipmunks (*Eutamias*): adaptations to aridity and high temperature. Amer. Midl. Nat. 87:296-313.
Hicks, L. L., and J. M. Elder.
1979. Human disturbance of Sierra Nevada bighorn sheep. J. Wildl. Manage. 43:909-915.
Hieb, S. R. (ed.)
1977. Proc. elk-logging-roads symposium, 1976. Forest Wildlife and Range Exp. Stn., Univ. Idaho, Moscow. 142 p.
Holdenreid, R.
1940. A population study of the long-eared chipmunk (*Eutamias quadrimaculatus*) in the central Sierra Nevada. J. Mammal. 21:405-411.
Hooven, E. F.
1959. Dusky-footed woodrat in young Douglas-fir. Oregon Forest Res. Cent., Corvallis, Res. Note 41:1-24.
Hornocker, M. G.
1970. An analysis of mountain lion predation upon mule deer and elk in the Idaho Primitive Area. Wildl. Monogr. 21:1-39.
Hornocker, M. G., and H. S. Hash.
1976. Ecology of the wolverine (*Gulo gulo*) in northwest Montana. Idaho Coop. Wildl. Res. Unit, Univ. of Idaho, Moscow., 16 p.
Howard, W. E., and H. E. Childs, Jr.
1959. Ecology of pocket gophers with emphasis on *Thomomys bottae mewa.* Hilgardia 29:277-358.
Humphrey, S. R.
19.69. Population ecology of the little brown bat (M. lucifugus) in Indiana and north-central Kentucky. Anim Behav. 17:480-485.
Husar, S. L.
1976. Behavioral character displacement: evidence of food partitioning in insectivorous bats. J. Mammal. 57:331-338.
Ingles, L. G.
1941. Natural history observations on the Audobon cottontail. J. Mammal. 22:227-250.
Ingles, L. G.
1947. Ecology and life history of the California gray squirrel. Calif Fish and Game 33:139-158.
Ingles, L. G.
1949. Ground water and snow as factors affecting the seasonal distribution of pocket gophers, *Thomomys monticola.* J. Mammal. 30:343-350.

Ingles, L. G.
1952. The ecology of the mountain pocket gopher, *Thomomys monticola*. Ecology 33:87-95.
Ingles, L. G.
1960. A quantitative study of the activity of the dusky shrews (*Sorex vagrans obscurus*). Ecology 41:656-660.
Ingles, L. G.
1961. Home range and habits of the wandering shrew. J. Mammal. 42:455-462.
Ingles, L. G.
1965. Mammals of the Pacific States. 506 p. Stanford Univ. Press, Stanford, Calif.
Jackson, H. H. T.
1961. The mammals of Wisconsin. 504 p. Univ. Wisconsin Press, Madison.
Jameson, E. W., Jr.
1951. Local distribution of white-footed mice, *Peromyscus maniculatus* and *P. boylii*, in the northern Sierra Nevada, California. J. Mammal. 32:197-203.
Jameson, E. W., Jr.
1952. Food of deer mice, *Peromyscus maniculatus* and *Peromyscus boylii*, in the northern Sierra Nevada. J. Mammal. 33:50-60.
Jameson, E. W., Jr.
1955. Observations on the biology of *Sorex trowbridgii* in the Sierra Nevada, California. J. Mammal. 36:339-345.
Jenkins, H. O.
1948. A population study of the meadow mice (*Microtus*) in three Sierra Nevada meadows. Proc. Calif. Acad. Sci., Set. 4., 26:43-67.
Johnson, D. H.
1943. Systematic review of the chipmunks (genus *Eutamias*) of California. Univ. Calif. Publ. Zool. 48:63-148.
Jones, J. K., Jr., D. C. Carter, and H. H. Genoways.
1975. Revised checklist of North American mammals north of Mexico. Occas. Pap. Mus., Texas Tech Univ. 28:1-14.
King, J.A., ed.
1968. Biology of *Peromyscus* (Rodentia). 593 p. Amer. Soc. Mammal., Oklahoma State Univ., Stillwater.
Kirk, D.
1975. River otter survey progress report. Calif Dep. Fish and Game, Nongame Wildl. Invest., job II-1. 1, Progr. Rep. 10 p. (Mimeo.)
Koford, C. B.
1977. Status and welfare of the puma (*Felis concolor*) in California, 1973-1976. Dep. For. and Conserv., Univ. Calif., Berkeley. 57 p. (Multilith.)
Krebs, C. J.
1970. Demographic changes in fluctuating populations of *Microtus californicus*. Ecol. Monogr. 36:239-273.
Krutzsch, P. H.
1946. Some observations on the big brown bat in San Diego County, California. J. Mammal. 27:240-242.
Krutzsch, P. H.
1954a. Notes on the habits of the bat, *Myotis californicus*. J. Mammal. 35:539-545.
Krutzsch, P. H.
19546. North American jumping mice (genus *Zapus*). Univ. Kansas Publ., Mus. Nat. Hist. 7:349-372 .
Krutzsch, P. H.
1955. Observations on the Mexican free-tailed bat, Tadarida mexicana. J. Mammal. 36:236-242.
Lawrence, G. E.
1966. Ecology of vertebrate animals in relation to chaparral fire in the Sierra Nevada foothills. Ecology 47:278-291.
Lay, D. W.
1942. Ecology of the opossum in eastern Texas. J. Mammal. 23:147-159.
Lechleitner, R. R.
1958. Movements, density and mortality in a black-tailed jackrabbit population. J. Wildl. Manage. 22:371-384.
Liers, E.
1951. Notes on the river otter. J. Mammal. 32:1-9.
Linsdale, J. M.
1946. The California ground squirrel. 475 p. Univ. Calif. Press, Berkeley.
Linsdale, J. M., and L. P. Tevis, Jr.
1951. The dusky-footed woodrat. 664 p. Univ. Calif. Press, Berkeley.
Loehr, K. A., and A. C. Risser.
1977. Daily and seasonal activity patterns of the belding ground squirrel in the Sierra Nevada. J. Mammal. 58:445-448.
Long, C. A.
1973. *Taxidea taxus.* Mammal Species 26:1-4.
Longhurst, W. M., A. S. Leopold, and R. F. Dasmann.
1952. A survey of California deer herds, their

ranges and management problems. Game Bull., Calif. Dep. Fish and Game 6:1-136.

Lord, R. D., Jr.
1961. A population study of the gray fox. Amer. Midl. Nat. 66:87-109.

MacClintock, D.
1970. Squirrels of North America. 184 p. Van Nostrand Reinhold Co., New York.

Mackie, R. J.
1970. Range ecology and relations of mule deer, elk and cattle in the Missouri River Breaks. Montana. Wildl. Monogr. 20:1-79.

Marshall, W. H., G. W. Gullion, and R. G. Schwab.
1962. Early summer activities of porcupines as determined by radio-positioning techniques. J. Wildl. Manage. 26:75-79.

Martin, P.
1971. Movements and activities of the mountain beaver. J. Mammal. 52:717-723.

Martinsen, D. L.
1968. Temporal patterns in the home ranges of chipmunks (*Eutamias*). J. Mammal, 49:83-91.

Maza, B. G., N. R. French, and A. P. Aschwanden.
1973. Home range dynamics in a population of heteromyid rodents. J. Mammal. 54:405-425 .

McCabe, T. T., and B.D. Blanchard.
1950. Three species of *Peromyscus.* 136 p. Rood Associates, Santa Barbara, Calif

McClure, H. E.
1942. Summer activities of bats (genus *Lasiurus*) in Iowa. J. Mammal. 23:430-434.

McCullough, D. R., and E. R. Schneegas.
1966. Winter observations on the Sierra Nevada bighorn sheep. Calif. Fish and Game 52:68-84.

McKeever, S.
1964a. Food habits of the pine squirrel in northeastern California. J. Wildl. Manage. 28:402-404.

McKeever, S.
1964b. The biology of the golden-mantled ground squirrel. Ecol. Monogr. 34:383-401.

McManus, J. J.
1974. *Didelphis virginiana.* Mammal. Species 40:1-6.

Merritt, J. F.
1974. Factors influencing the local distribution of *Peromyscus californicus* in northern California. J. Mammal. 55:102-114.

Merritt, J. F.
1978. *Peromyscus californicus.* Mammal. Species 85:1-6.

Mitchell, J. L.
1961. Mink movements and populations on a Montana river. J. Wildl. Manage. 25:48-54.

Morhardt, S. S., and D. M. Gates.
1974. Energy-exchange analysis of the belding ground squirrel and its habitat. Ecol. Monogr. 44:17-44.

Morton, M. L., C. S. Maxwell, and C. E. Wade.
1974. Body size, body composition, and behavior of juvenile belding ground squirrels. Great Basin Nat. 34:121-134.

Murie, O. J.
1951. The elk of North America. 376 p. Stackpole Co., Harrisburg, Penn.

Myers, L. G.
1969. Home range and longevity in *Zapus princeps* in Colorado. Amer. Midl. Nat. 82:628-629.

Nee, J. A.
1969. Reproduction in a population of yellow-bellied marmots (*Marmota flaviventris*). J. Mammal. 50:756-765.

Negus, N. C., P. J. Berger, and L. G. Forslund.
1977. Reproductive strategy of *Microtus montanus.* J. Mammal. 58:347-353.

Nelson, L., Jr., and J. K. Hooper.
1976. California big game and their management. Div. Agric. Sci., Univ. Calif., Leafl. 2223:1-25.

Newberry, D. W.
1973a. Marten field transect study, Tahoe Basin, California. Calif. Dep. Fish and Game, Spec. Wildl. Invest. 9 p. (Mimeo.)

Newberry, D. W.
1973b. A contribution toward a bibliography of California furbearers. Calif. Dep. Fish and Game, Spec. Wildl. Invest. 148 p. (Mimeo.)

O'Farrell, M. J.
1978. Home range dynamics of rodents in a sagebrush community. J. Mammal. 59-657-668.

O'Farrell, M. J., and E. H. Studier.
1973. Reproduction, growth and development in *Myotis thysanodes* and *M. lucifugus.* Ecology 54:18-30.

O'Farrell, T. P.
1965. Home range ecology of snowshoe hares in interior Alaska. J. Mammal. 46:406-418.
O'Farrell, T. P.
1975. Seasonal and altitudinal variations in populations of small mammals on Rattlesnake Mountain, Washington. Amer. Midi. Nat. 94:190-204.
Orr, R. T.
1940. The rabbits of California. Occas. Pap., Calif. Acad. Sci. 19:1-227.
Orr, R. T.
1949. Mammals of Lake Tahoe. Calif. Acad. Sci., San Francisco, 127 p.
Orr, R. T.
1954. Natural history of the pallid bat. Proc. Calif. Acad. Sci. 4:165-246.
O'Shea, T. J., and T. A. Vaughan.
1977. Nocturnal and seasonal activities of the pallid bat, *Antrozous pallidus.* J. Mammal. 58:269-284.
Packard, F. M.
1946. Ecology of bighorn sheep. J. Mammal. 27:3-30.
Patton, J. L., H. MacArthur, and S. Y. Yang.
1976. Systematic relationships of the four-toed populations of *Dipodomys heermanni.* J. Mammal. 57:159-163.
Pearson, O. P.
1960. Habits of harvest mice revealed by automatic photographic recorders. J. Mammal. 41:58-74.
Pearson, O. P., M. R. Koford, and A. K. Pearson.
1952. Reproduction of the lump-nosed bat (*Corynorhinus rafinesquii*) in California. J. Mammal. 33:273-320.
Petrides, G. A.
1949. Sex and age determination in the opossum. J. Mammal. 30:364-378.
Phillips, G. L.
1966. Ecology of the big brown bat in northeastern Kansas. Amer. Midi. Nat. 75:168-198.
Piekielek, W., and T. S. Burton.
1975. A black bear population study in northern California. Calif. Fish and Game 61:4-25.
Pine, D. S., and G. L. Gerdes.
1973. Wild pigs in Monterey County, California. Calif. Fish and Game 59:126-137.
Poelker, R. J., and H. D. Hartwell.
1973. Black bear of Washington. Washington State Game Dep., Biol. Bull. 14:1-180.
Provost, E. E., and C. M. Kirpatrick.
1952. Observations on the hoary bat in Indiana and Illinois. J. Mammal. 33:110-113.
Provost, E. E., C. A. Nelson, and D. A. Marshall.
1973. Population dynamics and behavior in the bobcat. In The World's Cats, R. L. Eaton, ed., 1:42-67. World Wildl. Safari, Winston, Oreg.
Quick, H. F.
1951. Notes on the ecology of weasels in Gunnison County, Colorado. J. Mammal. 32:281-290.
Roberts, D. R.
1962. Rodent movements in a cutover forest of the Sierra Nevada, California. Ph.D. Dissertation, Univ. Calif., Berkeley. 102 p.
Ross, A.
1967. Ecological aspects of the food habits of insectivorous bats. Proc. West. Found. Vertebr. Zool. 1:205-263.
Sadleir, R. M. F. S.
1974. The ecology of the deer mouse *Peromyscus maniculatus* in a coastal coniferous forest: II. Reproduction. Can. J. Zool. 52:119-131.
Sargeant, A. B., and D. W. Warner.
1972. Movements and denning habits of a badger. J. Mammal. 53:207-210.
Scheffer, T. H.
1923. American moles as agricultural pests and as fur producers. U.S. Dep. Agric., Farmers Bull. 1247:1-23 .
Schempf, P. F., and M. White.
1974. A survey of the status of seven species of carnivores on National Park Service lands in California. Wildlife-Fisheries Unit, Dep. For. and Conserv., Univ. Calif., Berkeley. 129 p.
Schempf, P. F., and M. White.
1975. Occurrence of six furbearer populations in U. S. National Forest lands of northern California. Prelim. Rep., Dep. For. and Conserv., Univ. Calif., Berkeley. 140 p. (Mimeo.)
Schempf, P. F., and M. White.
1977. Status of six furbearer populations in the mountains of northern California. U.S. Dep. Agric., Forest Serv., Calif. Region, San Francisco. 82 p.
Shapiro, J.
1949. Ecological and life history notes on the porcupine in the Adirondacks. J. Mammal. 30:247-257.

Shaw, W. T.
1924. Alpine life of the heather vole (*Phenacomys olympicus*). J. Mammal. 5:12-15.
Shields, P. W.
1960. Movement patterns of brush rabbits in northwestern California. J. Wildl. Manage. 24:381-386.
Sitton, L. W., and S. Wallen.
1976. California mountain lion study. Calif. Dep. Fish and Game. 40 p.
Smith, C. C.
1970. The co-evolution of pine squirrels (*Tamiasciurus*) and conifers. Ecol. Monogr. 40:349-371.
Smith, C. F.
1942. The fall food of the brushfield pocket mouse. J. Mammal. 23:337-339.
Smith, S. F.
1977. Social structure of chipmunk populations and its relation to resource availability and exploitation. Ph.D. Dissertation, Univ. Calif., Berkeley. 406 p.
Sorenson, M. W.
1962. Some aspects of water shrew behavior. Amer. Midl. Nat. 68:445-462.
States, J. B.
1976. Local adaptations in chipmunk (*Eutamias amoenus*) populations and evolutionary potential at species borders. Ecol. Monogr. 46:221-256.
Steinecker, W., and B. M. Browning.
1970. Food habits of the western grey squirrel. Calif. Fish and Game 56:36-48.
Storer, T. L, F. C. Evans, and F. G. Palmer.
1944. Some rodent populations in the Sierra Nevada of California. Ecol. Monogr. 14:166-192.
Storer, T. I. , and R. L. Usinger.
1971. Sierra Nevada natural history. 374 p. Univ. Calif. Press, Berkeley.
Storm, G. L.
1972. Daytime retreats and movements of skunks on farmlands in Illinois. J. Wildl. Manage. 36:31-45 .
Stuewer, F. W.
1943. Raccoons: their habits and management in Michigan. Ecol. Monogr. 13:203-258.
Sumner, L., and J. S. Dixon.
1953. Birds and mammals of the Sierra Nevada 484 p. Univ. Calif. Press, Berkeley.
Sutton, D. A., and C. Dunford.
1974. Bibliography of the chipmunk genus *Eutamias* in North America. Calif State Univ., Chico. 26 p. (Mimeo.)
Sutton, D. A., and C. F. Nadler.
1974. Systematic revision of three Townsend chipmunks (*Eutamias townsendii*). Southwest. Nat. 19:199-212.
Svendsen, G. E.
1974. Behavioral and environmental factors in the spatial distribution and population dynamics of a yellow-bellied marmot population. Ecology 55:760-771.
Swarth, H. S.
1919. Some Sierran chipmunks. Sierra Club Bull. 10:401-413.
Taber, R. D., and R. F. Dasmann.
1958. The black-tailed deer of the chaparral. Game Bull., Calif. Dep. Fish and Game 8:1-163.
Tappe, D. T.
1941. Natural history of the Tulare kangaroo rat. J. Mammal. 22:117-148.
Tappe, D. T.
1942. The status of beavers in California. Game Bull, Calif. Dep. Fish and Game 3:1-59.
Taylor, W. P.
1935. Ecology and life history of the porcupine (*Erethixon epixanthum*) as related to forests of Arizona and the southwestern U. S. Univ. Arizona Biol. Bull. 3:1-177.
Taylor, W. P.
1954. Food habits and notes of life history of the ring-tailed cat in Texas. J. Mammal. 35:55-63.
Taylor, W. P.
1956. The deer of North America. 668 p. The Stackpole Co., Harrisburg, Penn.
Terry, C. J.
1978. Food habits of three sympatric species of Insectivora in western Washington. Can. Field-Nat. 92:38-44.
Tevis, L., Jr.
1955. Observations on chipmunks and mantled squirrels in northeastern California. Amer. Midl. Nat. 53:71-78.
Tevis, L., Jr.
1956. Responses of small mammal populations to logging of douglas fir. J. Mammal. 37:189-196.
Trapp, G. R., and D. L. Hallberg.
1975. Ecology of the gray fox (*Urocyon*

cinereoargenteus): a review. *In* The Wild Canids. M. W. Fox, ed. p. 164-178. Van Nostrand Reinhold Co., New York.

Tucker, V. A.
1966. Diurnal torpor and its relation to food consumption and weight changes in the California pocket mouse, *Perognathus californicus.* Ecology 47:245-252.

Urban, D.
1970. Raccoon populations, movement patterns, and predation on a managed waterfowl marsh. J. Wildl. Manage. 34:372-382.

Verts, B. J.
1967. The biology of the striped skunk. 218 p. Univ. Illinois Press, Urbana.

Vestal, E. H.
1938. Biotic relations of the woodrat in the Berkeley hills. J. Mammal. 19:1-36.

Volland, L. A.
1974. Relation of pocket gophers to plant communities in the pine region of central Oregon. *In* Wildlife and Forest Management in the Pacific Northwest. H. C. Black, ed. p. 149-166. Forest Res. Lab., Oregon State Univ. Corvallis.

Watkins, L. C.
1977. *Euderma maculatum.* Mammal. Species 77:1-4.

Williams, D. F.
1975. Distribution records for shrew-moles, *Neurotrichus gibbsii.* Murrelet 56:2-3.

Williams, D. F.
1978. Karyological affinities of the species groups of silky pocket mice (*Rodentia, Heteromyidae*). J. Mammal. 59:599-612.

Williams, D. F.
1979. Checklist of California mammals. Ann. Carnegie Mus., 48:425-433.

Woods, C. A.
1973. *Erethixon dorsatum.* Mammal. Species 29:1-6.

Young, S. P.
1958. The bobcat of North America. 193 p. Stackpole Co., Harrisburg, Penn.

Zarn, M., T. Heller, and K. Collins.
1977. Wild, free-roaming horses-status of present knowledge. U.S. Dep. Inter., Bur. Land Manage. Tech. Note 294:1-72.

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Additional References

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Belrose, Frank C.
1978. Ducks, geese, and swans of North America. 2d ed. 540 p. Stackpole Books, Harrisburg, Pa.

Burton, Philip.
1979. Spotter's guide to birds of North America. 64 p. Mayflower Books, New York, N.Y.

Dasman, William P.
1968. Big game of California. 56 p. California Department of Fish and Game, Sacramento, Calif.

Elman, Robert.
1976. The living world of Audubon mammals. 272 p. Grosser & Dunlap, New York, N.Y.

Greater Los Angeles Zoo Association.
1968. Los Angeles zoo. 96 p. Los Angeles, Calif.

Landsdown, J.F., and J.A. Livingston.
1966. Birds of the northern forest. 247 p. Houghton Mifflin Co., Boston, Mass.

Linsdale, Jean M. and P. Quentin Tomich.
1953. A herd of mule deer. 567 p. Univ. California Press, Berkeley, Calif.

McCormick, Jack.
1966. The life of the forest. 232 p. McGraw-Hill Book Co., New York, N.Y.

Peterson, Roger Tory.
1961. A field guide to western birds. 2d ed. 366 p. Houghton Mifflin Co., Boston, Mass.

Pickett, Edwin.
1971. Birds of central California. 100 p. *Sacramento Bee*, Sacramento, Calif.

Robbins, Chandler S., Bertel Bruun, and Herbert S. Zim.
1966. A guide to field identification. Birds of North America. 340 p. Golden Press, New York, N.Y.

Ryden, Hope.
1972. Mustangs: a return to the wild. 111 p. Viking Press, New York, N.Y.

Seton, Ernest Thompson.
1977. Studies in the art anatomy of animals. 96 p. Running Press, Philadelphia, Pa.

Smith, Hobart M.
1978. A guide to field identification. Amphibians of North America. 160 p. Golden Press, New York, N.Y.

Spero, James.
1978. North American mammals. 96 p. Dover Publications, Inc., New York, N.Y.

Stebbins, Robert C.
1966. A field guide to western reptiles and amphibians. 279 p. Houghton Mifflin Co., Boston, Mass.

Time-Life Films, Inc.
1976. The cats. 128 p. New York, N.Y.

Udvardy, Miklos D.F.
1977. The Audubon Society field guide to North American birds (western region). 852 p. Alfred A. Knopf, New York, N.Y.

Walker, Ernest P.
1964. Mammals of the world. Volume 1. 644 p. Johns Hopkins Press, Baltimore, Md.

Welty, Joel Carl.
1962. The life of birds. 546 p. W.B. Sanders Co. Philadelphia, Pa.