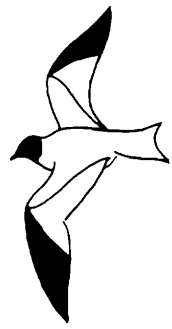


WESTERN BIRDS



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BIRDS OF HASTINGS RESERVATION, MONTEREY COUNTY, CALIFORNIA

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The Hastings Natural History Reservation was established in October 1937 as a field station of the Museum of Vertebrate Zoology (MVZ), University of California, Berkeley. At that time, Jean M. Linsdale of the Museum staff became the first resident director and initiated a program of research and instruction. Human disturbance to the land was kept to a minimum, a policy which continues to be enforced. Since the beginning of the Reservation's history at least one ornithologist has been permanently resident and a large file of records and field notes on the avifauna has been compiled. Contributors to this file include Reservation and Museum staff members, students, postdoctoral fellows, visiting scientists and members of visiting classes.

Information has been provided by George A. Bartholomew, Jeram L. Brown, Gene M. Christman, Nicholas E. and Elsie C. Collias, Keith L. Dixon, Harvey I. Fisher, Ralph J. Gutiérrez, Elgin Hurlbert, Ned K. Johnson, Nancy E. Joste, Carl B. Koford, Jean M. Linsdale, Michael H. and Barbara R. MacRoberts, Joe T. Marshall, Jr., Alden H. Miller, Ron L. Mumme, Sandy Nishimura, Frank A. Pitelka, Richard B. Root, Charles G. Sibley, William L. Thompson, J.J.A. van Iersel, Nicolaas A.M. Verbeek, Laidlaw Williams and Henry G. Weston, Jr. Many of these workers are cited in the species accounts which follow. In addition, we have used information provided by many other zoologists not primarily ornithologists who have worked at the Reservation including Floyd E. Durham, Robert B. Finley, Jr., Henry S. Fitch, Lawrence M. Hanks, Lloyd P. Tevis, Jr. and P. Quentin Tomich.

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As a result of the efforts of these workers, the occurrence of birds at the Reservation has been monitored continuously for 42 years. Therefore, it is possible to compile a reasonably complete annotated list for this station which may serve 1) as a basis for comparison with other areas, 2) as a baseline against which future changes in the avifauna may be measured, and 3) to assess changes which have oc-

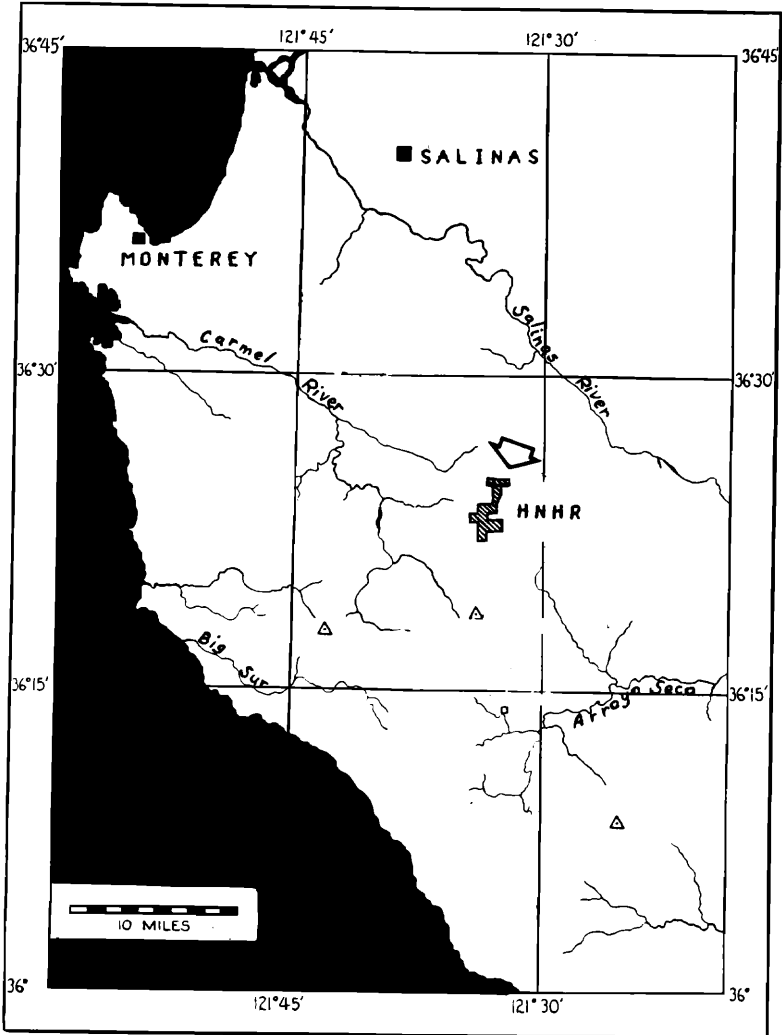


Figure 1. Location of Hastings Reservation (HNHR) in Monterey Co., California.

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curred since the Reservation's founding. Linsdale (1947) provided a list of the birds which had been recorded at the Reservation in the first 10 years of its operation, but the arrangement of species in his list makes it difficult to use and many new records have been added in subsequent years, making the compilation of a new list desirable.

The Reservation lies in the drainage of the upper Carmel River although not on the river proper (Figure 1). It is on the USGS Rana Creek and Chews Ridge quadrangles, covering 770 ha, with elevations ranging from 470 to 940 m. Location of headquarters, near the center of the Reservation, is 36°23' N and 121°33' W.

The Reservation contains five major vegetation types (Figure 2) typical of south coast range foothill vegetation (Griffin 1974). These are: mixed evergreen forest, including Black (*Quercus kelloggii*), Golden (*Q. chrysolepis*), and Coast Live (*Q. agrifolia*) oaks, California Laurel (*Umbellularia californica*), and Madrone (*Arbutus menziesii*), with an understory of Poison Oak (*Rhus diversiloba*), Coffeeberry (*Rhamnus californica*), gooseberry (*Ribes* sp.), Cream Bush (*Holodiscus discolor*), and Brake Fern (*Pteridium aquilinum*); foothill woodland, dominated by Blue Oaks (*Q. douglasii*) with Valley Oaks (*Q. lobata*) locally present, especially in oak savannas; riparian woodland of Western Sycamores (*Platanus racemosa*), Coast Live and Valley oaks, willows (*Salix* sp.), and Bigleaf Maple (*Acer macrophyllum*) and Red Alder (*Alnus rhombifolia*) locally; chapar-



Figure 2. View of Hastings Reservation showing the five major vegetation types.

Photo by W.D. Koenig

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ral, dominated by Chamise (*Adenostoma fasciculatum*), with Coast Ceanothus (*Ceanothus ramulosus*) and Eastwood Manzanita (*Arctostaphylos glandulosa*) locally; and grassland, dominated by Mediterranean annual grasses, especially Soft Chess (*Bromus mollis*), Wild Oat (*Avena fatua*), and Bronco Grass (*Bromus diandrus*). Conifers are essentially absent. There are three intermittent creeks on the Reservation.

Weather records have been kept at Reservation headquarters continuously since 1938. Forty-year means (1938-1977) are as follows: annual precipitation, 52.3 cm (range 26.2 cm in 1975-76 to 105.2 cm in 1940-41); mean monthly maximum temperatures range from 30.7°C (July) to 15.5°C (January); mean monthly minima range from 9.7°C (July and August) to 1.3°C (January). Very little rainfall (an average of 2.2 cm) falls between May and September, inclusive.

ANNOTATED LIST

Species are listed according to whether they are residents (permanent, summer or winter), migrants (spring or fall), visitants (recorded several times, but neither residents nor migrants), or accidental. Abundance categories are common (present in numbers each year), uncommon (present in small numbers each year), and rare (not recorded some years). Irregular species are those which vary markedly in abundance between years. Nomenclature generally follows the current AOU checklist except in a few cases where we have chosen to follow the more recent changes of Mayr and Short (1970). Species known to have bred at least once are indicated by an asterisk (*).

COMMON LOON, *Gavia immer*. Accidental. One seen flying over the Reservation 18 Dec 1937 (Linsdale).

ARCTIC LOON, *G. arctica*. Accidental. An injured bird found in a creek on the Reservation 15 Apr 1941 was collected (Tevis, specimen, Hastings Reservation).

RED-THROATED LOON, *G. stellata*. Accidental. One record of a bird stranded in a field 28 Mar 1973 (M. MacRoberts).

GREAT BLUE HERON, *Ardea herodias*. Visitant. Five records: 15 Aug 1946 (Riney), 18 Sep 1953 and 10 Aug 1974 (Davis), 16 Jul 1979 (Joste) and 28 Jun 1980 (P. Williams).

GREEN HERON, *Butorides striatus*. Rare spring migrant and fall visitant. Six records, four between 19 Apr and 29 May, one each 23 Jul and 23 Aug.

CANADA GOOSE, *Branta canadensis*. Accidental. Three records of small flocks passing over the Reservation on 18 Nov 1947 and 21 Dec 1948 (Tomich) and 22 Dec 1948 (Linsdale).

MALLARD, *Anas platyrhynchos*. Accidental. One record, two birds flying over on 22 Mar 1951 (Christman). Resident in small numbers on stock ponds adjacent to the Reservation.

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- PINTAIL, *A. acuta*. Visitant. Several fall and winter records of flocks passing over the Reservation.
- CINNAMON TEAL, *A. cyanoptera*. Accidental. Two records of three on a stock pond adjacent to the Reservation 12 Mar 1979 (Koenig) and 25 Jan 1980 (Mumme).
- COMMON MERGANSER, *Mergus merganser*. Accidental. The dried remains of one were found on 5 Jan 1951 (Tomich).
- TURKEY VULTURE, *Cathartes aura*. Uncommon summer resident. Rarely reported in winter.
- *WHITE-TAILED KITE, *Elanus leucurus*. Irregular summer resident. Recorded 17 out of 43 years between 1938 and 1980. Bred in at least five years.
 - *SHARP-SHINNED HAWK, *Accipiter striatus*. Uncommon resident. Numbers increase in fall and winter.
 - *COOPER'S HAWK, *A. cooperii*. Uncommon resident. Numbers increase in fall and winter.
 - *RED-TAILED HAWK, *Buteo jamaicensis*. Common resident.
 - *RED-SHOULDERED HAWK, *B. lineatus*. At present a common resident. Only one record until 1948. Recorded nearly every year since 1949 and has nested regularly since 1959.
- GOLDEN EAGLE, *Aquila chrysaetos*. Uncommon resident. Known to breed within 2 km of the Reservation.
- MARSH HAWK, *Circus cyaneus*. Formerly an uncommon visitant, especially in winter, recorded in all but two years between 1938 and 1952. Only three records since 1953, all in Dec.
- OSPREY, *Pandion haliaetus*. Visitant. Four records: 21 Apr 1938 (Linsdale); 16 Sep 1951 (Miller); 9 Mar 1970 (Verbeek); and 15 May 1977 (N. and E. Collias).
- PRAIRIE FALCON, *Falco mexicanus*. Formerly an uncommon visitant with 19 records between 1937 and 1942. Since 1942 only four records: 7 Dec 1951 (Tomich); 28 Apr and 31 Aug 1977 (Koenig); 9 Jul 1979 (Joste).
- PEREGRINE FALCON, *F. peregrinus*. Nine records; none since 1950.
- MERLIN, *F. columbarius*. Rare and irregular winter resident. Observed in eight winters between 1937 and 1954; only two subsequent records, 18 Nov 1976 and 13 Oct 1979 (Koenig).
- *AMERICAN KESTREL, *F. sparverius*. Common resident.
 - *CALIFORNIA QUAIL, *Lophortyx californicus*. Common resident.
 - *MOUNTAIN QUAIL, *Oreortyx pictus*. Common resident.
 - *TURKEY, *Meleagris gallopavo*. Introduced into the area by the California Department of Fish and Game in 1968. Present at the Reservation since 1970. After an initial increase in numbers the population has steadily declined and birds are seldom seen.
- VIRGINIA RAIL, *Rallus limicola*. Accidental. One record, a bird caught in a mist net 11 Nov 1973 (Koenig, specimen, MVZ).
- KILLDEER, *Charadrius vociferus*. Now accidental. Formerly rare visitant: 28 records between 1937 and 1954. Only two subsequent records: winter 1975 and 25 Mar 1980.
- COMMON SNIPE, *Capella gallinago*. Winter visitant. Ten records between 1938 and 1959; only one subsequently, 13 Jan 1976 (Koenig).
- SOLITARY SANDPIPER, *Tringa solitaria*. Rare migrant. Four records of a single individual at a stock pond adjacent to the Reservation: 29 Apr 1976; 21 Apr 1977; 21 Apr 1978 (all Koenig); 2 May 1979 (Hanks).
- RED PHALAROPE, *Phalaropus fulicarius*. Accidental. A mummified carcass was found 7 Apr 1947 (Linsdale, specimen, Hastings Reservation).
- BONAPARTE'S GULL, *Larus philadelphia*. Accidental. One bird seen flying over on 26 Dec 1968 (Verbeek).

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- CASPIAN TERN, *Sterna caspia*. Accidental. Three seen flying over on 21 Jul 1957 (Davis, van Iersel).
- BAND-TAILED PIGEON, *Columba fasciata*. Irregular winter resident; common in some years.
- ROCK DOVE, *C. livia*. Visitant; seven records.
- *MOURNING DOVE, *Zenaida macroura*. Common resident, irregular in winter.
- ROADRUNNER, *Geococcyx californianus*. Formerly a common resident, now rare. Records for four decades are as follows: 1938-47, 90; 1948-57, 52; 1958-67, 0; 1968-77, 2. Single records in 1978 and 1979. One male calling persistently in the spring of 1980. Possibly bred at one time but no definite record.
- *BARN OWL, *Tyto alba*. Common resident.
- *SCREECH OWL, *Otus asio*. Common resident.
- *GREAT HORNED OWL, *Bubo virginianus*. Common resident.
- *PYGMY OWL, *Glaucidium gnoma*. Uncommon resident.
- *LONG-EARED OWL, *Asio otus*. Rare resident, apparently less common in later years. Recorded in 1938, 1939, 1940, 1948, 1951, 1975 and 1980.
- *SAW-WHET OWL, *Aegolius acadicus*. Rare resident.
- *POOR-WILL, *Phalaenoptilus nuttallii*. Uncommon summer resident. Records fall between 6 Feb and 30 Nov, suggesting that some individuals may overwinter.
- BLACK SWIFT, *Cypseloides niger*. Rare migrant. Two records, both of three individuals flying overhead, 31 Aug 1954 and 7 Jul 1956 (Davis).
- VAUX'S SWIFT, *Chaetura vauxi*. Rare spring migrant. Ten records in six different years of small groups flying over. All records fall between 19 Apr and 19 May.
- WHITE-THROATED SWIFT, *Aeronautes saxatalis*. Uncommon visitant, but resident within several km of the Reservation. Seventeen records of birds flying overhead are distributed throughout all seasons.
- *BLACK-CHINNED HUMMINGBIRD, *Archilochus alexandri*. Uncommon summer resident. Recorded 18 Mar 1946 (Linsdale 1947) through 29 Sep. Subsequent earliest record is 2 Apr 1978 (P. Williams).
- *ANNA'S HUMMINGBIRD, *Calypte anna*. Common resident; numbers typically reduced in winter.
- RUFOUS HUMMINGBIRD, *Selasphorus rufus*. Uncommon spring migrant; rare summer migrant. Recorded 13 Feb-4 May; two summer records, 23 Jul 1942 (Durham) and 7 Sep 1950 (Tomich).
- *ALLEN'S HUMMINGBIRD, *S. sasin*. Uncommon summer resident. Recorded 22 Feb-13 Aug.
- CALLIOPE HUMMINGBIRD, *Stellula calliope*. Rare spring migrant. Three records: 25-26 Apr 1951 (Tomich); 2 May 1955 (Davis); and 8 Apr 1969 (Verbeek).
- BELTED KINGFISHER, *Megaceryle alcyon*. Uncommon permanent resident along Finch Creek. No breeding records for the Reservation but breeds nearby.
- *COMMON FLICKER, *Colaptes auratus*. Common resident, more numerous in winter. Hybrids with the "Yellow-shafted" form are rare winter residents recorded in six years.
- *ACORN WOODPECKER, *Melanerpes formicivorus*. Common resident.
- LEWIS' WOODPECKER, *M. lewis*. Presently a rare winter resident. Formerly occurred more commonly, recorded in 7 of 10 winters between 1937-38 and 1946-47, 4 of 10 in next decade, only twice subsequently (1 each in Sep and Oct 1972, M. MacRoberts). Records fall between 13 Sep and 16 May.
- RED-BREASTED SAPSUCKER, *Sphyrapicus ruber*. An uncommon winter resident, recorded from 18 Sep to 16 Apr.
- RED-NAPED SAPSUCKER, *S. nuchalis*. Visitant; recorded four times: 19-21 May 1958 (Davis); 15 Oct 1972 and 24 Nov 1973 (M. MacRoberts); and 15 Mar 1976 (Koenig).
- *HAIRY WOODPECKER, *Picoides villosus*. Uncommon resident.

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- *DOWNY WOODPECKER, *P. pubescens*. Uncommon resident.
- *NUTTALL'S WOODPECKER, *P. nuttalli*. Common resident.
- *WESTERN KINGBIRD, *Tyrannus verticalis*. Uncommon summer resident.
- *ASH-THROATED FLYCATCHER, *Myiarchus cinerascens*. Common summer resident.
- *BLACK PHOEBE, *Sayornis nigricans*. Common resident.
- SAY'S PHOEBE, *S. saya*. Uncommon winter resident. Single birds were recorded on 17 Jun and 4 Jul 1976 (Koenig).
- WILLOW FLYCATCHER, *Empidonax traillii*. Recorded in fall migration, few certain records.
- HAMMOND'S FLYCATCHER, *E. hammondii*. Recorded each year since 1978 when noted as common (Johnson). Probably a more regular spring migrant than indicated by these records.
- *WESTERN FLYCATCHER, *E. difficilis*. Common summer resident.
- *WESTERN WOOD PEWEE, *Contopus sordidulus*. Uncommon summer resident.
- *OLIVE-SIDED FLYCATCHER, *Nuttallornis borealis*. Uncommon summer resident.
- HORNED LARK, *Eremophila alpestris*. Present from 6 Nov to 10 Jan 1937-38, as many as 35 in one flock (Linsdale, Miller). "About 60" seen 12 Jan 1948, not present two days later (Tomich). Not recorded subsequently.
- *VIOLET-GREEN SWALLOW, *Tachycineta thalassina*. Common summer resident.
- TREE SWALLOW, *Iridoprocne bicolor*. Accidental, small groups flying over, moving N, 21 Feb 1970 (Verbeek).
- ROUGH-WINGED SWALLOW, *Stelgidopteryx ruficollis*. Visitant. Two, 12 Apr 1943 (Linsdale); three, 4 May, and one, 5 May 1975 (Koenig); six, 29 Jun, and one, 30 Jun, 1 Jul 1978 (P. Williams).
- *BARN SWALLOW, *Hirundo rustica*. One pair bred in 1980; only two prior records: 10 May 1938, 1 Jul 1979.
- *CLIFF SWALLOW, *Petrochelidon pyrrhonota*. Nested regularly in small numbers from 1938 to 1941. Small numbers recorded between Apr and Aug in ten years between 1942 and 1954, but no nesting observed. One nest in 1955. Next recorded 19 May 1977, when six were seen prospecting for nest sites; then 24 and 29 May 1980 (Nishimura).
- *PURPLE MARTIN, *Progne subis*. Seen every year but one between 1938 and 1955. Nested in 1942, 1948 and 1951. Last recorded 30 Jun 1958.
- *STELLER'S JAY, *Cyanocitta stelleri*. Common resident.
- *SCRUB JAY, *Aphelocoma coerulescens*. Common resident.
- *YELLOW-BILLED MAGPIE, *Pica nuttalli*. Common resident.
- COMMON RAVEN, *Corvus corax*. Accidental. Single birds seen flying over the Reservation 30 Sep 1953, 18 Feb 1956, and 9 May 1957 (Davis).
- *COMMON CROW, *C. brachyrhynchos*. Common resident.
- CLARK'S NUTCRACKER, *Nucifraga columbiana*. Single birds seen 4, 5 and 8 Nov 1950 (Koford, Tomich), 15 Oct 1972 (M. MacRoberts) and 20 Oct 1972 (Davis). One collected near Reservation boundary 26 Oct 1955 (Davis, specimen, MVZ). Widespread invasions occurred in California in 1950, 1955 and 1972 (Davis and L. Williams 1957, DeSante and Remsen 1973).
- *CHESTNUT-BACKED CHICKADEE, *Parus rufescens*. Uncommon resident.
- *PLAIN TITMOUSE, *P. inornatus*. Common resident.
- *BUSHTIT, *Psaltriparus minimus*. Common resident.
- *WHITE-BREASTED NUTHATCH, *Sitta carolinensis*. Common resident.
- RED-BREASTED NUTHATCH, *S. canadensis*. Irregular and uncommon migrant. Single records for Apr and May 1976. The remainder fall between 15 Jul and 27 Nov.
- *BROWN CREEPER, *Certhia familiaris*. Uncommon resident.
- *WRENTIT, *Chamaea fasciata*. Common resident.

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- *DIPPER, *Cinclus mexicanus*. One nesting pair recorded in 1942, 1943, 1944 and 1946 on Finch Creek. Single birds recorded in 1938, 1948 and 1952. No subsequent record.
- *HOUSE WREN, *Troglodytes aedon*. Common summer resident.
- WINTER WREN, *T. troglodytes*. Rare winter resident.
- *BEWICK'S WREN, *Thryomanes bewickii*. Common resident.
- CAÑON WREN, *Catherpes mexicanus*. Rare, irregular visitant. All records but one are for Jul and Aug.
- ROCK WREN, *Salpinctes obsoletus*. Visitant. Three records: 12 Sep 1951 (Tomich); 31 May 1970 (Verbeek); 28 Aug 1970 (Davis).
- MOCKINGBIRD, *Mimus polyglottos*. Visitant. Two records in Mar; all others fall between 7 Aug and 8 Jan.
- BROWN THRASHER, *Toxostoma rufum*. Accidental. A first-year female collected 3 Nov 1966 (specimen, MVZ) pertains to the race *longicauda* (Davis 1968).
- *CALIFORNIA THRASHER, *T. redivivum*. Uncommon resident.
- *AMERICAN ROBIN, *Turdus migratorius*. Common late summer to spring resident until recently, when some individuals remained throughout the summer. Breeding was established in 1979 when three nests were found (Koenig, P. Williams). Some individuals now apparently permanent residents.
- VARIED THRUSH, *Ixoreus naevius*. Irregular winter resident; common in some years.
- HERMIT THRUSH, *Catharus guttatus*. Common winter resident.
- SWAINSON'S THRUSH, *C. ustulatus*. Common spring migrant. Recorded Apr-Aug, with most records in May. A singing male recorded 18 Jun 1944 (Miller) suggests occasional breeding but no definite record.
- *WESTERN BLUEBIRD, *Sialia mexicana*. Common resident.
- TOWNSEND'S SOLITAIRE, *Myadestes townsendi*. Accidental. One record, 10 Oct 1951 (Tomich).
- *BLUE-GRAY GNATCATCHER, *Poliophtila caerulea*. Common summer resident.
- GOLDEN-CROWNED KINGLET, *Regulus satrapa*. Rare winter resident.
- RUBY-CROWNED KINGLET, *R. calendula*. Common winter resident.
- WATER PIPIT, *Anthus spinoletta*. Flocks noted 12 Nov-10 Dec 1937 (Fitch, Linsdale) and 1 Dec-12 Jan 1939-40 (Linsdale, Tevis). A lone bird noted 14 Feb 1940 (Tevis) was the last record at the Reservation.
- CEDAR WAXWING, *Bombycilla cedrorum*. Common winter resident, recorded in all months except Jul (extreme spring and late summer dates 2 Jun and 30 Aug).
- PHAINOPEPLA, *Phainopepla nitens*. Visitant. Seen in 13 of 42 years with most sightings in Oct and Nov, none in Jan, Mar, Jul and Dec.
- LOGGERHEAD SHRIKE, *Lanius ludovicianus*. Rare winter resident and spring migrant; seen in all months except Apr. One or two birds present Jul 1939-Mar 1940. Sighted in eight years since then.
- *STARLING, *Sturnus vulgaris*. Uncommon resident, increasing in numbers. First seen Nov 1964. Next recorded Jan 1968 and first nesting noted in the spring of that year.
- *HUTTON'S VIREO, *Vireo huttoni*. Common resident.
- *SOLITARY VIREO, *V. solitarius*. Uncommon summer resident.
- *WARBLING VIREO, *V. gilvus*. Common summer resident.
- *ORANGE-CROWNED WARBLER, *Vermivora celata*. Common summer resident.
- NASHVILLE WARBLER, *V. ruficapilla*. Uncommon spring migrant.
- NORTHERN PARULA, *Parula americana*. Accidental; one record, a singing male 22 Jul 1979 (Mumme; also seen by us).
- *YELLOW WARBLER, *Dendroica petechia*. Uncommon summer resident.
- YELLOW-RUMPED WARBLER, *D. coronata*. Both "Audubon's" and "Myrtle" warblers are common winter residents. Audubon's Warbler nests within 3 km of the Reservation.

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- *BLACK-THROATED GRAY WARBLER, *D. nigrescens*. Common summer resident; has occurred in every month but Jan.
- TOWNSEND'S WARBLER, *D. townsendi*. Uncommon winter resident. Numbers increase in fall and during spring migration. Recorded in all months but Jun and Jul.
- HERMIT WARBLER, *D. occidentalis*. Uncommon spring and fall migrant.
- *MACGILLIVRAY'S WARBLER, *Oporornis tolmiei*. A breeding bird in the early years. Recorded infrequently since 1954, it is now an uncommon spring migrant.
- YELLOWTHROAT, *Geothlypis trichas*. Uncommon visitant; records in Mar-Jul, Oct.
- YELLOW-BREASTED CHAT, *Icteria virens*. Uncommon spring and rare fall migrant, Apr-May and Aug-Sep.
- WILSON'S WARBLER, *Wilsonia pusilla*. Common migrant and visitant, Mar-Oct. Nests in vicinity.
- HOUSE SPARROW, *Passer domesticus*. Visitant. Recorded in 1939, 1962 and in seven years from 1967 to 1979.
- *WESTERN MEADOWLARK, *Sturnella neglecta*. Common resident.
- RED-WINGED BLACKBIRD, *Agelaius phoeniceus*. Visitant. Breeds at stock ponds adjacent to the Reservation.
- TRICOLORED BLACKBIRD, *A. tricolor*. Formerly an uncommon winter visitant; last seen in 1949.
- HOODED ORIOLE, *Icterus cucullatus*. Accidental. Recorded in two years; 27 Apr 1968 (Hurlbert) and 12, 15 May 1980 (P. Williams).
- SCOTT'S ORIOLE, *I. parisorum*. Accidental. One record, 26 Nov 1955 (Miller, specimen, MVZ).
- *NORTHERN ORIOLE, *I. galbula*. Common summer resident.
- BREWER'S BLACKBIRD, *Euphagus cyanocephalus*. Uncommon summer resident. Breeds adjacent to the Reservation.
- *BROWN-HEADED COWBIRD, *Molothrus ater*. Rare summer resident, first recorded in 1952, seen in five years subsequently. Has parasitized nests of the Blue-gray Gnatcatcher (Root, specimen, Hastings Reservation).
- WESTERN Tanager, *Piranga ludoviciana*. Common migrant. Migration period is long, with spring and fall migrations almost overlapping, although mid-June records are few. Breeds in vicinity.
- *BLACK-HEADED GROSBEAK, *Pheucticus melanocephalus*. Common summer resident.
- BLUE GROSBEAK, *Guiraca caerulea*. Accidental. One record, 31 Aug 1938 (Linsdale).
- *LAZULI BUNTING, *Passerina amoena*. Uncommon summer resident.
- *PURPLE FINCH, *Carpodacus purpureus*. Common resident.
- *HOUSE FINCH, *C. mexicanus*. Common resident, with marked reduction of numbers in winter.
- PINE SISKIN, *Carduelis pinus*. Common winter resident. Recorded in every month but Jun and Jul.
- AMERICAN GOLDFINCH, *C. tristis*. Uncommon winter resident.
- *LESSER GOLDFINCH, *C. psaltria*. Common resident.
- *LAWRENCE'S GOLDFINCH, *C. lawrencei*. Common resident; uncommon in winter.
- GREEN-TAILED TOWHEE, *Pipilo chlorurus*. Rare fall migrant, recorded three times in Sep (1953, 1954, 1964) and once in Oct (1947). Two of these birds were trapped and banded.
- *RUFIOUS-SIDED TOWHEE, *P. erythrophthalmus*. Common resident. Specimens (MVZ) are *P. e. megalonyx*.
- *BROWN TOWHEE, *P. fuscus*. Common resident. Specimens (Hastings Reservation) are *P. f. crissalis*.
- SAVANNAH SPARROW, *Passerculus sandwichensis*. Uncommon winter resident.

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- GRASSHOPPER SPARROW, *Ammodramus savannarum*. Two records, 22 Nov 1964 (Miller) and 16 Nov 1976 (Koenig).
- VESPER SPARROW, *Poocetes gramineus*. Three records: 26 Jan 1946 (Finley); two, 24 Mar 1954 (Davis); and 13 Oct 1969 (one trapped, Davis).
- *LARK SPARROW, *Chondestes grammacus*. Uncommon resident.
- *RUFIOUS-CROWNED SPARROW, *Aimophila ruficeps*. Rare resident.
- *SAGE SPARROW, *Amphispiza belli*. Rare resident.
- *DARK-EYED JUNCO, *Junco hyemalis*. Common resident. Numbers increase in fall as winter residents arrive, decrease in spring as they leave. One record of the "Gray-headed" Junco (*J. h. caniceps*), 5 Jan 1967 (Davis, specimen, MVZ).
- *CHIPPING SPARROW, *Spizella passerina*. Common summer resident.
- BLACK-CHINNED SPARROW, *S. atrogularis*. Accidental. Three records: 8 Jun 1938 (Sibley); 30 Aug 1939 (Linsdale); and one circa 1970 (Pitelka).
- HARRIS' SPARROW, *Zonotrichia querula*. Accidental. One record, 18 Nov 1944 (Weston, bird trapped and banded).
- WHITE-CROWNED SPARROW, *Z. leucophrys*. Common winter resident. A single tailless bird seen 17, 25, 27 Jul 1957 appeared to be of the coastal race, *nuttalli* (Davis).
- GOLDEN-CROWNED SPARROW, *Z. atricapilla*. Common winter resident. A male collected 25 Jul 1961 (Davis, specimen, MVZ) had a testis 2 mm long and slight fat and had apparently failed to migrate.
- WHITE-THROATED SPARROW, *Z. albicollis*. Irregular and rare winter resident.
- FOX SPARROW, *Passerella iliaca*. Irregular winter resident; common in some years.
- LINCOLN'S SPARROW, *Melospiza lincolni*. Uncommon winter resident.
- *SONG SPARROW, *M. melodia*. Uncommon resident.

CHANGES IN THE AVIFAUNA

Our search of the records of bird occurrence at Hastings reveals many changes in the bird community from the founding of the Reservation in 1937 to the present. The following species have increased or been added to the breeding community: Red-shouldered Hawk, Turkey, Barn Swallow, American Robin, Starling and Brown-headed Cowbird. Two of these, the Turkey and Starling, are exotics which have spread into the area in recent years. Both Red-shouldered Hawks and Brown-headed Cowbirds have increased in other parts of California in the same period. We know of no obvious environmental change which might correlate with the addition of American Robins or Barn Swallows, both of which have occurred as breeding birds since 1979.

Sixteen species appear to have decreased significantly or disappeared almost entirely from the community: Marsh Hawk, Prairie Falcon, Peregrine Falcon, Merlin, Killdeer, Roadrunner, Long-eared Owl, Lewis' Woodpecker, Horned Lark, Cliff Swallow, Purple Martin, Dipper, Mockingbird, Water Pipit, MacGillivray's Warbler and Tricolored Blackbird.

Two wintering species which prefer short grass, the Horned Lark and Water Pipit, quickly disappeared with the return of tall, dense grass to the Reservation after the cessation of grazing. The three

falcons and the Marsh Hawk have decreased markedly throughout much of California and elsewhere, presumably in part due to pesticide contamination (e.g., Hickey 1969, Temple 1972, Fyfe et al. 1976), robbing of nests for falconry (Small 1974) and/or habitat destruction (Arbib 1979). Purple Martins and Lewis' Woodpeckers have similarly declined throughout their ranges in recent years (Arbib 1979), while Roadrunners have declined in northern California generally (Small 1974). The Dipper nested in the period 1942-46, when the Reservation's major creeks flowed continuously. After 1946 all three creeks became intermittent and the Dipper soon disappeared except for an occasional visitant. Concurrent with this change in rainfall patterns has been that of a gradual decline in the riparian thickets along the watercourses, well documented by comparison of early photographs with the same areas today. This decline probably accounts for the present rarity of the MacGillivray's Warbler, Killdeer and Tricolored Blackbird, species which prefer mesic environments. We can offer no unambiguous reasons for the decline of the remaining two species, the Cliff Swallow and Mockingbird; the latter is particularly surprising given its recent increase in the nearby Monterey Peninsula (Davis pers. obs.)

COMPARISON WITH A "SEMIURBAN" AVIFAUNA

Raunkiaer's Law of Frequency, originally used by botanists, was used by Linsdale (1928) and several subsequent authors to census birds. Basically, this method does not yield information on relative abundance but rather on the relative frequency of occurrence of the individual species comprising an avifauna. Species are ranked according to the percentage of standard censuses on which they were recorded. Linsdale suggested that this method would afford a satisfactory basis for comparing different avifaunas at a given point of time and for assessing changes in a given avifauna over a period of time. Although the technique was used in several early studies (Linsdale 1928, 1932, 1936; Linsdale and Rodgers 1937; Rodgers and Sibley 1940), none of these workers tested the method by making any comparisons.

Linsdale (unpubl. data on file at Hastings Reservation) established the frequency of occurrence for a total of 123 species recorded on 689 censuses at Hastings Reservation from November 1937 through December 1940. Here we compare these results with those obtained by Rodgers and Sibley (1940), who established frequency of occurrence for a total of 65 species recorded on 120 censuses (10 per month) made on parts of the campus of the University of California, Berkeley, in 1938 and 1939. The two census periods are almost directly comparable chronologically.

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Table 1. The 20 most frequently recorded species on the University of California, Berkeley, campus and at the Hastings Reservation.

Rank	Campus ¹	Hastings		Campus Rank
		Rank	Hastings ²	
1	American Robin	33	Scrub Jay ³	12
2	Brown Towhee ³	3	Rufous-sided Towhee ³	11
3	Song Sparrow	37	Brown Towhee ³	2
4	White-crowned Sparrow	32	Plain Titmouse ³	15
5	Bushtit	23	Dark-eyed Junco ³	7
6	Brewer's Blackbird	44	Common Crow	—
7	Dark-eyed Junco ³	5	House Finch ³	9
8	Anna's Hummingbird	27	Yellow-billed Magpie	—
9	House Finch ³	7	Acorn Woodpecker	—
10	House Sparrow	—	California Quail ³	17
11	Rufous-sided Towhee ³	2	Common Flicker ³	18
12	Scrub Jay ³	1	Black Phoebe	26
13	Purple Finch	22	Wrentit	46
14	Lesser Goldfinch ³	17	Western Bluebird	65
15	Plain Titmouse ³	4	White-breasted Nuthatch	—
16	Pine Siskin	91	Western Meadowlark	—
17	California Quail ³	10	Lesser Goldfinch ³	14
18	Common Flicker ³	11	Lark Sparrow	—
19	Swainson's Thrush	95	California Thrasher	63
20	"Audubon's" Warbler	52	Nuttall's Woodpecker	—

¹All species permanent residents except Swainson's Thrush (summer resident) and "Audubon's" Warbler (winter resident).

²All species permanent residents.

³Common to both lists.

The campus area was 34.4 ha in extent and included 11 buildings, extensive lawns, scattered deciduous trees, conifers and eucalyptus, a large eucalyptus grove, two creeks which flowed until late summer, and shrubbery around the buildings and along the creeks. We have compared the composition of the 20 most frequently recorded species on each list (Table 1), as these would be the most important in indicating similarities and differences between the two avifaunas.

The greater diversity of habitats and reduced human disturbance at Hastings is suggested by the fact that 7 of the first 20 species (35%) on the Hastings list were not recorded at all at Berkeley whereas only one of the Berkeley top 20 (5%) was not recorded at Hastings (the House Sparrow).

Nine species (45%) are common to both lists (Table 1). All are birds commonly found in both natural areas and in city parks, gardens and suburban areas wherever suitable vegetation, native or introduced, is present.

Of the 11 species present at Berkeley but not in the first 20 at Hastings, the White-crowned Sparrow is represented on the campus by a resident race (*nuttalli*) and by winter residents of other races, but only by wintering birds at Hastings, where the species is absent from early May to mid- or late September. The House Sparrow is primarily an urban species closely tied to human habitation (Witherby et al. 1948, Summers-Smith 1963), and tends to drop out in undisturbed natural situations as at Hastings.

The Brewer's Blackbird, like the House Sparrow, has established successfully in suburban situations. At Hastings, nearly all records of the blackbird are of transients flying over, although some nesting occurs on the grazed savannas immediately adjacent to the Reservation. Thus the tall, ungrazed grass would appear to be limiting this species at Hastings.

The Anna's Hummingbird is much reduced in numbers at Hastings in late fall and winter but no such reduction is evident in Berkeley (F. Pitelka pers. comm.). Grinnell and Miller (1944) noted the importance of introduced flowering shrubs and trees in providing food for this species from October to January, allowing a much larger population to overwinter. In this period virtually no plants flower at Hastings. The greater frequency of this species at Berkeley most likely depends on winter food provided by garden flowers and ornamental plantings.

The higher frequency of American Robins at Berkeley, where they are a common permanent resident, correlates with the presence of extensive campus lawns which provide ideal foraging sites. The Pine Siskin, also a common breeder in Berkeley but not at Hastings, may be more frequent because of the extensive plantings of conifers on campus. Only two mature native pine trees occur at Hastings. The Purple Finch is better adapted physiologically to more mesic habitat (Salt 1952). The cooler, more humid climate at Berkeley probably accounts for its greater frequency there. At Hastings, this species is confined almost entirely to mesic canyon bottom sites from June to October.

The greater frequency of the Song Sparrow and Swainson's Thrush at Berkeley probably results from the presence of creeks flowing at least through the breeding and immediate postbreeding seasons, and the higher humidity and presence of green vegetation along these watercourses.

Only two species are difficult to account for, the Bushtit and Yellow-rumped (Audubon's) Warbler. The problem is not why these two species were so common at Berkeley but why they were recorded so infrequently at Hastings. Linsdale (1947) suggested that Bushtits may have declined markedly during the severe winter of 1936-37; this special circumstance may in part be the cause of the lowered

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ranking of this species at Hastings. We do not know why the Audubon's Warbler, which winters in a wide variety of habitats, is relatively less common at Hastings, although the wider variety of flowering exotics in Berkeley may make this area more suitable than Hastings.

Of the 11 Hastings species not in the Berkeley first 20, most can be accounted for by obvious habitat preferences: Acorn Woodpeckers, Nuttall's Woodpeckers and White-breasted Nuthatches are absent from most of the humid coastal environment of Berkeley; Yellow-billed Magpies, Common Crows, Western Bluebirds, Western Meadowlarks, and Lark Sparrows typically occur in grassland and/or oak savanna with a grassy understory; California Thrashers and Wrentits are most typical of chaparral. The only remaining species in this list is the Black Phoebe, which was 26th on the campus list. This species bred on the upper campus but strayed only rarely to the lower campus where the censuses were done (Rodgers and Sibley 1940).

Nearly all differences in relative frequency between Hastings and Berkeley are consistent with known habitat or climatic differences, and the similarities between the two areas involve species which are known to occur commonly in both natural and suburban areas. Thus, although there are far more refined methods which may be used to analyze the species composition of an avifauna, the Raunkiaer method is useful, and may be particularly valuable as a means to recover information from carefully kept records made by competent observers over an appreciable period of time.

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