BREEDING AVIFAUNAL CHANGES IN THE SAN FRANCISCO BAY AREA 1927–2005

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ABSTRACT: I compare the breeding avifauna of the San Francisco Bay area prior to 1927 with the current breeding avifauna. There were 172 breeding species known in the San Francisco Bay area prior to 1927, whereas today there are 215. Four species have been extirpated, whereas 47 are new. Most of the species added to the breeding avifauna are casual, irregular, or accidental, but 17 of these now breed regularly. The reasons for these avifaunal changes are diverse but in many cases are related to range expansions or contractions. Factors contributing to expansions include rebound of populations following cessation of commercial harvesting, conversion of salt marshes to salt-evaporation ponds, maturation of second-growth forests, urban adaptation, exploitation of artificial reservoirs, and habitat protection.

Grinnell and Wythe (1927) summarized the status of birds of the nine counties bordering on San Francisco and San Pablo bays, California, one of the major historical benchmarks in the description of western North America's avifauna. In the 80 years since 1927, the San Francisco Bay region has undergone vast changes, and its avifauna has changed in proportion. Thus a comparison of current conditions with those reported by Grinnell and Wythe is of value.

METHODS

I made a determination of the breeding status of the species listed in Grinnell and Wythe (1927) for each of the nine counties contiguous to the San Francisco Bay estuary (Figure 1), the region referred to subsequently as the "Bay area." In those cases where Grinnell and Wythe listed specific breeding evidence I accepted this evidence if it was equivalent to confirmed breeding according to the definitions of the North American Ornithological Atlas Committee's protocols for breeding bird atlases (http:/americanbirding.org/norac), that is, nest with young, dependent fledglings, etc. In cases where a species was described as a "resident" or "summer visitant" I accepted these records as being equivalent to confirmed breeding even though no evidence was given. However, when a bird was described as being present in the summer or at other times in the year, but no other evidence was provided, I treated these records as probable or possible breeding. To this list of confirmed species I added the Rock Pigeon (*Columba livia*), which was not treated by Grinnell and Wythe.

After making an initial determination of the current status of all species breeding in the San Francisco Bay area (see below), I established a draft list of those species whose status had changed, that is, species that had either been extirpated from or added to the breeding avifauna. For extirpated species I obtained the latest documentation of breeding, while for newly breeding species I recorded the documentation of first breeding. For documentation, I used published sources such as the seasonal reports for the Middle Pacific

Figure 1. San Francisco Bay area counties. Numbers correspond to the ordering of symbols coding for the distribution of species listed in tables 2 and 3.

Coast region (now called the Northern California region) contained in *North American Birds* and its predecessor publications, as well as the *Condor*, *Bird-Lore*, and the *Gull*. I also obtained a number of unpublished records from regional experts, and the observers responsible for these records are listed in the acknowledgments. I searched the egg collections of the California Academy of Sciences (CAS), the Museum of Vertebrate Zoology (MVZ), the Western Foundation of Vertebrate Zoology (WFVZ), the San Bernardino County Museum (SBCM), and the National Museum of Natural History, Smithsonian Institution (USNM) for egg records for species on my draft list. Although the focus of this paper is on the San Francisco Bay area, I have also examined breeding records from surrounding areas where these provide context for breeding expansions or contractions.

I determined the status of species currently breeding in the San Francisco Bay area from published information in the Marin, Sonoma, San Mateo, and Napa county breeding bird atlases (Shuford 1993, Burridge 1995, Sequoia Audubon Society 2001, Berner et al. 2003), as well as from unpublished information from ongoing atlas work in the other five counties. I prepared a draft list of currently breeding species, and I obtained detailed comments on these records from regional experts (see acknowledgments). The records in this paper for the nine counties are current through the 2005 breeding season.

To aid in assessing avifaunal changes from the pre-1927 period to the present, I assigned new breeding species to four categories: (1) regular breeder, (2) irregular or very rare breeder, (3) previously established (pre-1927) breeder, and (4) introduced breeder. I defined category 1 (regular breeders) as those species that are now breeding in one or more counties on an annual basis. I defined category 2 (irregular or very rare breeders) as those species that breed sporadically. To distinguish between category 1 and category 2 species, I plotted all documented breeding records on a map of California to determine whether the recent history of breeding records suggests a range expansion, hence category 1, or if the breeding was sporadic in space and time, hence category 2. I identified category 3 species as those rare or secretive species that were likely overlooked before 1927 but were probably present in small numbers. Introduced breeders (category 4) are generally well documented in the published literature and readily identified.

RESULTS

On the basis of the species accounts in Grinnell and Wythe, with the Rock Pigeon added, there were 160 species breeding in the nine-county San Francisco Bay area from the time of the earliest naturalists' visits (Alexander Collie and Paolo Emilio Botta in 1826 and 1827; Palmer 1917) up to 1927. Seven more species were listed as occurring during the breeding season but without evidence of confirmed breeding: the Spotted Owl (*Strix occidentalis*), Pileated Woodpecker (*Dryocopus pilieatus*), Purple Martin (*Progne subis*), Violet-green Swallow (*Tachycineta thalassina*), Red-breasted Nuthatch (*Sitta canadensis*), Yellow-rumped Warbler (*Dendroica coronata*), and Black-throated Gray Warbler (*D. nigrescens*). In Appendix 1 I list additional pre-1927 breeding records for the Bay area not mentioned by Grinnell and Wythe. For four of these additional species, the Purple Martin, Violet-green Swallow, Yellow-rumped Warbler, and Black-throated Gray Warbler, I found confirmed breeding evidence for species considered only probable or possible on the basis of Grinnell and Wythe's list, bringing the 1927 total to 164 species. In addition, there are another eight species that Grinnell and Wythe did not list as possible breeders for which I located breeding evidence earlier than 1927: the Eared Grebe (*Podiceps nigricollis*), Clark's Grebe (*Aechmophorus clarkii*), Great Egret (*Ardea alba*), Canada Goose (*Branta canadensis*), Black Rail (*Laterallus jamaicensis*), American Avocet (*Recurvirostra americana*), Lesser Nighthawk (*Chordeiles acutipennis*), and Black-chinned Hummingbird (*Archilochus alexandri*). With these additions the pre-1927 total of breeding birds increases to 172 species.

The number of breeding species in the nine San Francisco Bay area counties for the period up to 1927 is compared in Table 1 with the number of species that are known to have bred in these counties from 1928 to 2005. Whereas the total number of breeding species for the entire region in 1927 was 172, 215 species have been recorded breeding in the period following, for a 25% increase.

Four species breeding in the San Francisco Bay area prior to 1927 are no longer present as breeding species. These are listed in Table 2 and discussed below in the species accounts. In contrast, 47 species have been added to the list of breeding avifauna since 1927. These species are listed in Table 3 and also discussed in the species accounts.

SPECIES ACCOUNTS

These accounts provide a general overview of species that have been extirpated since 1927 or are new breeders. Specific records that document breeding changes are placed at the end of each account. These records sometimes refer to breeding evidence that is typically used in breeding bird atlases, such as, "on nest," "fledged young," "precocial young," and so forth. Abbreviations: AB, *American Birds*; AFN, *Audubon Field Notes*; NAB, *North American Birds*; NASFN, *National Audubon Society Field Notes*.

Extirpated Species

Grinnell and Wythe (1927) believed that by the time of their publication three species had already been extirpated from the Bay area counties: the California Condor (*Gymnogyps californianus*), Wood Duck (*Aix sponsa*), and Bald Eagle (*Haliaeetus leucocephalus*). There were few breeding records for the California Condor ever in the Bay area and none since 1869 (Grinnell and Miller 1944, Berner et al. 2003). The Wood Duck, however, has reestablished itself throughout the region, and Bald Eagles are now nest-

Table 1 Number of Breeding Species in San Francisco Bay Area by County, 1826–1927 versus 1928–2005

	Breeding Species		
County	1826–1927	1928–2005	Increase
Sonoma	118	164	39%
Marin	109	165	51%
San Francisco	87	104	20%
San Mateo	105	167	59%
Santa Clara	121	178	47%
Alameda	122	174	43%
Contra Costa	83	159	92%
Solano	70	137	96%
Napa	75	158	111%
Total Bay area	172	215	25%

Table 2 Species No Longer Breeding in the San Francisco Bay Area

Species	Status by County[a]
Fulvous Whistling-Duck	000++0000
Yellow-billed Cuckoo	+000+000+
Lesser Nighthawk	0000+0000
Willow Flycatcher	000+++000

[a]Codes ordered by county as numbered in Figure 1. 0, species is unrecorded breeding in the county; +, species recorded as breeding in the county prior to 1927.

ing at reservoirs in three counties. Since 1927 four further species have been extirpated, as listed in Table 2 and discussed below. The accounts place these species' disappearance in the context of distributional changes in California or the western United States. The records listed at the end of the account are, in chronological order, the last known breeding records.

Fulvous Whistling-Duck (*Dendrocygna bicolor*). The Fulvous Whistling-Duck appears to have been a fairly common breeding species in the San Joaquin and southern Sacramento valleys at the end of the 19th century (Grinnell 1902). Many egg sets were collected from the Central Valley during the first third of the 20th century, especially in Merced County and the counties to the south (WFVZ, CAS, MVZ). But there is no evidence that this duck occurred regularly in the Bay area at this time, and the two records listed below are the only known instances of breeding. The last egg set from Merced County was collected in 1937 (WFVZ 37781a). Adults with six unfledged young observed on 5 Oct 1947 on Tulare Lake, Kings County (AFN 1:18, 1948), made the last breeding record from the San Joaquin Valley. Farther south, nesting occurred on the coastal slope of southern California at Playa del Rey, Los Angeles County into the early 1950s (Garrett and Dunn 1981). The Fulvous Whistling-Duck nested at the southern end of the Salton Sea until the late 1990s but may now be extirpated as a breeding species from California (Patten et al. 2003). Records: Downy young captured in a marsh at Mountain View, Santa Clara County, summer 1917 (Snyder 1919). Downy young found near Redwood City, San Mateo County, prior to 1927 (Grinnell and Wythe 1927).

Yellow-billed Cuckoo (*Coccyzus americanus*). The Yellow-billed Cuckoo was considered rare in the Bay area at the beginning of the 20th century (Grinnell and Wythe 1927). At the start of the 20th century cuckoos generally nested in willow thickets along streams, sometimes in a mixture with other riparian trees and shrubs. In the Bay area willows historically grew along narrow riparian corridors or in thickets ("sausals") as a component of freshwater swamps. In Santa Clara County, drainage for agriculture and flood control eliminated most of this habitat by the end of the 19th century (Cooper 1926). The cuckoo's range contracted throughout the West, the species being extirpated from British Columbia by the 1920s, Washington by 1934, and Oregon by 1945 (Hughes 1999). To a substantial degree this range reduction has been caused by conversion of riparian habitats for agriculture, flood control, or urbanization (Laymon and Halterman 1987). Yet even apparently suitable habitats that appear unchanged in recent decades no longer have breeding cuckoos, and the reasons for this are not clear (Laymon and Halterman 1987). By the early 1990s the Yellow-billed Cuckoo bred in California only along the South Fork of the Kern River,

Table 3 Species Breeding in the San Francisco Bay Area Not Recorded by Grinnell and Wythe (1927)

Species	Category of Breeding	Status by County[a]
Mute Swan	Introduced	++0000+00
Gadwall	Regular	+++++++++
American Wigeon	Casual/sporadic	000+0+000
Blue-winged Teal	Casual/sporadic	0+00+++00
Canvasback	Casual/sporadic	0000+0000
Ring-necked Duck	Casual/sporadic	0000+0000
Hooded Merganser	Casual/sporadic	+00000000
Common Merganser	Regular	++0+++00+
Wild Turkey	Introduced	+00++++++
Least Bittern	Casual/sporadic	0+0000000
Snowy Egret	Regular	++0++++++
Little Blue Heron	Casual/sporadic	0000+0000
Cattle Egret	Casual/sporadic	+000++000
White-faced Ibis	Casual/sporadic	0000+0000
Wilson's Phalarope	Casual/sporadic	+000000+0
Heermann's Gull	Casual/sporadic	00++00000
California Gull	Regular	00+0+++00
Arctic Tern	Casual/sporadic	00000+000
Forster's Tern	Regular	0+0+++0++
Least Tern	Regular	000+0++00
Black Skimmer	Regular	000+++000
Marbled Murrelet	Likely <1927 but undetected	000+00000
Spotted Owl	Likely <1927 but undetected	++000000+
N. Saw-whet Owl	Likely <1927 but undetected	++0+++00+
Black Swift	Likely <1927 but undetected	000+00000
Costa's Hummingbird	Casual/sporadic	0000++000
Red-breasted Sapsucker	Regular	++0+000+0
Pileated Woodpecker	Regular	++0++000+
Cassin's Kingbird	Casual/sporadic	0+00++0+0
Bell's Vireo	Casual/sporadic	0000++000
Gray Jay	Casual/sporadic	+00000000
Red-breasted Nuthatch	Regular	++++++00+
Varied Thrush	Regular	000+00000
Northern Mockingbird	Regular	+++++++++
European Starling	Regular	+++++++++
Cedar Waxwing	Casual/sporadic	000++++0+
Nashville Warbler	Casual/sporadic	+00000000
Northern Parula	Casual/sporadic	0+0+00000
Hermit Warbler	Likely <1927 but undetected	++0++000+
American Redstart	Casual/sporadic	0+0+00000
Hooded Warbler	Casual/sporadic	000+00000
Rose-breasted Grosbeak	Casual/sporadic	000+00+00
Blue Grosbeak	Regular	+000++0+0
Indigo Bunting	Casual/sporadic	0+0++++00
Great-tailed Grackle	Regular	+0+0++++0
Hooded Oriole	Regular	+++++++++
Red Crossbill	Regular	0+++00000

[a]Codes ordered by county as numbered in Figure 1. 0, species unrecorded breeding in the county; +, species recorded as breeding in the county since 1927.

the Sacramento River, the Colorado River, and the Santa Ana River (Small 1994). Records: Specimen and nest collected, Palo Alto, Santa Clara County, 22 Jul 1901 (see CAS 14306). On nest, Wilson Ranch, Napa County, 1902 (E. L. Bickford notes *fide* W. T. Grummer). Four eggs collected, Santa Rosa Valley, Sonoma County, 24 Jun 1923 (WFVZ 102477).

Lesser Nighthawk (*Chordeiles acutipennis*). The Lesser Nighthawk is a species of the Lower Sonoran life zone. It was abundant in the San Joaquin Valley at the end of the 19th century, with birds also found in valleys in the coast ranges as far north as San Benito County (Grinnell 1902). However, Grinnell and Wythe (1927) did not record this nighthawk as occurring in the Bay area. Following publication, W. E. Unglish (1929) reported that he had collected egg sets of this species along Uvas Creek, Santa Clara County, since 1894 and that in the 1920s D. Bernard Bull had also found it breeding along Coyote Creek. Later, Pickwell and Smith (1938) reported extensively on the nighthawk's nesting behavior along Coyote Creek. Bull noted on an earlier egg slip (WFVZ 144649): "This locality, Uvas creek, and at Coyote are the only places I've found this species nesting. The breeding ground at Coyote is now covered over by water because of a dam. There are only two pairs breeding at Uvas creek this (1936) year." Lesser Nighthawks still breed in the San Joaquin Valley as close to the Bay area as San Joaquin County (NASFN 49:976, 1995). The eastern portions of Alameda, Contra Costa, and Solano counties are within the Great Valley faunal district (Miller 1951), which also includes San Joaquin County. Although there are no historical records of breeding from the three counties, Lesser Nighthawks are occasionally recorded in eastern Contra Costa County (NASFN 52:387, 1998) and may breed casually. Records: Two eggs collected, Uvas Creek, 2 mi. west of Gilroy, Santa Clara County, 17 May 1937 (WFVZ 30991).

Willow Flycatcher (*Empidonax traillii*). Grinnell and Wythe (1927) considered the Willow Flycatcher "sparingly summer resident" and recorded nesting only from Pleasanton in Alameda County and Alviso, Palo Alto, and Santa Clara in Santa Clara County. Breeding in San Mateo County as well as at other locations in Alameda and Santa Clara counties is attested by egg sets in various collections (WFVZ, CAS, USNM). Willow Flycatchers appear to have nested fairly regularly in Santa Clara County riparian areas through the mid-20th century with the last nesting birds found along Guadalupe River in 1962 by Donald D. McLean. Unitt (1987) described the northwestern breeding limit of the subspecies *E. t. extimus* as the rivers and streams on the coastal plain of southern California and the Kern River, thus birds breeding in the Bay area were of the subspecies *brewsteri*; see also Browning (1993). The ranges of both *brewsteri* and *extimus* retracted significantly in California over the latter half of the 20th century (Harris et al. 1987, Unitt 1987). The loss of riparian habitat and parasitism by the Brown-headed Cowbird are both factors that may have influenced these population declines. Brown-headed Cowbirds were first found in the Bay area in Alameda County in 1922 (La Jeunesse 1923), and C. P. Smith (1926) found a parasitized Willow Flycatcher nest along Guadalupe Creek as early as 3 Jul 1926. Records: Four eggs collected, San Francisquito Creek, San Mateo County, 13 Jun 1901 (WFVZ 75064). Three eggs collected, Alameda County, 16 Jun 1920 (WFVZ 49790). Nesting pair, Guadalupe River, Santa Clara County, 1962 (AFN 16:445, 1962).

New Species

Forty-seven species have been found breeding since 1927 and are listed in Table 3. In the following accounts, the first breeding records within the Bay area counties are listed in chronological order.

Mute Swan (*Cygnus olor*). Widely introduced in both the Old and New worlds, the Mute Swan has now established feral populations in both Sonoma and Marin counties (Middle Pacific Coast region notebooks) and, apparently, in Contra Costa County. Records: Nested, Marin County, about 1990 (R. Stallcup, Middle Pacific Coast region notebooks). Nested, Schollenberger Park, Petaluma, Sonoma County, about 2000 (R. Stallcup, Middle Pacific Coast region notebooks). Apparently nesting, Concord Naval Weapons Station, Contra Costa County, prior to 2005 (S. A. Glover).

Gadwall (*Anas strepera*). Grinnell and Wythe (1927) considered the Gadwall a "rare winter visitant." Since 1927 this species has slowly become more common. Its breeding was first noted in Sonoma and Alameda counties in 1965, in Santa Clara County in 1967, and in Solano County in 1969. Today it appears to nest regularly in all of the Bay area counties. This change in status is part of a significant expansion of the Gadwall's breeding range over the last 50 years throughout North America and Europe (LeSchack et al. 1997). Although reservoir construction and other water projects may have assisted this expansion, its cause on the broad scale is not understood (LeSchack et al. 1997). Records: Nested near Alvarado, Alameda County, prior to 1965 (AFN 19:574, 1965). Forty females and immatures, Tubbs Island, Sonoma County, 18 Aug 1965 (AFN 20:88, 1966). Nesting, Palo Alto Baylands, Santa Clara County, 1967 (AFN 21:601, 1967). Leslie Salt Ponds, Solano County, 19 Jul 1969 (AFN 23:690, 1969). Ducklings, Redwood Shores, San Mateo County, June 1974 (P. J. Metropulos). Nested, San Antonio Creek, Marin County, 6 May 1979 (Shuford 1993). Nest and eggs, Huichica Creek, Napa County, 13 Jun 1986 (Berner et al. 2003). Nested, Shell Marsh, Contra Costa County, 30 Jun 1995 (NASFN 49:975, 1995). Ducklings, Mallard Lake, Golden Gate Park, San Francisco County, 12 Jun 1999 (*fide* D. Singer).

American Wigeon (*Anas americana*). Small (1994) noted that this wigeon breeds sparingly in northeastern California, the Sacramento Valley, and the San Joaquin Valley as far south as Merced County. The only known nestings in the Bay area are two from Alameda and San Mateo counties. Records: Female with three ducklings, Hayward Regional Shoreline, Alameda County, 12 Jun 2000 (NAB 54:420, 2000). Female with six ducklings, Redwood Shores, San Mateo County, 21 Jun 2005 (R. S. Thorn). An unpublished 1984 record of the American Wigeon nesting on Brooks Island, Contra Costa County, cited by Shuford (1993), was the result of a data entry error in the Middle Pacific Coast region notebooks (S. F. Bailey pers. comm.).

Blue-winged Teal (*Anas discors*). Grinnell and Wythe (1927) considered the Blue-winged Teal a rare visitant to the Bay area. Its winter status appears little changed since 1927. Its breeding has been noted on four occasions since 1974, and the pattern of nesting appears to be sporadic. However, see Shuford (1993) concerning the difficulties in distinguishing breeding Blue-winged Teal from the more common Cinnamon (*A. cyanoptera*). Records: Ducklings, Palo Alto Baylands, Santa Clara County, 21 May 1974 (AB 28:846, 1974). Nested, Olema Marsh, Marin County, May 1997 (NASFN 51:923, 1997). Female with ducklings, McNabney Marsh, Contra Costa County, 8 Jun 2000 (NAB 54:420, 2000). Six ducklings, Hayward Regional Shoreline, Alameda County, 18 Jun 2000 (NAB 54:420, 2000).

Canvasback (*Aythya valisineria*). The Canvasback has bred sporadically in northeastern California and the Sacramento and San Joaquin valleys in the last 25 years (multiple records in *North American Birds*). It is a common winter visitant in the San Francisco Bay area, and a few birds are found in most summers. But there is only one breeding record for the Bay area: Half-grown young, Guadalupe Slough, Santa Clara County, 16 Jun 1989 (AB 43:1363, 1989).

Ring-necked Duck (*Aythya collaris*). Since the 1970s Ring-necked Ducks have

bred occasionally in such northern California counties as Del Norte, Lassen, and Plumas (multiple records in *North American Birds*). Few birds oversummer in the San Francisco Bay area. Only one nesting in the Bay area is known: Half-grown young, Calaveras Reservoir, Santa Clara County, 8 Aug 1997 (NASFN 51:1049, 1997).

Hooded Merganser (*Lophodytes cucullatus*). Grinnell and Wythe (1927) judged the Hooded Merganser to be a rare winter visitant in the Bay area. The first known breeding in California was on Mountain Meadows Reservoir, Lassen County, in 1964 (AFN 18:483, 1964). In the last decade, there has been a notable expansion of breeding Hooded Mergansers south through the Central Valley, including one record in the Bay area: 7 hatchlings, Lake Sonoma, 1999 (Pandolfino et al. 2006).

Common Merganser (*Mergus merganser*). Grinnell and Wythe (1927) considered the Common Merganser a fairly common winter visitant, but there is no evidence that it nested in the Bay area in 1927. Grinnell and Miller (1944) indicated that the species nested south along the coast only as far the Navarro River in Mendocino County. At least in some years, however, there is evidence that this merganser bred much farther south. Two broods of young were found along the Nacimiento River in southern Monterey County in June 1939 (Bird-Lore 41:262, 1939), and a nest and eggs were collected in San Luis Obispo County on 25 Apr 1941 (MVZ 5130). Eleven female-plumaged Common Mergansers on Calaveras Reservoir, Santa Clara County, 13 Jul 1971 (AB 25:900, 1971) suggested local nesting, but the first Bay area confirmation did not come until 1979. The Common Merganser is now a regular breeding species along streams and at reservoirs throughout the Bay area (Figure 2). Records: Ducklings, Salmon Creek, Sonoma County, 4 Aug 1979 (AB 33:893, 1979). Ducklings, Kent Lake, Marin County, 27 Jun 1981 (AB 35:974, 1981). Ducklings, Coyote Creek, Henry Coe State Park, Santa Clara County, 29 Jun 1986 (J. Yurchenco, A. Lauterbach). Ducklings, Lake Berryessa at Putah Creek, Napa County, summer 1988 (P. Carlisle *fide* W. T. Grummer, Berner et al. 2003). Ducklings, Crystal Springs Dam, San Mateo County, 14 Jul 1992 (AB 46:1174, 1992). Confirmed in 3 blocks, Alameda County, 1993–1997 (Alameda Breeding Bird Atlas, pre-final summary *fide* H. L. Cogswell).

Wild Turkey (*Meleagris gallopavo*). The Wild Turkey is not native to the San Francisco Bay area. Introduced birds were observed in Alameda County as early as 1965 as noted below. There have been a number of releases in the interior counties since 1970, mostly of subspecies *M. g. intermedia* from Texas (S. Gardner pers. comm.). These birds appear to have established viable breeding populations in eight of the Bay area counties. Records: Introduced in Arroyo Mocho, Alameda County, prior to 1965 (H. L. Cogswell); for this area a nest with eggs, Mines Road, 19 Apr 1986 is the earliest evidence of breeding (AB 40:519, 1986). Breeding at least since 1972, Santa Clara County (AB 27:814, 1973). Introduced to Healdsburg, Sonoma County, Mar 1978 (S. Gardner). Nest with eggs, Green Valley near Wild Horse Creek, Solano County, 15 May 1983 (C. Low *fide* R. L. C. Leong); introduced Fairfield, Solano County, Feb 1983 (S. Gardner). Fledged young, Silverado Trail, Napa County, 22 Jun 1986 (P. Broyles *fide* W. T. Grummer); introduced Pope Valley, Feb 1970 (S. Gardner). Introduced Morgan Territory Preserve, Contra Costa County, 1990 (S. Gardner). Chicks, Long Ridge Open Space Preserve, San Mateo County, 25 May 1997 (Sequoia Audubon Society 2001).

Least Bittern (*Ixobrychus exilis*). There are several early records of the Least Bittern breeding from Merced County (CAS, WFVZ egg sets). It is a regular summer resident and assumed breeder in the Central Valley (J. C. Sterling unpubl. data). But only one instance of nesting is known from the Bay area: Fledged young, Olema Marsh, Marin County, 25 Jul 1998 (NASFN 52:499, 1998).

Snowy Egret (*Egreta thula*). Little historical information exists for the Snowy Egret

Figure 2. Common Merganser young, inlet to Almaden lake, Santa Clara County, 22 June 2001.

Photo by Peter LaTourrette

in California prior to the devastation wrought by the plume hunters that supplied the millinery trade in the late 19th and early 20th centuries. James G. Cooper (Baird et al. 1884) considered the species common in southern California but did not observe breeding. Evermann (1886), without details, stated that it nested in Ventura County between 1879 and 1881. Although W. L. Dawson believed that this egret was a regular nesting species in the state prior to the plume-hunting era, no breeding was documented until 1914, when he discovered a nest in Merced County (Dawson 1915). Grinnell and Wythe (1927) considered the Snowy Egret a rare straggler to the Bay area. Nesting was first observed on West Marin Island about 1952 (Shuford 1993), but no further colonies formed until the 1960s, when breeding birds were found in Contra Costa and San Mateo counties. Today there are colonies in most years in all of the Bay area counties. This egret's establishment in the Bay area broadly parallels its resettlement along North America's east coast, where birds returned to nest in New Jersey in 1939 and in Maine in 1961 (Parsons and Master 2000). Notable breeding records in the West include breeding in Arizona in 1947 and in Oregon in the 1940s (Parsons and Master 2000). Records: Nested on West Marin Island, Marin County, by about 1952 (Shuford 1993). One hundred pairs in heronry on Brown's Island, Contra Costa County, 17 Apr 1962 (AFN 16:503, 1962). Fifty to 100 pairs nested on Bair Island, San Mateo County, 8 May 1967 (AFN 21:536, 1967). Nest with young, Gum Tree Road, Grizzly Island, Solano County, Jun 1976 (Z. Labinger *fide* R. L. C. Leong). One hundred fifty pairs nested at the Alviso heronry, Santa Clara County, 18 Apr 1980 (AB 34:811, 1980). Nested in Penngrove, Sonoma County, 1991 (Burridge 1995). Five nests, Napa State Hospital, Napa County, 14 Jun 1992 (AB 46:1174, 1992). Nested at Hayward Regional Shoreline, Alameda County, 1994 (NASFN 48:984, 1994).

Little Blue Heron (*Egretta caerulea*). The Little Blue Heron was unrecorded in

California in 1927. The first accepted record in the state was of an immature found at Bodega Bay, Sonoma County, on 7 Mar 1964 and collected on 15 Mar (Jeter and Paxton 1964). Since the first observed nesting of the Little Blue in the heronry in Alviso, Santa Clara County, in 1980, nesting has also been recorded there in 1993 (AB 47:1146, 1993), and 1994 (NASFN 48:984, 1994). Through 2005, at least one adult Little Blue Heron has been found within the South San Francisco Bay salt ponds every summer since the initial nesting, but the species remains a very rare summer visitant at this location, and its status is unclear. Record: Nested at the Alviso heronry, Santa Clara County, 1980 (AB 34:925, 1980).

Cattle Egret (*Bubulcus ibis*). Like the Little Blue Heron, the Cattle Egret was absent from California in 1927. Following its invasion of the Americas, the Cattle Egret was first observed in the state in Orange County in 1962, and the first breeding was recorded in Imperial County in 1970 (Small 1994). After the first breeding in the Bay area at the Alviso heronry in 1985, nesting was reported at this location also in 1988 (AB 42:1336, 1988) and 1993 (AB 47:1146, 1993). One to two nests were also observed in the Alviso heronry 1995–1997 but not subsequently (Cheryl M. Strong, San Francisco Bay Bird Observatory, pers. comm.). Telfair (1994) characterized this species' range expansion as occurring in "widespread, explosive, grenadelike leaps, not concentric waves." It is too early, perhaps, to define a pattern from the few known nestings in the Bay area. Records: Ten nests, Alviso heronry, Santa Clara County, 22 May 1985 (AB 39:345, 1985). On nest, west Santa Rosa, Sonoma County, May 1995 (Burridge 1995). On nest, Hayward Regional Shoreline, Alameda County, 13 Apr 2001 (NAB 55:352, 2001).

White-faced Ibis (*Plegadis chihi*). The White-faced Ibis nested widely in the San Joaquin Valley in the decades before Grinnell and Wythe (1927) published their summary (egg collections, MVZ, CAS, WFVZ). As of 1927, however, there were only two records from the Bay area. Grinnell and Miller (1944) noted a general decline in numbers, primarily from loss of habitat, and this appears to have continued into the 1960s and 1970s, not only in California, but widely in the West (Ryder and Manry 1994). Then, in the last two decades of the 20th century, there was a general increase (Ryder and Manry 1994), and in the Central Valley this has been reflected in new breeding colonies in northern California in Colusa, Fresno, Kings, Yolo, Siskiyou, and Shasta counties from 1979 to 1995 (AB reports). But in the San Francisco Bay area the only records are of ibises observed carrying sticks into the Alviso heronry, Santa Clara County, 1991 and 1992 (D. Starks, P. Woodin).

Wilson's Phalarope (*Phalaropus tricolor*). Grinnell and Miller (1944) reported that Wilson's Phalarope nested regularly in northeastern California and south to Inyo County east of the Cascade–Sierra crest, occasionally in the Central Valley. Subsequently there have been a number of reports of nesting or attempted nesting in the Central Valley (NAB) but only two breeding records in the Bay area. Records: Chicks, Cader Lane Ponds, Sonoma County, 26 Jun 1982 (Burridge 1995). Chicks, Jepson Prairie Preserve, Solano County, 29 Jun 2005 (J. Steinhert).

Heermann's Gull (*Larus heermanni*). Grinnell and Wythe (1927) reported Heermann's Gull as a visitor to the Bay area from June to October. Records: One pair nesting unsuccessfully, Alcatraz Island, San Francisco County, summer 1979, 1980, and 1981 (Howell et al. 1983). One pair nested, Año Nuevo Island, San Mateo County, spring 1994 (NASFN 48:339, 1994); although the young hatched, they suffered predation by Western Gulls (*L. occidentalis*) (Roberson et al. 2001).

California Gull (*Larus californicus*). Although California Gulls occasionally nested along flooded areas of the Sacramento River at the beginning of the 20th century (Shuford and Ryan 2001), Grinnell and Wythe (1927) noted only small numbers of

immature or nonbreeding birds in the Bay area through the summer and did not record evidence of breeding. Since first colonizing levees beside an abandoned salt pond near Alviso, Santa Clara County, in 1980, breeding California Gulls have expanded into Alameda, San Francisco, and Contra Costa counties, and the number of nesting birds has increased by 25% a year (Shuford and Ryan 2001) (Figure 3). There is some evidence that the whole species' population increased in the 20th century (Conover 1983), although this increase has been debated (Shuford and Ryan 2001). Records: Twelve pairs, Alviso salt ponds, Santa Clara County, 1980 (Jones 1986). Colony, salt ponds near Newark, Alameda County, 21 Jun 1983 (AB 37:1024, 1983). Nesting, Alameda Naval Air Station, Alameda and San Francisco counties, 1993 (Shuford and Ryan 2000). Four nests, Brooks Island, Contra Costa County, 14 Jun 2000 (S. Bobzien *fide* S. A. Glover).

Arctic Tern (*Sterna paradisaea*). One record: A female Arctic Tern summered regularly at the Hayward Regional Shoreline, Alameda County, in the late 1990s. It paired with a male Forster's Tern in 1999 and laid three eggs. Two chicks died, but one fledged about 5 Aug 1999 (NAB 53:429, 1999). The female Arctic Tern again paired with a Forster's Tern in 2000 but abandoned the nesting attempt. The hybrid young also returned to this location in 2000 (NAB 54:420, 2000).

Forster's Tern (*Sterna forsteri*). In the West, the greatest concentration of breeding Forster's Terns is in the ephemeral lakes, reservoirs, and marshes of the Great Basin near the Oregon, California, and Nevada borders (McNicholl et al. 2001). In California, at the beginning of the 20th century, Forster's Tern was believed to nest only on these interior lakes (Grinnell 1902). In the Bay area it was a common spring and fall migrant; Grinnell and Wythe (1927) considered the record of one along the shore of Alameda County on 10 Jun exceptional. Since the discovery of a colony at the east end of the San Mateo Bridge in 1948, this tern has also nested in Marin, Solano, and

Figure 3. California Gull nestlings, Mountain View salt ponds, Santa Clara County, 5 June 2004.

Photo by William G. Bousman

Napa counties, but the largest concentrations are found in the southern portion of San Francisco Bay (Figure 4). The colonization of San Francisco Bay appears to be part of a general coastal expansion with first breeding records in San Diego Bay in 1962 and in Baja California in 1990 (McNicholl et al. 2001). Records: One hundred active nests, east end of San Mateo Bridge, Alameda County, 1948 (AFN 2:187, 1948; Gill 1977). Approximately six colonies, Alviso and vicinity, Santa Clara County, 1971 (Gill 1977). One hundred nests on Bair Island, San Mateo County, 1973 (AB 27:914, 1973). Twenty nests near Vallejo, Solano County, 1987 (AB 41:1483, 1987). Nesting, Russ Island and Island No. 2, Napa County, 1989 (AB 43:1364, 1989). Three nests, Corte Madera, Marin County, 1998 (NAB 54:420, 1998).

Least Tern (*Sternula antillarum*). Two Least Terns near Alameda, Alameda County on 19 Aug 1923 were the only ones recorded in the Bay area before 1927. In the first half of the 20th century this tern nested commonly along Monterey Bay in Monterey and Santa Cruz counties (Bailey 1993). Egg sets were collected in Santa Cruz County as late as 1940 and in Monterey County through 1956 (WFVZ). A

Figure 4. Forster's Terns courting, Shoreline Lake, Santa Clara County, 12 June 2005.

Photo by Tom Grey

concentration of 50 birds in South San Francisco Bay on 27 Sep 1933 (Bird-Lore 35:337 1933) suggested a postbreeding movement, but it is not known whether these birds came from the Monterey Bay colonies or elsewhere. Since the first three nests were found at Alameda in 1967, this endangered species has nested within the Bay area primarily in Alameda County but also in San Mateo and Contra Costa counties. Records: Three juveniles, one fed with small fish, Alameda, Alameda County, 2 Aug 1959 (Middle Pacific Coast region notebooks *fide* H. Green). Three nests, Alameda, Alameda County, Jun 1967 (AFN 21:602, 1967). Nesting, Bair Island, San Mateo County, 8 Jul 1969 (AFN 23:691, 1969). Six nests, Pittsburg, Contra Costa County, 1984 (AB 38:1058, 1984).

Black Skimmer (*Rynchops niger*). The Black Skimmer was first recorded in California in 1962 (McCaskie and Suffel 1971) and first found nesting at the Salton Sea in 1972 (McCaskie et al. 1974). It began to nest at San Diego Bay in 1976 and in coastal Orange County by 1985 (Small 1994). In the Bay area breeding was first recorded in 1994 with pairs in both Alameda and Santa Clara counties. Since the initial invasion one or more pairs have attempted to nest in each subsequent year. Records: One pair nesting, Hayward Regional Shoreline, Alameda County, 9 Jun 1994 (Layne et al. 1996). One pair nesting, salt pond B2 (Jaegel Slough), Santa Clara County, 19 Jun 1994 (Layne et al. 1996). Nested unsuccessfully, Menlo Park salt ponds, San Mateo County, 2 Jul 1996 (NASFN 50:993, 1996).

Marbled Murrelet (*Brachyramphus marmoratus*). Grinnell and Wythe (1927) considered the Marbled Murrelet to be a fairly common winter visitant on the open ocean, but this alcid's unusual habit of nesting away from the coast in old-growth forest was not known in their day. Grinnell and Miller (1944) noted one inland along Pescadero Creek, San Mateo County, on 24 Aug 1904, and Dawson (1923) found one inland along Big Creek in nearby Santa Cruz County in 1914. A fledgling found in Pescadero Creek, San Mateo County, in 1957 (Anderson 1972) preceded the discovery of the first nest of this species anywhere along the Pacific coast on 7 Aug 1974 in Big Basin State Park, Santa Cruz County (Binford et al. 1975). The Marbled Murrelet's breeding biology is better understood today, and the species is known to breed in three regions along the California coast: Del Norte and northern Humboldt counties, south-central Humboldt County, and San Mateo and Santa Cruz counties (Carter and Erickson 1992). Although historical data are limited, there has been a general decline in numbers since the last century, and the murrelet is now missing from its former range in Mendocino and Sonoma counties (Nelson 1997). Despite the absence of breeding evidence for this rare murrelet in 1927, at that time it likely bred within San Mateo County and possibly in Sonoma and Marin counties as well. Record: Fledgling or juvenile, Portola State Park, San Mateo County, 15 Jun 1957 (Anderson 1972).

Spotted Owl (*Strix occidentalis*). Grinnell and Wythe (1927) knew of only three records of the Spotted Owl in the Bay area, all from Marin County. They judged this owl to be very rare but did not indicate its breeding status. Currently, the species is found regularly in Sonoma County with about 70 pairs (Burridge 1995), Marin County with 25–30 pairs (Shuford 1993), and Napa County with 25 pairs (Berner et al. 2003). There is yet no evidence of breeding for San Mateo County, although several pairs are apparently resident there (P. J. Metropulos pers. comm.). The historical distribution of this species is probably the same as the current distribution (Gutiérrez et al. 1995), and the lack of observed breeding evidence in 1927 is likely a result of this owl's secretiveness and nocturnal behavior. Records: On nest, near Phoenix Lake, Marin County, 14 Mar 1976 (Shuford 1993). Nest with young, Bothe-Napa State Park, Napa County, 19 May 1982 (W. T. Grummer). Confirmed nesting, Sonoma County, 1986 (Burridge 1995).

Northern Saw-whet Owl (*Aegolius acadicus*). Grinnell and Wythe (1927) consid-

ered the Northern Saw-whet Owl a rare and irregular winter visitant, listing only a single record for Sonoma County, three for Marin County, and one for San Mateo County. The first evidence for breeding in the Bay area was the discovery of a pair using nest boxes put out for Western Screech-Owls (*Megascops kennicottii*) in the Spring Valley Creek drainage of San Mateo County (Granfield 1937). The Saw-whet is now known to be an uncommon but widespread breeding species in the Bay area's coniferous forests. Currently, it is more common in Sonoma and Marin counties than the Spotted Owl, yet both counties have more confirmations of Spotted Owl nesting than of the Saw-whet, undoubtedly because the endangered status of the former has attracted more study. The lack of breeding evidence in 1927 is likely the result of the Saw-whet's secretive nature. Records: Six eggs, Spring Valley Lakes, San Mateo County, 18 Apr 1937 (Granfield 1937). Called regularly in Redwood Canyon, Alameda County, 1950s and 1960s (*fide* H. L. Cogswell). Injured juvenile, Stevens Creek County Park, Santa Clara County, spring 1969 (E. McClintock *fide* D. L. Suddjian). Nested, Sonoma County, 1976 (Burridge 1995). Two confirmations, Marin County, 1976–1982 (Shuford 1993). Nest with young, Napa, Napa County, 14 May 1985 (Berner et al. 2003). Confirmed in seven blocks in the Santa Cruz Mountains, Santa Clara County Breeding Bird Atlas, 1987–1993 (unpubl. data).

Black Swift (*Cypseloides niger*). The Black Swift was first found breeding in central California when Vrooman (1901) discovered a nest and egg in sea cliffs near Santa Cruz, Santa Cruz County. With only three records through 1927, however, Grinnell and Wythe considered this swift a rare migrant in the Bay area. The species was not proved to breed along the coast of San Mateo County until 1971, but possibly it has nested on these sea cliffs more or less regularly. The Black Swift is now apparently in decline along the Central California coast and may no longer breed in either San Mateo or Santa Cruz counties (NAB 55:479, 2001). Record: Nest with egg, Año Nuevo Point, San Mateo County, 4 Jul 1971 (AFN 25:903, 1971).

Costa's Hummingbird (*Calypte costae*). Grinnell and Wythe (1927) knew of only two records of this hummingbird in the Bay area. Grinnell and Miller (1944) noted that the species nested sparsely on the west side of the San Joaquin Valley as far north as Dos Palos, Merced County. Since the first recorded nesting in the Bay area Costa's Hummingbird has been found to breed regularly at the mouth of Del Puerto Canyon, Stanislaus County, but only casually in the northern Diablo Range. Records: Female and fledged young, San Jose, Santa Clara County, July 1960 (McLean 1969). Nest-building and nest with young, Arroyo Valle, Alameda County, 20 May and 19 Jun 1995 (NASFN 49:306, 1995, M. M. Rogers).

Red-breasted Sapsucker (*Sphyrapicus ruber*). Grinnell and Wythe (1927) considered the Red-breasted Sapsucker to be a winter visitant in limited numbers and did not mention any summer records from the Bay area. Grinnell and Miller (1944) considered the southern limit of this sapsucker's breeding range as central Mendocino County. The first confirmation of breeding in the Bay region was of adults feeding young in northern Sonoma County in 1979 (Burridge 1995). Birds were also found nesting in Marin County during that county's atlas work in 1980 and 1982 (Shuford 1993). This range has now been extended to include San Mateo County with at least one record from Solano County. Shuford (1986) concluded that field work in Sonoma and Marin counties prior to 1944 was inadequate to define the southern limit of this species' breeding range accurately. He considered it likely that the Red-breasted Sapsucker had always nested in low numbers in Sonoma and Marin counties. It seems unlikely, however, that that this species nested farther south. From 1935 to 1939, Orr (1942) surveyed the avifauna of the Big Basin area along the western slope of the Santa Cruz Mountains. He spent 176 days in the field, 117 of them from April through August. Approximately 60% of the study area was in San Mateo County, the remainder in Santa Cruz County. During his surveys he did not encounter any Red-breasted Sap-

suckers. Although breeding Red-breasted Sapsuckers may have been overlooked in Sonoma and Marin counties in the past, the establishment of breeding birds in the Santa Cruz Mountains is believed to be recent (D. L. Suddjian pers. comm.). Records: Nested, Gualala River at Skaggs Springs Road, Sonoma County, 1979 (Burridge 1995). Confirmed breeding in two atlas blocks, Marin County, 1976–1982 (Shuford 1993). Nested, near Pescadero, San Mateo County, 1995 (NASFN 49:306, 1995). Nestling found and rehabilitated in Vacaville, Solano County, 5 May–27 Jun 2000 (*fide* R. L. C. Leong).

Pileated Woodpecker (*Dryocopus pileatus*). The Pileated Woodpecker was considered rare by Grinnell and Wythe (1927), with observations noted from parts of Sonoma and Marin counties. These records suggest that this woodpecker may have been a sporadic breeder there, although there is no specific evidence. The first clear evidence of breeding of this vocal woodpecker in the Bay area was in Napa County prior to 1944 (Hemphill 1944). From the 1960s to the 1980s, breeding was also observed in Sonoma and Marin counties. South of the Golden Gate, Orr (1942) never observed the Pileated Woodpecker in the Big Basin region, an area where it is now regular. It began to be recorded in the Santa Cruz Mountains in the early 1970s (AB 26:805, 1972), and the first nesting in this area was in Big Basin State Park in Santa Cruz County on 30 Jun 1987 (AB 41:1484, 1987) (Figure 5). Records: Fledglings, Los Posadas State Forest, Napa County, prior to 1944 (Hemphill 1944). Nested, Glen Ellen, Sonoma County, 2 Jun 1963 (AFN 17:482, 1963). Nested, Lake Lagunitas, Marin County, 1976 (AB 30:884, 1976). Fledglings, San Mateo County, 29 Jul 1988 (Sequoia Audubon Society 2001). Fledglings, Lake Elsman, Santa Clara County, 18 Jun–8 Jul 1996 (NASFN 50:993–994, 1996).

Cassin's Kingbird (*Tyrannus vociferans*). Grinnell and Wythe (1927) did not record any observations of Cassin's Kingbird from the Bay area as of 1927. Just to the south, near Paicines, San Benito County, the Mailliards considered Cassin's Kingbird to be a common summer resident, although not so common as the Western Kingbird (Mailliard and Mailliard 1901). The northwest edge of the Cassin's Kingbird's breeding range runs roughly from southwestern San Joaquin County on a line to the coast at the Monterey–San Luis Obispo County boundary (Tweit and Tweit 2000). Over the last 30 years this kingbird has sporadically bred north of this line. Records: Feeding young, near Livermore, Alameda County, 26 Jun 1968 (AFN 22:645, 1968). Nested, near Bolinas, Marin County, 1972 (Shuford 1993). Nested, San Felipe Road, Santa Clara County, 13 Apr 1997 (NASFN 51:924, 1997). Feeding nestlings, Vallejo, Solano County, 30 May 2005 (R. L. C. Leong, T. Jenkins).

Bell's Vireo (*Vireo bellii*). Grinnell and Wythe (1927) knew of only one record of Bell's Vireo in the Bay region, a specimen collected by Chase Littlejohn at Redwood City, San Mateo County, in 1905. The first records of breeding in the San Francisco Bay area were in 1932. Grinnell and Miller (1944) showed the breeding range of Bell's Vireo as including the eastern portions of Solano, Contra Costa, and Alameda counties and the southern edge of Santa Clara County. It appears, at best, that this vireo was very rare in these areas but was found more commonly to the east in the Central Valley. By the 1970s, however, Bell's Vireo was extirpated from all of northern and central California (Goldwasser et al. 1980). The collapse of the California population is believed to have been caused by cowbird parasitism and habitat destruction, although in some areas it is unclear which factors were most important. To assist or restore the species' populations cowbird control has been undertaken in southern California in areas where Bell's Vireos still breed. It seems likely that a pair of nesting Bell's Vireos found near Gilroy in May 1997 (NASFN 51:924, 1997) is related to these recovery efforts. Records: Eggs collected, near Gilroy, Santa Clara County, 19 (per publication) or 29 Apr (per egg-data card) 1932 (Unglish 1937, WFVZ 31088). Dependent juvenile collected, Corral Hollow, southeast Alameda County, 13 (per

Figure 5. Pileated Woodpecker and nestlings, Table Mountain, Santa Clara County, 14 June 1998.

Photo by Alan K. Walther

specimen label) or 15 (per publication) Jun 1932 (G. L. Bolander, MVZ 60897, Bird-Lore 34:349, 1932), although there is some uncertainty whether the bird was in Alameda or San Joaquin County (Sibley 1952). Nestling banded, somewhere between Livermore, Alameda County, and Tracy, San Joaquin County on 31 May 1937 (R. Taylor, News from the Bird-Banders 14:23 1937; Gull 19(7) 1937). Again, there is some uncertainty as to the exact location.

Gray Jay (*Perisoreus canadensis*). Grinnell and Wythe (1927) did not record the Gray Jay anywhere in the Bay area. Grinnell and Miller (1944) considered the southern limit of the species' breeding range to be Humboldt and Del Norte counties, with birds possibly resident in the northwestern corner of Mendocino County. Small (1994) noted a southern expansion of this range on the coast to the Navarro River, Mendocino County, as well as inland in Mendocino County in the coast range. Record: Adult feeding a fledgling, Gualala Point State Park, Sonoma County, 7 Aug 1995 (Burridge 1995).

Red-breasted Nuthatch (*Sitta canadensis*). Grinnell and Wythe (1927) considered the Red-breasted Nuthatch an irregularly common fall and winter visitant to the Bay region. Although they had no evidence of breeding, Grinnell and Wythe did mention that it had been found in Douglas firs (*Pseudotsuga menziesii*) west of Cazadero in Sonoma County in the summer and that possibly it was a regular breeder there. The Red-breasted Nuthatch now nests in all the Bay area counties except Solano. Ghalambor and Martin (1999) reported a southward expansion of the species' range in the Midwest, ascribing to increases in planted coniferous forests. Similar changes, however, have not been noted in this nuthatch's western range. Records: Nested in a box, Diamond Canyon, Alameda County, 15 May 1932 (Condor 34:234). Probable breeding, Mt. Tamalpais, Marin County, 11 Jun–21 Jul 1936 (Condor 39:38). Nestlings, Castle Rock State Park, Santa Clara County, 14 Jun 1953 (AFN 7:325, 1953). Nested, Golden Gate Park, San Francisco County, 1953 (AFN 7:289, 1953). Nested, Annadel State Park, Sonoma County, 19 Jun 1982 (AB 36:1013, 1982). Feeding young, San Mateo County, 5 Jun 1990 (Sequoia Audubon Society 2001). Fledglings, near Atena Springs, Napa County, 14 Jul 1990 (AB 44:1183, 1990).

Varied Thrush (*Ixoreus naevius*). Grinnell and Wythe (1927) listed the Varied Thrush as a winter visitant in variable numbers in the San Francisco Bay Area. With respect to breeding, Grinnell and Miller (1944) noted records only from the northwest corner of California in Del Norte, Humboldt, and Trinity counties. Since breeding was first observed in the wet coastal forests of the Santa Cruz Mountains in San Mateo County in 1991, one or more pairs have bred at scattered locations within these forests in San Mateo and Santa Cruz counties (David L. Suddjian, pers. comm.). The paucity of summer records prior to 1991 suggests that this colonization is recent (D. L. Suddjian, P. J. Metropulos, pers. comm.). Records: Nests, Butano State Park and Butano Creek, San Mateo County, 21 Jun 1991 (AB 45:1159, 1991).

Northern Mockingbird (*Mimus polyglottos*). Phillips (1928) reported that a country club in San Francisco imported Northern Mockingbirds from Louisiana in 1891 and attempted to establish them in the city. Apparently this attempt failed, and Grinnell and Wythe (1927) did not mention it. At the end of the 19th century the Northern Mockingbird was more common on the coastal slope of southern California but was also resident in the San Joaquin and Salinas valleys (Grinnell 1902). Arnold (1935, 1980) documented the mockingbird's northwestward expansion, and it is now a common breeding species throughout the Bay area. Arnold (1980) concluded that the planting of various fruiting trees in urban areas was a major cause of the mockingbird's expansion. Derrickson and Breitwisch (1992) reported that this species has also increased its range along North America's east coast in recent decades. Records: Four nestlings, Gilroy, Santa Clara County, 12 May 1928 (Sibley 1952). Nested, Walnut Creek, Contra Costa County, 1929 (Arnold 1935). Nested, Hayward, Alameda County, 1930 (Arnold 1935). Nested, Benicia, Solano County, 23 Apr 1934 (Condor 36:253). Attending young, Tulocay Cemetary, Napa, Napa County, March 1935 (E. L. Bickford *fide* W. T. Grummer). Nest, south of Sonoma, Sonoma County, 1959 (AFN 13:397–398, 1959). Probably nesting by early 1960s, Marin County (Shuford 1993). Fledged young, Belmont, San Mateo County, summer 1980 (P. J. Metropulos). Confirmed in five atlas blocks, San Francisco County, 1991–1992 (*fide* D. Singer).

European Starling (*Sturnus vulgaris*). From its initial release in New York City, the European Starling swept west across the continent. The vanguard of this expansion was normally composed of winter flocks, and the species colonized a few years after the vanguard's arrival (Cabe 1993). Using Christmas Bird Count data, DeHaven (1973) documented the exponential growth in wintering flocks in California from 1953 to 1971. Breeding records followed in Santa Clara and Alameda counties in 1963 (AFN

17:483, 1963) and in San Francisco in 1964 (Tenaza and Tenaza 1966). Starlings now breed abundantly throughout the Bay area. Records: Nested, Stanford, Santa Clara County, Apr 1963 (AFN 17:483, 1963). Nested, Bay Farm Island, Alameda County, Apr 1963 (AFN 17:483, 1963). Nest with young, near Lake Merced, San Francisco County, 8 May 1964 (Tenaza and Tenaza 1966). Nest with eggs, Belmont, San Mateo County, spring 1971 (P. J. Metropulos). Nest building, River Park, Vallejo, Solano County, 6 Apr 1975 (J. C. Lovio *fide* R. L. C. Leong). Nesting, upper Napa Valley, Napa County, by mid-1970s (W. T. Grummer). One hundred thirty-eight confirmations, Marin County, 1976–1982 (Shuford 1993). Confirmed in 86 atlas blocks, Sonoma County, 1986–1991, (Burridge 1995). Confirmed in 90 atlas blocks, Contra Costa County, 1998–2002 (S. A. Glover pers. comm.).

Cedar Waxwing (*Bombycilla cedrorum*). Grinnell and Miller (1944) considered this species a sparse resident in the humid coast belt south to Eureka. Small (1994) described essentially the same breeding range but noted rare extralimital breeding, including one instance in Orange County (Pugh 1966). Since 1984, Cedar Waxwings have nested at least once in five of the Bay area counties and twice in San Mateo County. These sporadic nestings have occurred both within the coast belt and in urban areas. Records: Feeding a young cowbird, Berkeley, Alameda County, 18 Jul 1971 (AB 25:904, 1971). On nest, Linda Falls, Angwin, Napa County, summer 1973 (Berner et al. 2003). Carrying nest material, Half Moon Bay, San Mateo County, mid-June 1984 (B. Sauppe *fide* P. J. Metropulos). Adult with fledgling, suburban park in Concord, Contra Costa County, 4 Jun 2002 (NAB 56:484, 2002). Adults feeding begging fledglings in Palo Alto, Santa Clara County, 16 Jun 2002 (NAB 56:484, 2002).

Nashville Warbler (*Vermivora ruficapilla*). Historically, the southern edge of the Nashville Warbler's breeding range in the inner coast ranges was Mt. Sanhedrin, Mendocino County (Grinnell and Miller 1944). More recently, breeding has been noted on Crockett Peak, Lake County, and San Benito Mountain, San Benito County (Johnson and Cicero 1985). The single record for the Bay area is slightly beyond the historical range. Record: Feeding young, Little Sulphur Creek, Sonoma County, 23 Jun 1993 (Burridge 1995).

Northern Parula (*Parula americana*). The western edge of this eastern warbler's primary breeding range extends from northern Minnesota south to the Texas coast (Moldenhauer and Regelski 1996). Nesting was first discovered in California in 1952 (Williams et al. 1958), and has recurred sporadically in coastal counties from Monterey to Humboldt since that time. These records represent misoriented spring migrants that found suitable places to nest 2200 km from the western edge of their normal range. Attempts at breeding have occurred at least four times in Marin County and twice in San Mateo County. Records: On nest, Five Brooks Pond, Marin County, 17 Jun 1977 (Shuford 1993). Nested, Gazos Creek, San Mateo County, 28 May–2 Jul 1991 (AB 45:1159, 1991).

Hermit Warbler (*Dendroica occidentalis*). Grinnell and Wythe (1927) considered the Hermit Warbler an irregular migrant in the Bay region and listed fewer than ten records, most in the spring. Just south of the Bay area, Leslie Hawkins found a pair of nesting Hermit Warblers on Ben Lomond Mountain, Santa Cruz County, on 22 Jun 1930 (field notes *fide* D. L. Suddjian). McLean (1936) collected an adult male north of La Honda, San Mateo County, on 10 Jun 1933 and believed that this bird was nesting. Nesting in the Bay area was not proven, however, until 1954. Subsequently it has been confirmed in five Bay area counties. The distribution of breeding Hermit Warblers in the Santa Cruz Mountains is patchy. Within their preferred habitats they can be locally fairly common, but they are absent from other areas. Although logging may have reduced this species' numbers in the early 20th century,

Hermit Warblers have likely been nesting in the Santa Cruz Mountains throughout the historical period (D. L. Suddjian pers. comm.). Records: On nest, Castle Rock State Park, Santa Clara/Santa Cruz County line, 30 May 1954 (AFN 8:327, 1954). Feeding young, Mt. Tamalpais, Marin County, 7 Jul 1981 (AB 35:976, 1981). One confirmation, Sonoma County, 1986–1991 (Burridge 1995). Feeding young, San Mateo County, 16 Jun 1987 (Sequoia Audubon Society 2001). Fledged young, R. L. Stevenson State Park, Napa County, 11 Jul 1998 (C. Toews *fide* W. T. Grummer, Berner et al. 2003).

American Redstart (*Setophaga ruticilla*). The southwestern edge of the American Redstart's wide breeding range extends from southern British Columbia through northeastern Washington to northeastern Wyoming, although there is occasional nesting in south-central Oregon (Sherry and Holmes 1997). In California, the first nesting was recorded north of Arcata, Humboldt County, on 22 Jul 1972, 210 km southwest of the nearest known nest site in Oregon (Binford and Stallcup 1972). Subsequently this species has nested sporadically along California's northwest coast, but there does not appear to be a local population (NAB 55:353, 2001). American Redstarts nested in Marin and San Mateo counties in 1997, but there have been no subsequent records. Records: Fledged young cowbirds, Phipps Ranch, San Mateo County, 16 Jul 1997 (NASFN 51:1050, 1997). Fledged young redstarts, Stinson Beach, Marin County, 27 Jul 1997 (NASFN 51:1050, 1997).

Hooded Warbler (*Wilsonia citrina*). The Hooded Warbler breeds in the southeastern United States. The western edge of its range extends to eastern Oklahoma and eastern Texas, about 2300 km from the Bay area. In occasional flight years misoriented southeastern warblers, such as the Northern Parula, Kentucky (*Oporornis formosus*), and Hooded, reach California in unusual numbers in spring (Patten and Marantz 1996). The first breeding of the Hooded in California was recorded in the flight of1992, in Kern and Los Angeles counties (Small 1994). Record: Pair, female carrying food, Butano State Park, San Mateo County, 2 Jul 2005 (D. L. Suddjian).

Rose-breasted Grosbeak (*Pheucticus ludovicianus*). The western edge of this grosbeak's range extends from central and southeastern Alberta to the Dakotas. The species has nested twice in the San Francisco Bay area, about 1600 km southwest of its normal range. Records: Juvenile with adults, Gazos Creek, San Mateo County, 21 Jul 1983 (B. Sauppe *fide* P. J. Metropulos). Male fledged two young with female Black-headed Grosbeak, Tilden Park, Contra Costa County, 1992 (AB 46:1176, 1992).

Blue Grosbeak (*Passerina caerulea*). Grinnell and Wythe (1927) knew of only one record of the Blue Grosbeak in the Bay region, a bird seen on 1 May 1876 at Hayward, Alameda County. At the end of the 19th century, the Blue Grosbeak was a common summer resident in southern California and found regularly in the Central Valley as far north as Marysville (Grinnell 1902). East of California, Johnson (1994) reported a significant northward range expansion of this species from its Arizona and New Mexico population centers, starting in the 1960s. Since the first known nesting of this grosbeak in Alameda County in 1990 nesting has been recorded also in Sonoma and Santa Clara counties (Figure 6). Records: Nesting, east of Livermore, Alameda County, 9–30 Jun 1990 (AB 44:1183, 1990). Nest with young, Sears Point, Sonoma County, 24–29 Jul 1995 (NASFN 49:978, 1995). Fledged young, Llagas Creek, Santa Clara County, 2 Sep 1995 (NASFN 50:112, 1996). Breeding pairs, Liberty Island, Solano County, 2000 (NAB 54:421, 2000).

Indigo Bunting (*Passerina cyanea*). Until the 1940s or 1950s the Indigo Bunting was not found west of the continental divide, but subsequently it invaded the southwestern United States (Payne 1992, Johnson 1994). Numbers of singing territorial males have been increasing particularly in southern California (Small 1994). In the

Figure 6. Blue Grosbeak, Covington Park, Morongo Valley, San Bernardino County, 30 Apr 2002.

Photo by Peter LaTourrette

San Francisco Bay area nesting was first observed in Marin County in 1984 and subsequently has occurred at least once in four other counties. At least half of six reported nesting attempts, however, have been by mixed pairs, Indigo × Lazuli Bunting (*P. amoena*). Records: Nest with young, near Olema, Marin County, 12 Jul 1984 (Shuford 1993). Nest with eggs (hybrid pair), Colorado Creek, Santa Clara County, 1–12 Jun 1993 (AB 47:1148, 1993). Feeding young, near Pescadero, San Mateo County, 14–21 Aug 1994 (NASFN 49:99, 1995). Fledged young, near Goat Rock, Alameda County, 22 Jun–3 Jul 1995 (NASFN 49:978, 1995). Hybrid nesting, Piper Slough, Contra Costa County, 1998 (NASFN 52:501, 1998).

Great-tailed Grackle (*Quiscalus mexicanus*). In 1900 the northern limit of this grackle's range barely barely crossed the United States' southern boundary in southern Texas. Over the 20th century this range expanded far to the north (Johnson and Peer 2001). The Great-tailed Grackle was unknown in California prior to 1964, when it first reached the Colorado River and Imperial Valley (McCaskie and DeBenedictis 1966). Nesting was first recorded on the Colorado River in 1969, along the coast of southern California in 1988. An early harbinger of the grackle's colonization of the Bay area was a pair that attempted to nest in San Francisco in 1980 (AB 34:928, 1980). The colonization of the Bay area began more consistently in 1999 with irregular nesting in five counties since. Records: Failed nesting, San Francisco, San Francisco County, 20 Jun 1980 (AB 34:928, 1980). Two fledged young, Shadow Cliffs Regional Park, Alameda County, 24 Jun 1999 (NAB 53:431, 1999). Female building nest, McNabney Marsh, Contra Costa County, 8 Jun 2000 (NAB 54:421, 2000). Carrying food, Almaden Lake, Santa Clara County, 16 Jul 2000 (NAB

54:421, 2000). Nest with two fledged young, Rooster Run Golf Course, Sonoma County, Jul 2001 (NAB 55:481, 2001). Nest building, Fairfield, Solano County, 15 May 2004 (J. Walsh *fide* R. L. C. Leong).

Hooded Oriole (*Icterus cucullatus*). The Hooded Oriole was not listed by Grinnell and Wythe (1927). The first records of this species in the Bay area were from Oakland, Alameda County, and Reliez Valley, Contra Costa County, prior to May 1930 (Grinnell 1930) and San Jose, Santa Clara County, on 21 Jul 1930 (Pickwell 1932). Although a female and immature were observed in San Jose, Santa Clara County, in 1932 (Grinnell 1933), the first reported nest was in 1939 (Sibley 1952). Today, the Hooded Oriole nests in all of the Bay area counties, generally in fan palms (*Washingtonia* spp.) or by using palm fiber for nests in other trees. To a substantial extent this oriole's range expansion appears to have followed the planting of fan palms north of their historic range (Small 1994). Records: Nest with egg, San Leandro, Alameda County, 17 Jun 1939 (Sibley 1952). Nest with young, Larkspur, Marin County, 22 May 1941 (Shuford 1993). Nest building, San Jose, Santa Clara County, 24 Apr 1946 (Sibley 1952). Nesting activity, Lombardis, Napa County, 2 May 1948 (AFN 2:187, 1948). Nesting activity, Green Valley, Solano County, 19 May 1948 (AFN 2:187, 1948). Adults feeding fledgling, Burlingame, San Mateo County, 6 Jul 1956 (Gull 38:38, 1956). Nested, Sonoma, Sonoma County, 1977 (Burridge 1995). Nest with young, Seacliff area, San Francisco County, 16 May 1985 (A. S. Hopkins). Confirmed in 24 atlas blocks, Contra Costa County, 1998–2002 (S. A. Glover pers. comm.).

Red Crossbill (*Loxia curvirostra*). Grinnell and Wythe (1927) considered the Red Crossbill an irregular winter visitant, although they noted that in invasion years some birds were found in Berkeley and San Francisco through April. Crossbills apparently nested at Mt. Hermon in the Santa Cruz Mountains, south of the Bay region, in the summers of 1951 (AFN 5:303, 1951) and 1955 (AFN 9:402, 1955). The first breeding record for the Bay area was from Marin County in 1960 (Shuford 1993); irregular breeding has been recorded subsequently in San Francisco and San Mateo counties. Records: Gathering nest material, Inverness Ridge, Marin County, 23 Apr 1960 (Shuford 1993). Feeding young, Lincoln Park, San Francisco County, 9 Jun 1974 (AB 28:946, 1974). Fledged young, Gazos Creek Road, San Mateo County, July 1984 (B. Sauppe *fide* P. J. Metropulos).

DISCUSSION

Grinnell and Wythe wrote their summary of birds of the San Francisco Bay area near the end of an era that had seen enormous destruction of wildlife for commercial purposes as well as the destruction of wildlife habitats. The latter part of the 19th century and the first decades of the 20th century were marked by depredations of grebes, herons, shorebirds, and terns for use by the millinery trade. This trade was not stopped until 1918, with the final approval of the Lacey Act. Dawson (1923) judged that the numbers of these birds were at their lowest from 1900 to 1910. The era of market hunting had a similar effect on geese, ducks, and quail, and their numbers reached a low point between 1890 and 1910 (Grinnell et al. 1918). Coastal forests in Sonoma, Marin, San Mateo, and Santa Clara counties were harvested with the peak in timber cutting extending from about 1860 to 1890 (Jensen 1939, Stanger 1967). It is possible that Grinnell and Wythe (1927:150) reflected on this era when they wrote, "On the whole, it looks as though the total number of species in the Bay region at the present time were undergoing decided reduction, due in major part to the elimination of

habitats of wide diversity or of productive kinds. There is little doubt, too, that the aggregate number of individual birds, of all species together, is also becoming less, due to the expansion of closely built-up urban areas where practically no undomesticated bird-life of any sort can exist."

There are no means of comparison by which we can determine whether the aggregate number of birds has increased or decreased since 1927. As I have shown, however, there has been no decline in the number of breeding species in the Bay region but rather an increase. Undoubtedly, several factors contributed to these changes: (1) rebound of populations following cessation of commercial harvesting, (2) range expansions and contractions, (3) conversion of salt marshes to salt-evaporation ponds, (4) maturation of second-growth forests, (5) urban watering, (6) reservoir construction, and (7) habitat protection.

With the passage of the Lacey Act in 1918, milliners were prevented from importing or exporting aigrettes and grebe skins, and this finally ended the slaughter of many species for the millinery trade. The most striking result of the recovery of heron populations was for the Great and Snowy egrets. The first Great Egrets returning to the Bay area were seen in Suisun Bay in 1924 (Storer 1931), and by 1940 eggs had been collected at San Felipe Lake at the southern edge of the region (MVZ 7400) for the first nesting record in 50 years. The Snowy also rebounded, but at a slower pace. What is unclear, however, is how much of the resettlement of these egrets in the Bay area was caused by the displacement of birds from drained wetlands in the Central Valley, their original metropolis.

Although herons, grebes, shorebirds, and terns rebounded after the slaughter of the millinery trade ceased, few of the game species enjoyed a similar recovery following the end of market hunting. An exception is the Wood Duck, which now breeds throughout much of the Bay area. Lack of recovery of game-bird populations is probably a consequence of the urbanization Grinnell and Wythe feared and, for waterfowl, the loss of wetlands.

Numerous range expansions and contractions have been documented in the United States. For species in the western United States range expansions have been described (e.g., Johnson 1994, Laymon 1987, Bock and Lepthien 1976, Arnold 1980), as have contractions (e.g., Goldwasser et al. 1980, Laymon and Halterman 1987). Some studies have concluded that some changes were largely independent of human activities (Johnson 1994), whereas others have shown that the human influence has been a direct cause of the distribution changes (Laymon 1987, Goldwasser et al. 1980). Many of the category 1 species from Table 3 that now breed in the Bay area appear to be part of general range expansions, including the Gadwall, Common Merganser, Snowy Egret, Forster's Tern, Least Tern, Black Skimmer, Red-breasted Sapsucker, Pileated Woodpecker, Red-breasted Nuthatch, Northern Mockingbird, European Starling, Blue Grosbeak, Great-tailed Grackle, and Hooded Oriole.

The conversion of salt marshes to salt-evaporator ponds in San Francisco Bay was detrimental to the Clapper Rail (*Rallus longirostris*), the Alameda Song Sparrow (*Melospiza melodia pusilla*), and the Salt Marsh Harvest Mouse (*Reithrodontomys raviventris*) but provided new habitat for many avian species. Salt production started in Alameda County in the 1850s on

small plots, apparently where natural salt ponds occurred within the salt marsh (Ver Planck 1958). Most of these first salt ponds were operated by local families. By the end of the 19th century most of the salt marsh in Alameda County had been converted, lesser amounts converted in San Mateo County. Salt marshes in Santa Clara County remained relatively intact until the 1930s, and most of the salt ponds in that county were constructed between 1930 and 1950. Avifaunal changes related to the increase in salt-pond acreage were noted as early as 1914 when Snowy Plovers were found nesting along the salt ponds' levees near Alvarado in Alameda County (Grinnell et al. 1918). The first colony of Caspian Terns (*Hydroprogne caspia*) in the San Francisco Bay area was recorded by 1922 (or possibly earlier), again on salt pond levees near Alvarado (DeGroot 1931, Grinnell and Miller 1944). Today, most nesting by California Gulls, Forster's Terns and Least Terns, all new breeding species, occurs on islands or levees within the salt ponds. Although California Gulls will sometimes forage on the salt ponds, they are more likely seen away from these ponds, particularly at active dumps. Forster's and Least terns use the salt ponds for foraging but are also found feeding in intertidal waters away from these ponds. Snowy Egrets use salt ponds for foraging throughout the year but are generalists and can be found in many other habitats. The Black Skimmer nests and forages within the mosaic of salt ponds.

After California became part of the United States much of the Bay area's forests were cut. Redwood was a particularly favored lumber, and early logging in San Mateo County had eliminated essentially all of the forests on the eastern side of the Santa Cruz Mountains by the 1860s (Stanger 1967). To the south, redwood and Douglas-fir forests were cut in the Los Gatos Creek watershed, and the mills were continually shifted to higher and steeper areas to get to the timber. Most of this forest was cut by the 1870s (Jensen 1939). On the west side of the mountains the lumber was taken out later, but only 8% of the original forest remained by the 1930s (Wilson 1937). Many of the areas logged over a century ago now have mature second-growth forests. James G. Cooper was the only ornithologist to survey this area during the period of extensive lumbering (Cooper 1870), and he made no mention of the Pileated Woodpecker or Red-breasted Nuthatch. It is likely that the Pileated Woodpecker, Red-breasted Nuthatch, Varied Thrush, and Red Crossbill have all benefited from the maturing of the second-growth forests.

The first settlers in the Bay area raised crops that could be grown following the winter rains or they irrigated through ditches from local creeks. Later, they used artesian wells to provide water for irrigation. As water became more plentiful, mesic plant communities sprouted within cities, and several birds were able to take advantage of these new habitats. The American Robin (*Turdus migratorius*), Northern Mockingbird, and Hooded Oriole moved into urban areas. Some of the original inhabitants, such as Bewick's Wren (*Thryomanes bewickii*), Spotted Towhee (*Pipilo maculatus*), and California Towhee (*P. crissalis*), adapted to the new habitats, but others, such as the Lazuli Bunting (*Passerina amoena*) and Chipping Sparrow (*Spizella passerina*), did not.

Water use as indicated by reservoir storage has increased in rough proportion to the increase in human population. In 1927 water storage was

about 250,000 acre-feet, where today it is in excess of 2,000,000 acre-feet (Britton et al. 1974). Most of this water has been used for household or industrial purposes, but a significant fraction has been used for miscellaneous purposes outside the home (Rantz 1972). The reservoirs themselves are used by numerous duck species in the winter, and it also appears that the various reservoirs have benefited Western (*Aechmophorus occidentalis*) and Clark's grebes, which breed in greater quantities today than in Grinnell and Wythe's time. Common Mergansers appear to have benefited from reservoirs also, although they do not nest on the reservoirs exclusively, as do the grebes, but nest nearby or upstream and move to the reservoirs soon after the young are hatched. Other piscivorous birds, including the Osprey (*Pandion haliaetus*) and Bald Eagle, have also benefited from the new reservoirs and are more common now than they were in the 1920s.

In 1927 there were few regional parks focused on land preservation as opposed to recreation. In their conclusions Grinnell and Wythe (1927:150) foresaw the need for a land ethic that would preserve the best and most valuable habitats: "Even though such changes in the direction of diminution are in large part inevitable, they can and should be compensated for insofar as is practicable by the establishment of parks and natural preserves here and there, such as Muir Woods, and by the spread of popular appreciation of bird-life as a community asset, so that general protection and encouragement of this asset for its esthetic and other values will become second-nature throughout our citizenry." The fourfold increase in population has, in fact, supported the protection of extensive regional parks through the Bay area in the 70 years since 1927. To some degree the resulting preservation has occurred only because of the size of the local population. A good argument can be made that there are a number of sensitive species in the Bay area that would not survive today without the habitat that has been preserved over the last 70 years. Although both salt marsh and riparian habitats have been destroyed or severely degraded over this period, enough habitat has been protected to support apparently viable populations of Black and Clapper rails in the remaining marshes and Yellow-breasted Chats (*Icteria virens*) in a few remaining healthy riparian areas. There is no question that today there is wide public support for conservation and wildlife protection throughout the Bay area. The same growing human population that so concerned Grinnell and Wythe in 1927 has also been the key for protection of our avifauna and remains so today.

The unhappy future projected by Grinnell and Wythe has not come to pass, at least not yet. Although we can be optimistic that our local avifauna has not been so soon destroyed, we must be concerned that our methods to assess the environmental health of the San Francisco Bay area are poor. The crude measure I have used, of the total number of breeding species, says nothing of the size or health of these populations. Suitable measures for the size and health of breeding bird populations were not employed in Grinnell and Wythe's day. Much of what is known now about breeding species in the Bay area has been obtained from the extensive volunteer efforts that have gone into the local county breeding bird atlases. There is, however, a need to build on this effort and move forward with long-term, quantitative approaches to monitor our wildlife populations.

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LITERATURE CITED

Anderson, V. L. 1972. The murrelet's secret. Pacific Discovery 25(3):25–26.

Arnold, J. R. 1935. The changing status of the Western Mockingbird in California. Condor 37:193–199.

Arnold, J. R. 1980. Distribution of the Mockingbird in California. W. Birds 11:97–102.

Atkinson, W. L. 1899. Band-tailed Pigeon nesting in Santa Clara County, Cal. Condor 1:57.

Atkinson, W. L. 1899. Nesting of the California Cuckoo. Condor 1:95.

Bailey, F. M. 1902. Handbook of Birds of the Western United States. Houghton Mifflin, Boston.

Bailey, S. F. 1993. Least Tern (*Sterna antillarum*), in Atlas of the Breeding Birds of Monterey County, California (D. Roberson and C. Tenney, eds.), p. 399. Monterey Peninsula Audubon Soc., Monterey, CA.

Baird, S. F., Brewer, T. M., and Ridgway, R. 1884. The Water Birds of North America, vol. I. Little, Brown, Boston.

Berner, M., Grummer, B., Leong, R., and Rippey, M. 2003. Breeding Birds of Napa County, California. Napa-Solano Audubon Soc. Vallejo, CA.

Binford, L. C., Elliott, B. G., and Singer, S. W. 1975. Discovery of a nest and downy young of a Marbled Murrelet. Wilson Bull. 87:303–319.

Binford, L. C., and Stallcup, R. W. 1972. American Redstart breeding in California. Calif. Birds 3:87–90.

Bock, C. E., and Lepthien, L. W. 1976. Population growth in the Cattle Egret. Auk 93:164–166.

Britton, L. J., Ferreira, R. F., and Averett, R. C. 1974. Limnological data from selected lakes in the San Francisco Bay region, California. U.S. Geol. Surv. and Dept. Urban Development Open-File Report. Available at U.S. Geological Survey, 345 Middlefield Rd., Menlo Park, CA 94025.

Browning, M. R. 1993. Comments on the taxonomy of *Empidonax traillii* (Willow Flycatcher). W. Birds 24:241–257.

Burridge, B., ed. 1995. Sonoma County Breeding Bird Atlas. Madrone Audubon Soc., Santa Rosa, CA.

Cabe, P. R. 1993. European Starling (*Sturnus vulgaris*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 48. Acad., Nat. Sci., Philadelphia.

Carter, H. R., and Erickson, R. A. 1992. Status and conservation of the Marbled Murrelet in California, 1892–1987. Proc. W. Found. Vert. Zool. 5:92–108.

Clark, H. W. 1927. Birds of Howell Mountain. Pacific Union College library, 1 Angwin Ave., Angwin, CA 94508 (typed notes).

Conover, M. R. 1983. Recent changes in the Ring-billed and California Gull populations in the western United States. Wilson Bull. 95:362–383.

Cooper, J. G. 1870. Ornithology, Volume I, Land Birds. Geological Survey of California (S. F. Baird, editor).

Cooper, W. S. 1926. Vegetational development upon alluvial fans in the vicinity of Palo Alto, California. Ecology 7:1–30.

Dawson, W. L. 1915. The breeding of Snowy Egret in California. Condor 17:97.

Dawson, W. L. 1923. The Birds of California, vol. 4. South Moulton Co., San Diego.

De Groot, D. S. 1931. History of a nesting colony of Caspian Terns on San Francisco Bay. Condor 33:188–192

DeHaven, R. W. 1973. Winter population trends of the Starling in California. Am. Birds 27:836–838.

Derrickson, K. C., and Breitwisch, R. 1992. Northern Mockingbird, in The Birds of North America (A. Poole, P. Stettenheim, and F. Gill, eds.), no. 7. Acad. Nat. Sci., Philadelphia.

Dixon, J. 1923. Nesting records of the Dusky Poor-Will. Condor 25:77–85.

Evermann, B. W. 1886. A list of the birds observed in Ventura County, California. Auk 3:86–94.

Garrett, K., and Dunn, J. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Soc., Los Angeles.

Ghalambor, C. K., and Martin, T. E. 1999. Red-breasted Nuthatch (*Sitta canadensis*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 459. Birds N. Am., Philadelphia.

Gill, R., Jr. 1977. Breeding avifauna of the South San Francisco Bay estuary. W. Birds 8:1–12.

Goldwasser, S., Gaines, D., and Wilbur, S. 1980. The Least Bell's Vireo in California: A de facto endangered race. Am. Birds 34:742–745.

Granfield, W. M. 1937. Nesting of the Saw-Whet Owl. Condor 39:185–187.

Grinnell, H. W. 1930. Minutes of Cooper Club meetings. Condor 32:268.

Grinnell, H. W. 1933. Minutes of Cooper Club meetings. Condor 35:130–132.

Grinnell, H. W. 1940. Joseph Grinnell: 1877–1939. Condor 42:3–34.

Grinnell, J. 1901. The birds of California. Condor 3:83.

Grinnell, J. 1902. Check-list of California birds. Pac. Coast Avifauna 3.

Grinnell, J., Bryant, H. C., and Storer, T. I. 1918. The Game Birds of California. Univ. Calif. Press, Berkeley.

Grinnell, J., and Miller, A. H. 1944. The distribution of the birds of California. Pac. Coast Avifauna. 27.

Grinnell, J., and Wythe, M. W. 1927. Directory to the bird-life of the San Francisco Bay region. Pac. Coast Avifauna 18.

Gutiérrez, R. J., Franklin, A. B., and LaHaye, W. S.. 1995. Spotted Owl (*Strix occidentalis*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 179. Acad. Nat. Sci., Philadelphia.

Harris, J. H., Sanders, S. D., and Flett, M. A. 1987. Willow Flycatcher surveys in the Sierra Nevada. W. Birds 18:27–36.

Hemphill, D. V. 1944. Distribution of vertebrate animals in relationship to plant associations on Howell Mountain, Napa County, California, M.A. thesis, Univ. Calif., Berkeley.

Howell, J., Laclergue, D., Paris, S., Boarman, W. I., DeGange, A. R., and Binford, L. C. 1983. First nests of a Heermann's Gull in the United States. W. Birds 14:39–46.

Hughes, J. M. 1999. Yellow-billed Cuckoo (*Coccyzus americanus*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 418. Birds N. Am., Philadelphia.

Jensen, H. A. 1939. Vegetation types and forest conditions of the Santa Cruz Mountains unit of California. Forest Survey Release No. 1, Calif. Forest and Range Experiment Station, Berkeley.

Jeter, H. H., and Paxton, R. O. 1964. Little Blue Heron collected in California. Condor 66:447.

Johnson, K., and Peer, B. D. 2001. Great-tailed Grackle (*Quiscalus mexicanus*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 576. Birds N. Am., Philadelphia.

Johnson, N. K. 1994. Pioneering and natural expansion of breeding distributions in western North American birds. Studies Avian Biol. 15:27–44.

Johnson, N. K., and Cicero, C. 1985. The breeding avifauna of San Benito Mountain, California: Evidence for change over one-half century. W. Birds 16:1–23.

Jones, P. A. 1986. Aspects of the reproductive biology of the California Gull in Alviso, California. M. A. thesis, San Francisco State Univ., San Francisco.

Kelly, J. W. 1927. White-throated Swifts in Oakland. Gull 9(12).

Kiff, L. F. 1978. Probable Black Rail nesting record for Alameda County, California. W. Birds 9:169–170.

La Jeunesse, H.V. 1923. Dwarf cowbird nesting in Alameda County, California. Condor 24:31–32.

Laymon, S. A. 1987. Brown-headed Cowbirds in California: Historical perspectives and management opportunities in riparian habitats. W. Birds 18:63–70.

Laymon, S. A., and Halterman, M. D. 1987. Can the western subspecies of the Yellow-billed Cuckoo be saved from extinction? W. Birds 18:19–25.

Layne, V. L., Richmond, R. J., and Metropulos, P. J. 1996. First nesting of Black Skimmers on San Francisco Bay. W. Birds 27:159–162.

LeSchack, C. R., McKnight, S. K., and Hepp, G. R. 1997. Gadwall (*Anas strepera*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 283. Acad. Nat. Sci., Philadelphia.

Mailliard, J. 1900. Land birds of Marin County, Cal. Condor 2:62–68.

Mailliard, J., and Mailliard, J. W. 1901. Birds recorded at Paicines, San Benito Co., California. Condor 3:120–127.

McCaskie, G., and DeBenedictis, P. 1966. Notes on the distribution of certain icterids and tanagers in California. Condor 68:595–597.

McCaskie, R. G., and Suffel, G. S. 1971. Black Skimmers at Salton Sea, California. Calif. Birds 2:69–71.

McCaskie, R. G., Liston, S., and Rapley, W. A. 1974. First nesting of Black Skimmer in California. Condor 76:337–338.

McLean, D. D. 1936. Some notable records of birds for California. Condor 38:16–17.

McLean, D. D. 1969. Some additional records of birds in California. Condor 71:433–434.

McNicholl, M. K., Lowther, P. E., and Hall, J. A. 2001. Forster's Tern (*Sterna forsteri*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 595. Birds N. Am., Philadelphia.

Miller, A. H. 1951. An analysis of the distribution of the birds of California. Univ. Calif. Publ. Zool. 50:531–643.

Moldenhauer, R. R., and Regelski, D. J. 1996. Northern Parula (*Parula americana*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 215. Acad. Nat. Sci., Philadelphia.

Nelson, S. K. 1997. Marbled Murrelet (*Brachyramphus marmoratus*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 276. Acad. Nat. Sci., Philadelphia.

Orr, R. T. 1942. A study of the birds of the Big Basin region of California. Am. Midland Nat. 27:273–337.

Palmer, T. S. 1917. Botta's visit to California. Condor 19:159–161.

Pandolfino, E. R., Kwolek, J., and Kreitinger, K. 2006. Expansion of the breeding range of the Hooded Merganser within California. W. Birds 37:228–236.

Parsons, K. C., and Master, T. L. 2000. Snowy Egret (*Egretta thula*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 489. Birds N. Am., Philadelphia.

Patten, M. A., McCaskie, G., and Unitt, P. 2003. Birds of the Salton Sea. Univ. Calif. Press, Berkeley.

Patten, M. A., and Marantz, C. A. 1996. Implications of vagrant southeastern vireos and warblers in California. Auk 113:911–923.

Payne, R. B. 1992. Indigo Bunting, in The Birds of North America (A. Poole, P. Stettenheim, and F. Gill, eds.), no. 4. Acad. Nat. Sci., Philadelphia.

Phillips, J. C. 1928. Wild birds introduced or transplanted in North America. U.S. Dept. Agric. Tech. Bull. 61.

Pickwell, G. 1932. The Arizona Hooded Oriole in San Jose, California. Condor 34:48.

Pickwell, G., and Smith, E. 1938. The Texas Nighthawk in its summer home. Condor 40:193–215.

Pugh, E. A. 1966. Cedar Waxwing nesting in southern California. Condor 68:307–308.

Rantz, S. E. 1972. A Summary View of Water Supply and Demand in the San Francisco Bay Region, California. United States Geological Survey, Water Resources Division, Menlo Park, California.

Roberson, D., Bailey, S. F., and Carratello, R. 2001. First successful United States nesting of Heermann's Gull: Challenges of an urban colonist. N. Am. Birds 55:375–378.

Ryder, R. A., and Manry, D. E. 1994. White-faced Ibis (*Plegadis chihi*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 130. Acad. Nat. Sci., Philadelphia.

Sequoia Audubon Society. 2001. San Mateo County Breeding Bird Atlas. Sequoia Audubon Soc., Woodside, CA.

Sherry, T. W., and Holmes, R. T. 1997. American Redstart (*Setophaga ruticilla*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 277. Acad. Nat. Sci., Philadelphia.

Shuford, W. D. 1986. Have ornithologists or breeding Red-breasted Sapsuckers extended their range in coastal California? W. Birds 17:97–105.

Shuford, W. D. 1993. The Marin County Breeding Bird Atlas. Bushtit Books, Bolinas, CA.

Shuford. W. D., and Ryan, T. P. 2000. Nesting populations of California and Ring-billed gulls in California: Recent surveys and historical status. W. Birds 31:133–164.

Sibley, C. G. 1952. The birds of the South San Francisco Bay region. Mimeographed. Available at Santa Clara Valley Audubon Society library, 22221 McClellan Rd., Cupertino, CA 95014.

Small, A. 1994. California Birds: Their Status and Distribution. Ibis Publ., Vista, CA.

Smith, C. P. 1926. Has the cowbird come to stay? Condor 28:245.

Snyder, J. O. 1919. Breeding of the Fulvous Tree-Duck in Santa Clara County. Calif. Fish and Game 5:43.

Stanger, F. M. 1967. Sawmills in the Redwoods. San Mateo Hist. Soc., San Mateo, CA.

Storer, T. I. 1931. The American Egret in the lower Sacramento Valley, California. Condor 33:34–35.

Telfair, R. C., II. 1994. Cattle Egret (*Bubulcus ibis*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 113. Acad. Nat. Sci, Philadelphia.

Tenaza, K., and Tenaza, R. 1966. First report of a Starling nesting in San Francisco, California. Condor 68:600.

Tweit, R. C., and Tweit, J. C. 2000. Cassin's Kingbird (*Tyrannus vociferans*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 534. Birds N. Am., Philadelphia.

Unglish, W. E. 1929. The Texas Nighthawk in Santa Clara County, California. Condor 31:223.

Unglish, W. E. 1932. Nesting of the Black-chinned Hummingbird in Santa Clara County, California. Condor 34:228

Unglish, W. E. 1937. A few unusual records from central California. Condor 39:39–40.

Unitt, P. 1987. *Empidonax traillii extimus*: An endangered subspecies. W. Birds 18:137–162.

Vallejo, G. 1890. Ranch and mission days in Alta California. Century Magazine 41(2):183–192.

Ver Planck, W. E. 1958. Salt in California. Bull. 175, Div. Mines, Calif. Dept. of Natural Resources, Sacramento.

Vrooman, A. C. 1901. Discovery of the egg of the Black Swift. Auk 18:394–395.

Wheelock, I. G. 1916. Birds of California. A. C. McClurg, Chicago.

Williams, L., Legg, K., and Williamson, F. S. L. 1958. Breeding of the Parula Warbler at Point Lobos, California. Condor 60:345–354.

Wilson, R. C. 1937. Early-day lumber operations in the Santa Cruz redwood region. Timberman 38(7):12–15.

APPENDIX 1

The following county breeding records are not in Grinnell and Wythe (1927). Species marked with an asterisk were not noted as breeding in any of the nine San Francisco Bay area counties, while the remaining species represent additional counties for which there is breeding evidence not listed by Grinnell and Wythe. For each species, records are ordered by date.

Canada Goose (*Branta canadensis*)*. Four eggs collected, San Francisco, San Francisco County, 10 Jun 1915 (WFVZ 96369).

Wood Duck (*Aix sponsa*). On nest, Imrie Lake, Napa County, 1925 (E. L. Bickford's notes *fide* W. T. Grummer). [Grinnell and Wythe considered this species to have been extirpated in the Bay area but recorded previous nesting in Marin County in the 1870s.]

Mallard (*Anas platyrhynchos*). Eleven eggs collected, Ravenswood, San Mateo County, 30 Mar 1909 (WFVZ 96451).

Eared Grebe (*Podiceps nigricollis*)*. Seven eggs collected, Stanford University, Santa Clara County, 14 May 1908 (WFVZ 145157).

Clark's Grebe (*Aechmophorus clarkii*)*. Three eggs collected, Lake Merced, San Francisco County, 8 Jun 1885 (WFVZ 120839). [Grinnell and Wythe listed breeding records for the Western Grebe in the broad sense. A. M. Ingersoll, the collector, indicated the form was *clarkii* for this egg set.]

Brandt's Cormorant (*Phalacrocorax penicillatus*). Three eggs collected, New Years Point, San Mateo County, 18 Jun 1899 (WFVZ 81287).

Great Blue Heron (*Ardea herodias*). Four eggs collected, Novato, Marin County, 14 Mar 1896 (CAS 6693). Five eggs collected, near Brentwood, Contra Costa County, 21 Mar 1915 (WFVZ 34490). Five eggs collected, Forestville, Sonoma County, 10 Mar 1920 (WFVZ 48908). Eggs collected, Cut-off Slough, Solano County, 11 Apr 1920 (Condor 41:81–82).

Great Egret (*Ardea alba*)*. Two sets of eggs collected, Sargent, Santa Clara County, 4 Apr 1889 (CAS 6697 and 6699).

Green Heron (*Butorides virescens*). Six eggs collected, Napa, Napa County, 21 May 1900 (CAS 3291). Five eggs collected, Searsville Lake, San Mateo County, 28 May 1904 (WFVZ 94665). Five eggs collected, "Lagunita Lake, Palo Alto," Santa Clara County, 4 May 1908 (WFVZ 54420).

Black-crowned Night-Heron (*Nycticorax nycticorax*). Three eggs collected, near Santa Clara, Santa Clara County, 18 May 1899 (WFVZ 48922). Four eggs collected, Menlo Park, San Mateo County, 28 Apr 1901 (WFVZ 95724). Eggs collected, north end of Belvedere Island, Marin County, 22 Apr 1918 (Condor 41:81–82). On nest, Imrie Lake, Napa County, 15 Mar 1925 (E. L. Bickford's notes *fide* W. T. Grummer).

White-tailed Kite (*Elanus leucurus*). Four eggs collected, near Spring Valley, San Mateo County, 3 May 1901 (WFVZ 33184). Four eggs collected, Contra Costa County, 28 Mar 1915 (WFVZ 23191).

Bald Eagle (*Haliaeetus leucocephalus*). Two eggs collected, near Guerneville, Sonoma County, 24 Feb 1904 (WFVZ 98766).

Northern Harrier (*Circus cyaneus*). Five eggs collected, Redwood City, San Mateo County, 23 May 1892 (WFVZ 76390). Three eggs collected, salt marsh near Petaluma, Sonoma County, 31 May 1924 (WFVZ 45207).

Sharp-shinned Hawk (*Accipiter striatus*). Three eggs collected, Berryessa, Santa Clara County, 11 May 1893 (WFVZ 107440). Four eggs collected, Menlo Park, San Mateo County, 3 May 1903 (WFVZ 35187). Five eggs collected, Alpine Valley, Sonoma County, 4 Jun 1914 (WFVZ 10075).

Cooper's Hawk (*Accipiter cooperii*). Four eggs collected, San Mateo County, 2 May 1893 (WFVZ 98701). Eggs collected, 4 miles south of Gilroy, Santa Clara County, 27 May 1916 (MVZ 2701).

Red-shouldered Hawk (*Buteo lineatus*). Two eggs collected, near Menlo Park, San Mateo County, 2 Apr 1898 (WFVZ 80563). Eggs collected, Oakley, Contra Costa County, 18 Apr 1915 (MVZ 7646).

Swainson's Hawk (*Buteo swainsoni*). One egg collected, Petaluma, Sonoma County, before 11 Jun 1859 (USNM B01679). Two eggs collected, "Ferguson's Swamp," Santa Clara County, 30 Apr 1889 (WFVZ 98178).

Peregrine Falcon (*Falco peregrinus*). Eggs collected, Alameda County, 4 Apr 1896 (MVZ 7818).

Black Rail (*Laterallus jamaicensis*)*****. Nested at Alviso, Santa Clara County, prior to 1904 (Wheelock 1916). Eggs collected, Newark, Alameda County, 10 Apr 1911 (WFVZ 99670, Kiff 1978).

Clapper Rail (*Rallus longirostris*). Eight eggs collected, Petaluma, Sonoma County, 28 Apr 1920 (WFVZ 102325)

Sora (*Porzana carolina*). Nine eggs collected, Santa Clara County, 1 May 1892 (CAS 10729).

Common Moorhen (*Gallinula chloropus*). Eight eggs collected, Santa Clara County, 28 Apr 1894 (WFVZ 163759).

American Avocet (*Recurvirostra americana*)*****. One downy young collected, Alvarado, Alameda County, 11 May 1926 (MVZ 145184).

Western Gull (*Larus occidentalis*). Three eggs collected, Bodega Bay, Sonoma County, 20 May 1910 (WFVZ 44594).

Caspian Tern (*Hydroprogne caspia*). Colony near east end of Dumbarton Bridge, Alameda County, 1922 (Grinnell and Miller 1944).

Rock Pigeon (*Columba livia*)*. No early nestings recorded, because of the species' domestic origin (Shuford 1993). Vallejo (1890) reported that domesticated pigeons were common around the missions prior to California's becoming a state. Grinnell and Miller (1944) noted that they were common about California cities. An egg set

collected in Eureka, Humboldt County, 25 Nov 1907 (WFVZ 139081) is the earliest preserved from the state.

Band-tailed Pigeon (*Patagioenas fasciata*). Nesting on valley floor near San Jose, Santa Clara County, 1895 and 1898 (Atkinson 1899). Egg set from Sulphur Creek, Sonoma County, 16 May 1896 (WFVZ 46638).

Yellow-billed Cuckoo. Four eggs collected, Napa County, 15 May 1881 (WFVZ 4585).

Greater Roadrunner (*Geococcyx californianus*). Eggs collected, Eaton Gulch, Redwood City, San Mateo County, 29 May 1896 (WFVZ 47898). Eggs collected, Novato, Marin County, 21 Apr 1901 (MVZ 8697). Eggs collected, Mt. Diablo, Contra Costa County, 2 May 1904 (CAS 4738).

Burrowing Owl (*Athene cunicularia*). Four eggs collected, Sonoma County, 15 May 1891 (CAS 2763). Eight eggs collected, Sweany Ranch, Redwood City, San Mateo County, 13 Jun 1898 (WFVZ 89859). Historically present, Marin County, before 1900 (Mailliard 1900). Five eggs, Benicia store house 29, Solano County, 7 Apr 1919 (Emerson Stoner's notes *fide* R. L. C. Leong).

Long-eared Owl (*Asio otus*). Four eggs collected, Sonoma County, 4 Apr 1881 (CAS 2741). Eggs collected, Berryessa, Santa Clara County, 6 Apr 1896 (MVZ 5968).

Lesser Nighthawk (*Chordeiles acutipennis*)*. Eggs collected on Uvas and Coyote creeks, Santa Clara County, 1894 to 1937 (Unglish 1929, WFVZ 30991).

Common Poorwill (*Phalaenoptilus nuttallii*). Nest with eggs, San Carlos, San Mateo County, 15 Jul 1885 (Dixon 1923). Two eggs collected, San Geronimo, Marin County, 22 Jul 1908 (CAS 7366). Eggs collected, Alpine Valley, Sonoma County, 31 May 1920 (WFVZ 100453). Set of eggs taken along Uvas Creek, Santa Clara County, 14 Apr 1926 (Unglish 1929).

White-throated Swift (*Aeronautes saxatalis*). Nesting in Leona quarries in Oakland, Alameda County, 21 Aug 1927 (Kelly 1927).

Black-chinned Hummingbird (*Archilochus alexandri*)*. Three egg sets collected west of Gilroy, Santa Clara County, May 1907 (Unglish 1932).

Western Wood-Pewee (*Contopus sordidulus*). Two eggs collected, Fair Oaks, San Mateo County, 4 Jun 1893 (WFVZ 75475).

Willow Flycatcher (*Empidonax traillii*). Four eggs collected, San Francisquito Creek, San Mateo County, 23 Jun 1895 (WFVZ 75063).

Horned Lark (*Eremophila alpestris*). Three eggs collected, 0.5 mi. E of Redwood City, San Mateo County, 27 Apr 1898 (WFVZ 74305). Two eggs collected, Antioch, Contra Costa County, 7 May 1915 (WFVZ 102704). Nest with eggs, east of Benicia Arsenal, Solano County, 11 May 1925 (Emerson Stoner's notes *fide* R. L. C. Leong).

Purple Martin (*Progne subis*)*. Two eggs collected, Napa, Napa County, before 14 Oct 1859 (USNM B02069).

Tree Swallow (*Tachycineta bicolor*). Eggs in nest box, Napa, Napa County, 1916 [E. L. Bickford; Gull 1(3)].

Violet-green Swallow (*Tachycineta thalassina*)*. Four eggs collected, Santa Rosa, Sonoma County, 25 May 1893 (CAS 8553). Eggs collected, Redwood City, San Mateo County, 3 Jun 1900 (WFVZ 91979). Eggs collected, San Anselmo, Marin County, 8 May 1904 (WFVZ 117333). Eggs collected, Coyote, Santa Clara County, 2 Jun 1926 (MVZ 6236).

Northern Rough-winged Swallow (*Stelgidopteryx serripennis*). Five eggs collected, Harrison, San Mateo County, 17 Jun 1899 (WFVZ 101936). Five eggs collected, Santa Rosa Laguna, Sonoma County, 25 Jun 1920 (WFVZ 101937).

White-breasted Nuthatch (*Sitta carolinensis*). Five eggs collected, Redwood City, San Mateo County, 17 Apr 1919 (WFVZ 94904).

Pygmy Nuthatch (*Sitta pygmaea*). Six eggs collected, Pescadero, San Mateo County, 19 May 1901 (WFVZ 90190).

Brown Creeper (*Certhia americana*). Eggs collected, Stanford University, Santa Clara County, 17 May 1914 (MVZ 2975).

Rock Wren (*Salpinctes obsoletus*). Six eggs collected, Hawes Ranch, Redwood City, San Mateo County, 28 May 1899 (WFVZ 90469). Six eggs collected, Rincon Valley, Sonoma County, 26 Apr 1913 (WFVZ 101001).

American Dipper (*Cinclus mexicanus*). Three eggs collected, Alameda Canyon, Alameda County, 9 May 1905 (CAS 10145). On nest, Lower Chiles Valley Road, Napa County, summer 1910 (E. L. Bickford's notes *fide* W. T. Grummer).

Western Bluebird (*Sialia mexicana*). Four eggs collected, 1.5 mi. W of Redwood City, San Mateo County, 19 Apr 1896 (WFVZ 105844).

Hermit Thrush (*Catharus guttatus*). Four eggs collected, Saratoga, Santa Clara County, 20 May 1884 (WFVZ 104194).

American Robin (*Turdus migratorius*). On nest, Los Gatos, Santa Clara County, 1893 (Nidiologist 1:95). On nest, Napa, Napa County, summer 1914 (E. L. Bickford's notes *fide* W. T. Grummer). Mt. Olivet Cemetery, San Mateo County, 15 Jul 1917 (Condor 19:185).

Yellow-rumped Warbler (*Dendroica coronata*)*. Howell Mountain, Napa County, prior to 1927 (Clark 1927).

Black-throated Gray Warbler (*Dendroica nigrescens*)*. Four eggs collected, Rincon Valley, Sonoma County, 23 May 1923 (WFVZ 108790). Howell Mountain, Napa County, prior to 1927 (Clark 1927).

MacGillivray's Warbler (*Oporornis tolmiei*). Five eggs collected, Danville, Contra Costa County, 2 May 1897 (CAS 8718). Three eggs collected, Summit Springs, San Mateo County, 2 Jul 1899 (WFVZ 93850). On nest, Lokoya Redwoods, Mt. Veeder Road, Napa County, summer 1921 (E. L. Bickford's notes *fide* W. T. Grummer).

Yellow-breasted Chat (*Icteria virens*). Five eggs collected, San Francisco, San Francisco County, 2 May 1882 (WFVZ 130211).

Western Tanager (*Piranga ludoviciana*). Nesting, Napa, Napa County, since 1917 (E. L. Bickford notes *fide* W. T. Grummer).

Chipping Sparrow (*Spizella passerina*). Four eggs collected, Redwood City, San Mateo County, 7 May 1895 (WFVZ 84996). Eggs collected, Danville, Contra Costa County, 6 May 1898 (MVZ 3339). Used nest, Golden Gate Park, San Francisco County, 1920 [Gull 3(2), 1921].

Lark Sparrow (*Chondestes grammacus*). Three eggs collected, near San Carlos, San Mateo County, 20 May 1884 (WFVZ 77048).

Sage Sparrow (*Amphispiza belli*). Four eggs collected, Redwood City, San Mateo County, 1 May 1910 (WFVZ 77118).

Grasshopper Sparrow (*Ammodramus savannarum*). Four eggs collected, Phelps Hill, Redwood City, San Mateo County, 7 Jun 1896 (WFVZ 77029). Five eggs collected, Rincon Valley, Sonoma County, 30 Jun 1911 (WFVZ 104999).

Tricolored Blackbird (*Agelaius tricolor*). Eggs collected, 2.5 mi. from Santa Rosa, Sonoma County, 23 May 1906 (WFVZ 111190).

Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*). Eggs collected, Pinole, Contra Costa County, 28 May 1899 (MVZ 3329).

Lawrence's Goldfinch (*Carduelis lawrencei*). Four eggs collected, Pinole, Contra Costa County, 21 May 1900 (WFVZ 119258). Four eggs collected, San Francisco, San Francisco County, 23 May 1915 (WFVZ 94053). Five eggs collected, Rincon Valley, Sonoma County, 20 May 1917 (WFVZ 112103).

American Goldfinch (*Carduelis tristis*). Eggs collected, Hercules, Contra Costa County, 30 May 1902 (MVZ 3333).

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