FIFTY YEARS SINCE GRINNELL AND MILLER: WHERE IS CALIFORNIA ORNITHOLOGY HEADED?

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December 1994 marked the fiftieth anniversary of a monumental event in California ornithology, publication of *The Distribution of the Birds of California* by Joseph Grinnell and Alden H. Miller, perhaps the most thorough state avifauna ever produced. Grinnell and Miller laid an impressive foundation. Published posthumously (it was completed by Miller), this work was the culmination of nearly fifty years of Grinnell's study of California wildlife, an achievement unmatched by anyone. The species accounts are filled with information about centers of abundance, seasonal movements, habitat uses, and outlying records. In terms of habitat descriptions, breeding ranges, and subspecies distributions, this work remains the key to our understanding of California's birds. Its enduring importance is exemplified by the enduring demand for it, enabling Artemisia Press to reprint it in 1986. More recent summaries, such as those by Garrett and Dunn (1981), McCaskie et al. (1988), and Small (1994), have contributed incrementally to our understanding of the status and distribution of California's birds, but none have reached, let alone exceeded, the level of detail that their forebears attained. For example, Grinnell and Miller's distribution maps, though forty years older, are still on average more detailed, accurate, and useful than those in Zeiner et al. (1990). As noted by Dunn (1994), "By and large, our knowledge of California breeding birds really hasn't advanced a lot in most areas beyond what was in Grinnell and Miller." Whereas this tribute to the authors is a huge one, Grinnell, as noted by Miller (1940), would have been the first to encourage that we move on, using their document as a springboard, and not relying upon it alone forever. Unfortunately, it is all too easy to be complacent about our current state of knowledge. Certainly we have learned a tremendous amount during the past fifty years, but even California, a relatively well-explored state, has many frontiers. Its avifauna, like that anywhere, is not constant.

From its inception through the 1950s, the *Condor* was the primary means of communication about these topics for California birds. As the *Condor* began to focus more on other issues in avian ecology and behavior, at the expense of distributional and taxonomic notes, a publication void had developed by the late 1960s. Fortunately, *California Birds* arrived in the nick of time, so that nary a beat was missed in the publishing of basic descriptions of bird distributions. In 1973, the fledgling California Field Ornithologists expanded into the Western Field Ornithologists; this organization has just celebrated its 25th anniversary, and its journal, *Western*

Birds, has grown to become *the* means of exchange of basic field ornithology ideas and information throughout western North America. Regional reports in *American Birds*, now *National Audubon Society Field Notes*, continue to be a valuable, though narrowly focused, source of primary distributional information.

THE QUEST FOR VAGRANTS

So what strides have we made in the past fifty years? Without question, our knowledge of the occurrence of vagrants has increased dramatically ("vagrants" being defined as "out-of-range," after DeSante and Ainley 1980:84). An oft-quoted remark by Grinnell (1922) is that "It is only a matter of time theoretically until the list of California birds will be identical with that for North America as a whole." By 1970, the quest for vagrants was a hot trend, and largely remains so today. This intrinsically exciting and entertaining pursuit has real scientific value: the status and patterns of occurrence of vagrants often provide insight into large-scale bird movements. But as a result of birding's preoccupation with glamorous vagrants, our knowledge of their status and distribution in California has leapfrogged over that of many regularly occurring breeders, migrants, and wintering species, with Grinnell and Miller still providing the core of our current knowledge for non-vagrants.

Grinnell and Miller treated 427 species. By the end of 1979, the California state list had grown to 535 species, an increase of 25% (Jehl 1980). The state list now stands at 586 (Heindel and Garrett 1995), a 10% increase since 1979 and a nearly 37% increase since Grinnell and Miller. With the exception of a few procellariids, particularly Murphy's (*Pterodroma ultima*) and Cook's (*P. cookii*) petrels, which have proven to be regular parts of our avifauna and probably always were, and roughly ten species that have truly invaded, such as the Cattle Egret (*Bubulcus ibis*) and Great-tailed Grackle (*Quiscalus mexicanus*), nearly every species added to the California list since Grinnell and Miller has been a vagrant (see Jehl 1980: Table 1). Species continue to be added annually, and a few invaders may establish themselves, but the ocean far offshore probably represents the only true frontier where we are likely to add species other than vagrants. Yet aside from this impressive increase in the list of species recorded in California, which included, admittedly, a ground-breaking understanding of vagrancy in western North America, our current position in understanding of status and distribution is only marginally ahead of where Grinnell and Miller left us.

THE CONSULTING INDUSTRY

Another major factor driving California ornithology has been environmental regulations, such as the federal Endangered Species Act and the California Environmental Quality Act. The requiring of environmental reports has drawn vastly increased numbers of biologists into the field and prompted the gathering of vast amounts of new data. In particular, the

federal Endangered Species Act, because of its role as one of the most effective tools for conservation of birds and their habitats, has resulted in endangered species attracting intensive study and, in some cases, substantial money. Knowledge of their distribution and biology has thus often increased disproportionately over that of more common species. Witness, for example, the extensive efforts focused on gathering basic data for the California Gnatcatcher (*Polioptila californica*), recently listed as threatened by the United States Fish and Wildlife Service. Over the past fifteen years, this species has gone from as obscure as any, even incorrectly classified as a subspecies, to one of California's best known birds. At this point we probably know more about the California Gnatcatcher than 90% of the other bird species in the state! The status review by Atwood (1990) provided the basis supporting the petition to list the this species as endangered. This review was able to include substantial information about current population levels, trends, habitat use, breeding biology, and taxonomy, making it probably the most thorough such documentation ever written. Nevertheless, the listing was recently successfully challenged in court (this ruling was stayed, pending review of additional information).

Unfortunately, most current information regarding the biology of the California Gnatcatcher, and a host of other sensitive species, exists only in unpublished documents, in-house reports, or other forms of "gray literature." This situation arises from the nature of the biological consulting industry, which has grown exponentially as environmental regulations have directed more businesses, developers, and government agencies into biological research. Yet almost none of the information generated by this industry is shared with other biologists. Indeed, much of it is considered proprietary to the business that commissioned the study! Although this problem is not confined to ornithology (*cf.* Wilbur 1990, Germano and Bury 1994), it has perhaps reached its pinnacle in this field, if only because of the sheer volume of consulting work being performed on birds in this state. Without question, more data about California birds is now being generated than at any time in the state's history. We acknowledge that many consultant reports are prepared only to assist regulatory agencies in judging compliance with environmental laws, but many contain new, well-documented information describing the basic biology of various California birds. The ultimate culprit is the short-sightedness of the environmental review process, which pays for the gathering of information, and for the writing of reports that gather dust in bureaucrats' files, but not for disseminating this information to the scientific community. Every effort should be made to share such data and, if appropriate, to publish them in peer-reviewed outlets such as *Western Birds*. Failure to share requires all of us to continually reinvent the wheel, escalating costs. Researchers in the burgeoning field of conservation biology desperately need good field data and solid descriptive ornithology, not the political strife so often associated with conservation efforts, such as the recent lawsuits associated with the California Gnatcatcher and Northern Spotted Owl (*Strix occidentalis caurina*) listings. As noted by Dhondt and Matthysen (1993), "urgent answers that conservation biology needs cannot often be provided by our present knowledge [and] although birds are better known than any other animal group, for

many species we have only vague ideas about their actual ranges and basic life-history traits."

LEVELS OF SCALE

Effective conservation planning at the local level requires a very fine-scale knowledge of bird distribution and abundance. Yet this kind of information is lacking except for a few endangered species and colonial seabirds (Sowls et al. 1980). For the great majority of California birds, the most detailed distributional data for the state as a whole are still the maps and text in Grinnell and Miller. Accurate as they are, their focus is at too coarse a scale for many of today's needs. The several county- or region-specific avifaunas published over the past twenty-five years (e.g., Harris 1991, Lehman 1994, Unitt 1984) for the most part update Grinnell and Miller adequately for those areas, but none achieves a significantly finer focus of scale. The first real breakthrough beyond this level has come only in the past two years with the publication of California's first two breeding bird atlases (Roberson and Tenney 1993, Shuford 1993). Several other similar projects are in varying stages of progress (Manolis 1991).

Each of these atlases has been initiated and pursued by private organizations and individuals, mainly amateurs, with no significant direction or support from government agencies. Yet, for the areas covered, these atlases will likely prove more useful to the wildlife agencies than anything the agencies have produced or sponsored themselves. If a tenth of the millions of dollars spent for consultants' studies had gone to support bird atlases as well executed as those for Marin and Monterey counties, we would have California's avifauna mapped completely, in even more exquisite detail, and a solid base for multiple-species conservation plans throughout the state. Instead, we endure the spectacle of millions being wasted on unpublished studies whose only visible result is political deadlock. The state of California has made a significant step toward useful management of information with the establishment of the Department of Fish and Game's Natural Diversity Data Base (Shaw 1987), but this data base is still very incomplete, even for the sensitive species it covers, and will remain so as long as its cost for use remains exorbitant. Other projects, such as the Urban and Environmental Outreach Program at the University of California, Riverside (intended to provide consultants and researchers with literature searches from published and unpublished sources), show promise of solving this information-management problem on a local level, but they have yet to become operational.

THEORETICAL VS. APPLIED ORNITHOLOGY

If descriptive ornithology and wildlife management have diverged, despite their natural interdependence, descriptive and theoretical, often university-based, ornithology have diverged even further (see *Auk* 97:409 and 98:636). With advances in the science and technology of avian ethology, ecology, energetics, physiology, genetics, etc., descriptive ornithology (the search for *patterns*) ceased to be at the "cutting edge," even though much

of it remains to be done. Universities began directing students into "cutting-edge," theoretical research (the search for *processes*) and away from descriptive ornithology. Ultimately descriptive ornithology, especially local faunistics, was left unsuitable as a thesis topic for graduate students in biology. All too frequently now, university-trained ornithologists have no ability or interest in identifying birds. It is as if physics students, after the development of relativity theory and quantum mechanics, no longer learned Newtonian mechanics. Thus orphaned, descriptive ornithology was inherited by birders, who have a natural interest in cultivating it.

Meanwhile, academic ornithology forged ahead, using mathematical and physical tools not readily accessible to amateurs. Ornithology thus followed the path of so many other sciences, in which ground-breaking advances can now be made only with the aid of sophisticated theories, expensive instrumentation, and money. Yet the need for more and better information on bird identification and distribution remains, along with those of us who feel motivated to explore these topics.

One point where the divergence between theoretical, process-oriented and descriptive, pattern-oriented ornithology is about to become a rift is over the definition of species. Genetic studies are beginning to suggest that some populations are reproductively isolated even though they are not completely differentiated in either external appearance or by voice. Johnson (1994) is quite right to point out that birds bear no responsibility for making themselves easy to identify. But field work in ecology, biogeography, and the like demands a species concept that is not only biologically sound but broadly useful as well. A proliferation of species cryptic to anyone outside a genetics lab would disrupt ornithology pursued anywhere else. We do not doubt that such cryptic "species" may be real, may merit study, and may have useful applications, but we prefer they be known by some other name. Otherwise, we see the biggest upheaval in systematics since Darwin, and the rift in ornithology becoming as great as that between quantum mechanics and home remodeling.

A related trend is the promotion of the "phylogenetic species concept" (Cracraft 1983, McKitrick and Zink 1988), in which every minimally diagnosable cluster of individuals considered an independently evolving unit is ranked as a species. This notion seems equally destructive to applied ornithology, its theoretical validity aside. We question the usefulness of a concept that assumes that speciation proceeds uniformly by the dichotomous branching of lineages, when evidence of their anastomosing in a network (secondary intergradation) is manifest.

THE VALUE OF SUBSPECIES

Perhaps in nothing is the divergence between process-oriented and pattern-oriented ornithology more marked than in the use of subspecies. New genetic techniques have revealed that the difference between two subspecies is reflected in but a tiny fraction of their genome, a fraction often different from the tiny fraction examined in genetic studies. These studies have often implied a population structure and evolutionary history different from what might have been inferred from subspecies defined by differences

in external appearance. Therefore many ornithologists have rejected the use of subspecies or at least neglected them as irrelevant. The viewpoints presented in a forum on the subspecies concept (Wiens 1982) illustrate this trend well (see also Monk 1992, Zink 1994, and Frank A. Pitelka's comments in the 1986 Artemisia Press reissue of Grinnell and Miller 1944). Part of the recent disdain for subspecific taxonomy may be traceable to misunderstanding just what a subspecies is. Many believe that described subspecies have utility only if they represent "evolutionary units" or incipient species. But as Mayr (1942:155) wrote in addressing the relationship between species and subspecies, "Geographic speciation is thinkable only if subspecies are incipient species. This, of course, does not mean that every subspecies will eventually develop into a good species. Far from it! All this statement implies is that every species that developed through geographic speciation had to pass through a subspecies stage."

Subspecies remain essential to the most detailed understanding of bird distribution and migration. They constitute the finest level on which most persons interested in birds will ever be able to describe them and their distributions. Marshall (in Phillips et al. 1964:x) put it well when he noted that "subspecies teach us more about migration than any other source of information . . . [and] constitute whole *populations* which are 'marked' by their peculiarities of color, size and proportions."

Even the American Ornithologists' Union, in its *Check-list of North American Birds*, the source followed as a standard for taxonomy in most publications on this continent, seems to have abandoned subspecies, despite its fine explanation for their maintenance (A.O.U. 1983:xiii). Not for thirty-eight years (A.O.U. 1957) has it dealt with subspecific taxonomy or distribution, and most of the current members of the check-list committee have published little or nothing on the subspecies of North American birds. Although it was not the intent of the A.O.U. to leave subspecies out of its check-list forever (Lanyon 1982), as this neglect continues, many field ornithologists and birders mistakenly conclude that subspecific information is of no value. Worse yet, the omission of subspecies from the sixth edition of the A.O.U. Check-list is frequently misinterpreted. For example, in their Field Sparrow (*Spizella pusilla*) account, Carey et al. (1994) stated that there are "No currently recognized subspecies (Am. Ornithol. Union 1983)"! Despite such misconceptions, *S. p. arenacea* remains strongly differentiated.

With few exceptions (e.g., Johnson and Marten 1992), as a result of this long neglect, understanding of California subspecies has advanced little since the time of Grinnell and Miller. The preoccupation of some of the old-time collectors with this subject may lead some to assume that little remains to be learned about it. Since 1957, however, some twenty new subspecies of birds occurring in California have been described (Browning 1990, Phillips 1991), though the validity and precise ranges of some of these need to be tested and refined. Doubtless some subspecies remain to be described, even in California; the avian biodiversity in our vast state has still not been fully documented.

Data about the distribution and status of many, if not most, subspecies remain poor. For example, the literature indicates that only one subspecies

of the Black-capped Chickadee (*Parus atricapillus*) occurs in California: *P. a. occidentalis*, as a resident in cismontane lowlands south to Humboldt County and inland to Siskiyou County, with only limited winter movements (A.O.U. 1957, Erickson pers. obs.). Yet E. Clarke Bloom (unpubl. data) has recorded Black-capped Chickadees in winter on the Modoc Plateau. Rather than *P. a. occidentalis*, which many might assume they are, these birds could be *P. a. fortuitus*, a subspecies with documented winter dispersal in other regions, or even the presumably sedentary but geographically closer *P. a. nevadensis*; neither of these subspecies is known from California, and both differ conspicuously from *occidentalis*.

Vagrants can originate from multiple source populations (McCaskie and Patten 1994). For example, the majority of the Yellow-throated Warblers (*Dendroica dominica*) recorded in California have been of the "white-lored," small-billed subspecies *albilora*, but there are at least four well-supported occurrences (e.g., Craig 1970) of large-billed, yellow-lored birds, presumably nominate *dominica*. Unfortunately, this species is one of the few for which such information is available, for the commendable effort made to document vagrants too often stops at the species level.

Whereas many vagrants have proven regular in California, these are of species lacking subspecies common in California. That eastern *subspecies* of transcontinental species are lacking from the California list is nearly as true as twenty years ago, when Phillips (1975) joked that "eastern birds appear to stray west only if they lack western relatives." He mentioned specifically the eastern Hermit (*Catharus guttatus*) and Swainson's (*C. ustulatus*) thrushes, Bell's (*Vireo bellii*), Solitary (*V. solitarius*), and Warbling vireos (*V. gilvus*), and Nashville (*Vermivora ruficapilla*), Yellow (*Dendroica petechia*), and Wilson's warblers (*Wilsonia pusilla*). Twenty years later, of these subspecies, only the nominate subspecies of the Solitary Vireo has been collected in California (once); for the others there are only a few inconclusive unpublished sight reports.

CONSERVE THE COLLECTIONS

Answering these sorts of questions requires judicious collecting of specimens. Collecting (and even mist-netting), however, has unfortunately fallen into disfavor in many birding circles, despite many excellent commentaries explaining the critical need for specimens and collections, including one by Grinnell himself eighty years ago (Grinnell 1915). Mercifully, in California bird collecting is not regulated as excessively and counterproductively as it is in some states, but urbanization and the need for special local authorizations make it impractical over ever larger areas. Still, collecting and collections need the wholehearted support of birders (Winker et al. 1991). If the practitioners and consumers of applied, descriptive ornithology do not support collections, they cannot expect the ecologists, physiologists, and geneticists to do it for them. The recession of the 1990s has led to the financial hobbling of several of California's important bird collections. If these are to remain open for public use, birders and field biologists must make responsibility for their maintenance and prosperity a priority for their parent institutions.

Collections and descriptive taxonomy are crucial not only to basic ornithology but to many conservation efforts as well. As noted by Zink (1994), "Museums, and associated personnel trained in identification of specimens, taxonomy, and phylogenetic relationships, must form the framework of our attempt to preserve the earth's biota." So whether or not subspecies are in fashion, we must keep in mind that birds distribute themselves by populations, not by species; they are also most effectively conserved, or lost forever, at the population level. The California Gnatcatcher is just one example of taxonomy's bearing on conservation. Many other rare or endangered taxa need taxonomic reevaluation. For example, the Eagle Mountain Scrub Jay (*Aphelocoma coerulescens cana*) and Inyo Brown Towhee (*Pipilo crissalis eremophilus*) may not be valid subspecies (Phillips 1986, Peterson 1990, Unitt pers. obs.). Conversely, the recently described and intensively analyzed San Diego Cactus Wren (*Campylorhynchus brunneicapillus sandiegensis*), though rarer than California Gnatcatcher (Rea and Weaver 1990), will receive no protection from the U. S. Fish and Wildlife Service (1994). This agency denied the subspecies' existence by pretending the published study did not exist and relying on one of its own employees for scientific cover.

Subspecies distributions are no less static that those of species. For example, the San Diego Song Sparrow (*Melospiza melodia cooperi*) has invaded the range of the desert subspecies *M. m. saltonis*, and secondary intergradation of two of the most divergent subspecies in North America has begun (Unitt pers. obs.). Do the Loggerhead Shrikes of San Clemente Island, still represent *Lanius ludovicianus mearnsi*, a subspecies listed as endangered? Our observations suggest that, externally, they may not. What does this mean for the conservation of the population?

Even without collecting one can contribute to our understanding of subspecies distribution. The Atlantic Brant (*Branta bernicla hrota*), Myrtle Warbler (*Dendroica coronata*), and Harlan's Hawk (*Buteo jamaicensis harlani*), are as readily field-identifiable as they were when they were ranked as species, though reports of them are spotty or have virtually ceased (Patten and Campbell 1992).

CONCLUSION

Grinnell and Miller provided us with a sturdy foundation for the study of bird species and subspecies in California. Now more than ever, given the massive and rapid changes in this state's environment, we need to update and refine our knowledge in all fields to build upon that foundation. Unanswered questions remain at all levels. Why has the Brown Pelican (*Pelecanus occidentalis*) increased so dramatically as a post-breeding visitor to the Salton Sea? Why do we almost never detect migrant Black-chinned Sparrows (*Spizella atrogularis*)? Is the Least Bittern (*Ixobrychus exilis*) declining in California? Basic knowledge of breeding biology, dispersal capabilities, and habitat requirements is still needed for most species, let alone populations. Most counties still need an updated summary, much less a breeding bird atlas. An atlas of *winter* distribution, as has been done for Britain and France, for example, is still beyond the horizon. As clear as

the importance of descriptive ornithology may seem to those of us in the field, it will be an uphill battle to educate and reeducate society about its relevance and applications. Finding resources to support its practice and communication will be an even greater challenge. Fortunately, *Western Birds* remains committed to the importance, practice, and publication of descriptive ornithology in the tradition of Grinnell and Miller.

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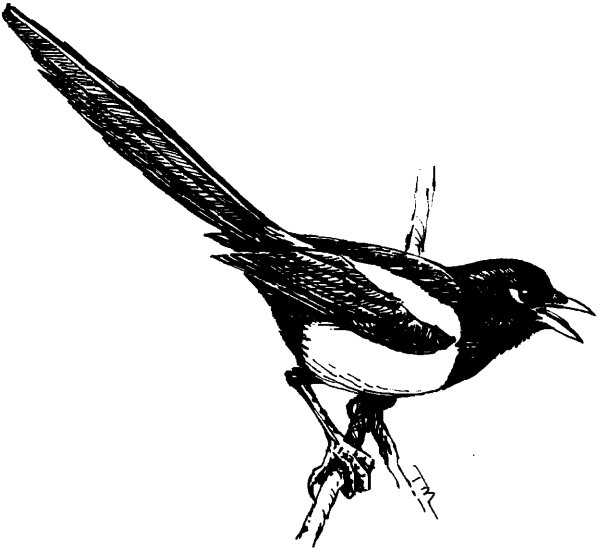

Yellow-billed Magpie *Sketch by Tim Manolis*