

PROBLEMS IN SEPARATING SPECIES WITH SIMILAR HABITS AND VOCALIZATIONS

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ABSTRACT.—The possibilities for species misidentification based on vocalization or habitat association are high. However, the magnitude of the errors actually perpetrated is generally within an acceptable range in most types of bird survey work.

Examples of problems discussed are: congeners that are similar in appearance or in song (such as Chimney and Vaux's Swifts, *Chaetura pelagica*, *C. vauxi*; Hammond's, Dusky and Gray Flycatchers, *Empidonax hammondi*, *E. oberholseri*, *E. wrightii*; Willow and Alder Flycatchers, *E. traillii*, *E. alnorum*; Common and Fish Crows, *Corvus brachyrhynchos*, *C. ossifragus*); birds that are misidentified because they are not expected by the observer (House Finches, *Carpodacus mexicanus*, invading new areas of eastern U.S.); birds that imitate other species (especially Starling, *Sturnus vulgaris*, and Mockingbird, *Mimus polyglottos*); birds in mixed flocks; birds with geographic differences in vocalizations (Solitary Vireo, *Vireo solitarius*); woodpeckers that are only heard drumming; and nests or eggs that are misidentified.

Equally serious problems are the errors resulting from undetected species and from careless recording or failure to check manuscripts against original data. The quality of published count work can be improved considerably by (1) recognizing the problems that exist, (2) standardizing techniques for dealing with situations where not all birds can be identified, and (3) routinely applying all appropriate safeguards such as verification by mist netting and measuring, photography, tape recording or playback, additional observations, and careful verification of all entries in the final manuscript.

Errors of species identification are made not only by students, trainees, and field assistants, but by experienced field ornithologists as well. Even birds in the hand are often misidentified. Many misidentified birds have been stored in museum trays for decades before being "discovered." Banders are occasionally embarrassed to find they have misidentified a bird in the hand. Several years ago, after more than 30 years experience as a bird bander, the senior author netted and banded what he took to be a Common Yellowthroat (*Geothlypis trichas*); on release it gave the characteristic chip of a Mourning Warbler (*Oporornis philadelphia*). When recaptured later in the day the bird proved to be in typical immature female Mourning Warbler plumage; it simply had not been examined carefully.

Thus, we should realize it is not always someone else who is making incorrect identifications, and therefore we should be constantly alert to keep misidentifications to a minimum. We shall review several types of identification problems, then give some specific examples. We shall also briefly discuss how possibilities of misidentification should influence selection of a count technique. Finally, we shall add a few comments regarding errors that occur between the time a bird is observed and the time the report appears in print.

TYPES OF IDENTIFICATION PROBLEMS

Inexperienced observers.—The most obvious source of identification error is observers who are unfamiliar with the species, or with their songs, or with habitat requirements, or seasonal occurrence. A cautious inexperienced observer will miss species that are present; one not so cautious will include migrants with breeding or wintering species, or list distant birds of another habitat in the habitat being surveyed, or record species that are not present at all. Inexperienced observers are especially prone to mistake imitations by Starlings or Mockingbirds for the species being imitated, or to mistake vocal imitations of hawks uttered by jays.

Carelessness.—Carelessness can lead to misidentification, especially when an observer is under pressure. Examples include: 1) haste to complete a field trip, to catch up if behind schedule, or to record a large number of species in a measured time interval (such as a 3-minute BBS stop); 2) desire to record a bird that was seen too briefly or at too great a distance for positive identification; 3) failure to record a given species either because several other species were seen at the same time or because the observer was distracted before an observation was recorded; and 4) a snap judgment on a bird too briefly observed, a competitive urge, or an over-riding desire to excel.

Discomfort, fatigue.—Condition of the observer can certainly contribute to misidentifications. This topic is covered by Faanes and Bystrak (1981) in their discussion of observer variability and will not be belabored here.

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Unfamiliar species or plumages, nests and eggs.—Some counters may perform very well for most of the species they encounter, yet may overlook or possibly misidentify a few species with which they may not be familiar or that they are not expecting (see Faanes and Bystrak 1981). Birds in juvenile plumage can be a problem during the breeding season because very few juvenile plumages are illustrated in field guides. Juveniles of some, but not all, species can be recognized by call notes that are similar to those of the adult. Many count takers are not familiar with nests and eggs of all the birds in their study plots, and if nests are located before incubation starts or after the nests have been abandoned there is danger of misidentification.

Racial variation.—Misidentification may result from the great spectrum in phenotypic appearance of various races of some species (e.g., Savannah Sparrow, *Passerculus sandwichensis*; some *Catharus* thrushes) that occur together during migration or on winter grounds. Field guides generally do not illustrate the full range of plumages.

Identification by habitat.—Dependence on printed material or popular belief about habitat requirements may lead to problems. Hammond's and Dusky Flycatchers, for instance, usually, but not always, nest in their "assigned" habitats. These species should always be double checked by plumage, behavioral, and vocal features. We must also be watchful for species expanding their "stated" ranges such as Anna's Hummingbird (*Calypte anna*), which is expanding its range to the north and east.

Dependence on field guides.—North American field guides, unfortunately, have an eastern bias. No field guide author or field guide artist has spent an appreciable time with live birds in the West, where geographic differences in appearance and vocalizations are much greater than in the East. Thus, technical points of identification of western species and races often receive secondary treatment. It would be impossible, for instance, for any inexperienced person to identify a Bell's Vireo (*Vireo bellii*) in California from the field guide pictures that are available. Field guides contain some inaccuracies and all contain some misleading pictures. Much of this may be a result of birds being painted from study skins, with resulting mistakes in shape and attitude. Field guides also lack new information that has become available since publication. Sophisticated articles, notes, and booklets on critical identification of many of the most difficult North American bird complexes and groups have been published over the last five years. Perhaps they will all be indexed or published together, but for now any person interested in

accurate critical identification of birds should consult such journals as *Western Birds*, *British Birds*, *Continental Birdlife*, and *Western Tanager* (Los Angeles Audubon Society), or the British Trust for Ornithology Field Guide 17 (Prater et al. 1977).

Dependence on bird song tapes and records.—Because of tremendous geographic differences in songs and calls within a single species, no record or set of records has enough geographical treatment to solve all identification problems. Published recordings of many western species were no doubt taped in the East (e.g., Winter Wren, *Troglodytes troglodytes*). Some recordings have local dialects, recorded somewhere in the West, that are not representative of the vast majority of populations (e.g., Northern Pygmy Owl, *Glaucidium gnoma*). One should be especially careful with owls, wrens, blackbirds, and fringillids.

Birds with similar songs or calls.—There are a few species (to be discussed later) whose songs or calls are practically indistinguishable. There are many more that cause identification problems for relatively inexperienced census workers. This problem is compounded by occasional birds that give extremely atypical songs: for example, a Hooded Warbler (*Wilsonia citrina*) singing like a Yellow-bellied Flycatcher (*Empidonax flaviventris*).

Unfamiliar geographic area.—We know of instances where highly experienced census takers have made serious identification mistakes when working in different parts of the continent. Even familiar species may cause problems because of geographic or local dialects in their songs or call notes (e.g., Solitary Vireo; Red-winged Blackbird, *Agelaius phoeniceus*; Rufous-sided Towhee, *Pipilo erythrophthalmus*).

Hybrids.—Banders have found that hybrid birds are more frequent than had previously been supposed. Some hybrids sing the song of one parent or the other; some sing different or intermediate songs. Any aberrant song should, of course, be checked.

Mixed flocks.—A problem encountered frequently in winter (and even more so during migration) is a large flock in which not all species are individually identified. Some observers conservatively record only those individuals closely examined and accounted for at the same time. Other observers count or estimate the total number of birds in the flock and estimate the percentage composition of the flock on the basis of the sample that can be identified. Uniform procedures should be established.

Species overlooked in a flock.—In contrast to obvious mixed flocks, there is a problem with flocks that at first glance appear to contain only

one species (e.g., Horned Larks, *Eremophila alpestris*; Red-winged Blackbirds, or Lapland Longspurs, *Calcarius lapponicus*). The second look can be very important.

SELECTED EXAMPLES OF IDENTIFICATION PROBLEMS

Hawks.—Accipiters pose a problem because of sexual size dimorphism and inconspicuousness (until the observer approaches close to the nest). The common woodland buteos (Red-tailed, *Buteo jamaicensis*; Red-shouldered, *B. lineatus*; and Broad-winged, *B. platypterus*, Hawks) also can be confused by an observer who is not familiar with their appearance, calls, and habitat use. Large falcons (Gyr Falcon, *Falco rusticolus*; Prairie Falcon, *F. mexicanus*; and Peregrine, *F. peregrinus*) are usually seen at a distance, making it important to learn their diagnostic shapes, wing beats, and flight characteristics.

Rails, cuckoos.—Experts have argued for years over calls of Black (*Laterallus jamaicensis*), Yellow (*Coturnicops noveboracensis*), and Virginia (*Rallus limicola*) Rails; and some calls of King (*R. elegans*) and Clapper (*R. longirostris*) Rails are hard to separate. We have seen Sora (*Porzana carolina*) and Virginia Rails at a nest utter what sounded to be identical alarm notes. Although the Black-billed (*Coccyzus erythrophthalmus*) and Yellow-billed (*C. americanus*) Cuckoos have diagnostic calls, they also use calls consisting of a series of single notes that are extremely similar.

Owls.—Owls are more often missed than misidentified, simply through lack of nocturnal coverage. On the other hand, large owls flushed are difficult to identify. Screech Owls (*Otus asio*) may imitate Saw-whets (*Aegolius acadicus*), and nutria (*Myocastor coypu*) may sound like Long-ears (*Asio otus*). Winnowing Common Snipe (*Capella gallinago*) may be mistaken for Screech Owls.

Dark swifts, hummingbirds.—Chimney Swifts are rapidly colonizing the Southwest, and Vaux's Swifts are similarly expanding their breeding range in the Northwest, their winter range in the tropics, and in migration occur as far east as Louisiana. It is likely that Vaux's are overlooked as Chimneys in the East and Chimneys overlooked as Vaux's and even possibly Black Swifts (*Cypseloides niger*) in the West. Female and young male hummingbirds are notoriously hard to identify. Furthermore, east of the Rockies most observers incorrectly assume that all hummingbirds are Ruby-throated (*Archilochus colubris*).

Woodpeckers drumming.—A few species of woodpeckers (e.g., Pileated, *Dryocopus pilea-*

tus; sapsuckers, *Sphyrapicus* spp.) have a characteristic pattern of drumming that can be used to identify them. Many others cannot be positively identified by their drumming because there is a greater difference in resonance between drumming substrates than among species. Additionally, some species of woodpeckers do not drum at all.

Flycatchers.—The recent range expansion of Wied's Crested Flycatchers (*Myiarchus tyrannulus*) may cause identification problems with Great Crested (*M. crinitus*) and Ash-throated (*M. cinerascens*) Flycatchers in the West. Some Olivaceous (*M. tuberculifer*) Flycatchers drift north after breeding and have overwintered successfully north of their breeding range (Luther et al. 1979). Few observers can confidently identify *Empidonax* flycatchers in the field by sight alone. The recent splitting of the Alder Flycatcher from the Willow poses a serious problem not only for banders, but also for the many observers who are unable to distinguish between the songs of these two species. Even more difficult are the songs of some of the western *Empidonax* species. During spring when on territory, each species of *Empidonax* has a totally diagnostic dawn and dusk (sometimes night) song or song series. Other, less intense songs and calls, which are given frequently during the day, can be most confusing. This is particularly true in the Hammond-Dusky-Gray Flycatcher group. It is imperative to hear true, complete songs as well as to compile clues from behavior, color, proportion, and habitat to identify these birds. A silent pewee (*Contopus* sp.) is more of a problem than a silent *Empidonax* flycatcher. Silent pewees are identified primarily on the basis of where they are found, rather than by appearance. Silent Coues' Flycatchers (*C. pertinax*) have more the appearance of pewees than they do of Olive-sides (*Nuttallornis borealis*).

Crows, chickadees.—Few observers are competent to separate the three North American crow species on sight, and many others cannot do so reliably by voice. To many observers, especially in the East, any chickadee is a Black-capped Chickadee (*Parus atricapillus*). Most misidentifications result from the observer not being aware of the existence of additional species. Some observers, who are aware that Black-capped Chickadees sometimes winter in the northern part of the breeding range of the Carolina Chickadee (*P. carolinensis*), habitually find Black-capped Chickadees every winter—even in those winters when there is no southward movement of Black-caps. The presence of small numbers of hybrid chickadees where the ranges of two species meet confuses the situation. In the Rocky Mountains, observers used

to seeing only Black-capped Chickadees may assume that all chickadees they hear belong to this species. In autumn, molting Mountain Chickadees (*P. gambeli*) may completely lack a white eyebrow and are easily misidentified as Black-caps.

Thrushes.—The *Catharus* thrushes, especially when seen in poor light, can be a real problem. This problem is especially acute for color-blind persons.

Kinglets, vireos.—Golden-crowned (*Regulus satrapa*) and Ruby-crowned (*R. calendula*) Kinglets should be readily separable in the field, but the many reports of Ruby-crowned Kinglets in winter in the northern states suggest that inexperienced observers are reporting male Golden-crowned Kinglets as Ruby-crowns. Agitated Hutton's Vireos (*Vireo huttoni*) often move quickly and wing-flick persistently, thus appearing like Ruby-crowned Kinglets. The Solitary Vireo has a wide geographic range, including some strikingly different habitats in different parts of North America. There are not only conspicuous differences in plumage, but also striking differences in song. For example, some of the western Solitary Vireos sound more like Yellow-throated Vireos (*V. flavifrons*) than like eastern Solitaires. Another pair of vireos whose songs are practically indistinguishable are the Red-eyed (*V. olivaceus*) and Philadelphia (*V. philadelphicus*) Vireos. A fourth vireo problem relates to separation of immature White-eyed Vireos (*V. griseus*) with dark eyes from Bell's Vireos. Also, juvenile Warbling Vireos (*V. gilvus*) can be quite yellow below and green above, thus appearing like Philadelphia Vireos.

Warblers.—There are many instances of similarity in plumage or song in the wood warbler family, Parulidae. We mention just a few examples. Golden-winged (*Vermivora chrysoptera*) and Blue-winged (*V. pinus*) Warblers cannot be separated solely by song because hybrids and back-crosses are known to sing the typical songs of both parents. A general problem with most parulid warblers is that they typically have two quite different songs, one generally more diagnostic than the other. Cape May (*Dendroica tigrina*), Blackburnian (*D. fusca*), and Bay-breasted (*D. castanea*) Warblers and American Redstart (*Setophaga ruticilla*) have songs that are readily confused with each other. The Northern Parula (*Parula americana*) and Cerulean Warbler (*Dendroica cerulea*) songs frequently are confused, as are those of the Yellow (*D. petechia*) and Chestnut-sided (*D. pensylvanica*) Warblers. Songs of the Northern (*Seiurus noveboracensis*) and Louisiana (*S. motacilla*) Waterthrushes are confused by observers who are not thoroughly familiar with both, and

another song similar to that of the Louisiana Waterthrush is given by the Swainson's Warbler (*Limnothlypis swainsonii*). We are unable to tell a MacGillivray's Warbler (*Oporornis tolmiei*) from a Mourning Warbler by its song.

Tanagers.—Tanagers can be a problem by either sight or sound if one is working in an area where more than one species may occur. The Summer Tanager (*Piranga rubra*) can even be passed up for a singing American Robin (*Turdus migratorius*), and a Scarlet Tanager (*P. olivacea*) with faint wing bars can be mistaken for a Western Tanager (*P. ludoviciana*).

Finches and sparrows.—Cassin's (*Carpodacus cassinii*) and Purple (*C. purpureus*) Finches are readily confused in parts of the mountainous West. An even more severe problem occurs in the Northeast where invading House Finches are being mistaken for the native Purple Finches. Possibilities of confusing different species of sparrows are almost unlimited. Problems in separating the so-called "grass" sparrows extend far beyond inability of some observers to hear their songs. Even when in plain sight, many sparrows are misidentified by people not thoroughly familiar with them. The Henslow's Sparrow (*Ammodramus henslowii*), because of its inconspicuous habits, is one of the birds most likely to be entirely overlooked. The tail patterns of wintering longspurs are often very difficult to see; however, these birds can be told by their diagnostic calls given during flight.

VULNERABILITY OF DIFFERENT CENSUS TECHNIQUES TO MISIDENTIFICATIONS

Count techniques vary considerably in their probability of error in species identification. Methods based on a single or brief visit or on input from inexperienced personnel are most subject to species identification errors. Most reliable are methods based on repeated visits over several days by different observers and especially by ornithologists experienced in the geographic area and in sampling methodology.

Any ranking of techniques according to vulnerability to species identification error is bound to reflect personal opinion. Having had personal experience in all of the following methods, we feel we are relatively unbiased in ranking them as follows, with methods least subject to error appearing first: (1) studies based on trapping and banding, and those in which banding is used as a supplementary tool; (2) censuses based on mapping of birds during a series of visits on different days (such as Breeding Bird Census and Common Birds Census); (3) Breeding Bird Atlas studies, in which the important records (confirmations) are based primarily on close or pro-

longed behavioral observations; (4) point counts and other variable circle counts, especially when they involve multiple visits; (5) transects that involve only a single visit to a particular area; and (6) Breeding Bird Survey, with its series of short single visits.

We consider that all of these breeding season methods are less subject to misidentifications than are census attempts at other seasons of the year. We rate the winter techniques as follows: (1) Winter Bird-Population Study with its numerous visits; (2) Winter Bird Survey, which is a single walking coverage; and (3) Audubon Christmas Bird Count.

We emphasize that the above ranking applies *only* to vulnerability to misidentifications, not to an overall appraisal of the techniques. Our rating of the Breeding Bird Survey at the bottom of the breeding season list does not reflect any lack of confidence in the Breeding Bird Survey. There undoubtedly are numerous misidentifications on the Breeding Bird Survey, but we believe these are very few compared to the total numbers of birds reported (which average close to 1000 individuals per year on each of the 1700 or more routes). The purpose of the Breeding Bird Survey is primarily to monitor changes in abundance over a period of years, and assuming that identification errors are small in relation to the total birds reported and of about the same annual magnitude, their effects on the Survey would be minimal. Much more serious are misidentifications on Christmas Bird Counts where unusual birds, rather than the common species, receive special emphasis.

For purposes of comparing avifaunas among different habitats or different geographic areas, a combination of mapping census and banding would presumably give the most accurate results because: (1) chance of misidentification is minimal, (2) presence of late migrants could be detected by examining for fat deposition on captured birds, and (3) few species would go undetected.

We believe the same general ranking given above for reliability of identification would also apply to completeness of an avifaunal survey. Again the Breeding Bird Survey would fall last among breeding season techniques because it is based on brief samples rather than an effort to observe a high percentage of the birds present. As an example, we cite a Maryland study in which two experienced observers covered a familiar 50-stop Breeding Bird Survey route and observed simultaneously without communicating with each other. At the end of the survey they compared their observations stop by stop, ignoring the number of individuals of each species recorded but comparing only the list of

species each observer had noted during each 3-min stop. There was not a single stop out of the 50 at which the two observers had recorded the same list of species. On another day on a similar coverage of the same route, the results were the same: there was not a single stop at which both observers had noted the same list of species. It was not until the third trial that the first identical species lists were recorded (at two stops). On each of the three days the total number of species recorded by the two observers was almost identical, so this was not a matter of one observer being better trained or more alert than the other. It was simply a matter of concentration on birds heard, and chance as to which birds seen were noted by one or the other observer.

SUGGESTIONS FOR MINIMIZING SPECIES ERRORS

Procedural recommendations.—Because of observer variability, including differential rates of recognition in different species, it helps to follow a carefully planned procedure in the field, especially if comparisons are to be made among geographic regions, habitats, or years, and most especially if studies are to be made before and after habitat alteration. We suggest: (1) Rotate observers carefully among plots, transects, or points so that censuses will be as comparable as possible and so that as few species as possible will be overlooked or misidentified. (2) Train all observers in advance with appropriate books, skins, records, or tapes. (3) Follow this with field training to include familiarization with field conditions and with call notes that are not available for study on tapes or records. (4) Examine field records of all participants for comparability prior to and in early phases of the actual study. (5) Standardize handling of difficult problems such as woodpeckers that are only heard drumming, mixed flocks of birds, and species that cannot be identified by the observer.

Report preparation.—The following comments are based on Robbins' experience in editing Breeding Bird Census reports for *American Birds* for many years, and in subsequent checking of 43 years of these reports for a computerized data bank. We believe that one of the most serious sources of error is not in identification of birds in the field but in the various processes that take place at the desk after the close of the breeding season. Thus a special word of caution is in order, and this applies especially to the professionals and other experts who are experienced in census taking, but tend to be careless in report preparation.

Because of the high probability of error in interpreting results and preparing reports for publication, we urge all census field workers and

compilers to follow these procedures: (1) start an initial draft of maps, tables, and text early, before the fieldwork is completed, so as to become aware of any potential identification problems or the need for additional fieldwork; (2) in mapping territories or computing densities, refer to your own or other prior fieldwork and be as consistent as you can with procedures used in prior years; and (3) check carefully for transcribing errors and especially for omissions and incorrect mathematical calculations. Frequently one or more species, sometimes common ones, are inadvertently omitted from manuscripts submitted for publication!