

THE MIGRANT

Published by the Tennessee Ornithological Society
to Record and Encourage the Study of Birds in Tennessee
Issued in March, June, September and December

VOL. 90

SEPTEMBER 2019

NO. 3

The Migrant 90(3): 77-92, 2019

***Et tu, Picoides?* UNDERSTANDING WHY BIRD NAMES CHANGE**

R. Peter Dorn¹, Howard E. Horne², Michael D. Collins^{3,4,*}

¹Program in Biomathematics, Rhodes College, Memphis, TN 38112, USA

²Barry A. Vittor & Associates, Mobile, AL 36695, USA

³Department of Biology, Rhodes College, Memphis, TN 38112, USA

⁴Program in Environmental Studies and Sciences,
Rhodes College, Memphis, TN 38112, USA

* Corresponding author: collinsm@rhodes.edu

ABSTRACT -The scientific names and standardized English names of birds change over time. We explore the prevalence of name changes for the birds of Tennessee since 1998, when the 7th edition of the Checklist of North American Birds was released (AOU 1998) and investigate the reasons for these changes. Of the 409 bird species in Tennessee, the scientific names of 116 species (28%) changed at least once. Of these changes, 89 were due to generic reallocation in which one or more species were moved into a different or new genus to reflect the evolutionary relationships of these species. Seventeen changes in the scientific name (15%) were due to the splitting of one species into two or more species. Species splits were generally based on multiple lines of evidence, including genetic, morphological, and behavioral data. Eight standardized English names changed. English names changed to reflect species splits or to align with worldwide usage. New data and continued study will further reshape our understanding of the evolutionary history of birds and of species delimitations and introduce additional name changes.

Key words: birds, nomenclature, phylogenetics, scientific name, systematics, taxonomy

Even casual birders are aware that the names of birds change over time. Sometimes it is a bird's standardized English name that changes. Standardized (or "official") names are

those that have been adopted by a governing body or professional scientific organization such as the American Ornithological Society (AOS). These are the “common names” that you will find in a field guide. While often considered synonymous with standardized names, the concept of common names is broader and encompasses names used by regional communities and other languages besides English. Examples of recent standardized name changes include replacing the long-used and familiar Rock Dove with Rock Pigeon in 2003 and updating the controversial name of Oldsquaw to the Long-tailed Duck in 2000. These recent name changes are not a modern phenomenon. Many readers might fondly recall the days when the Northern Harrier was known as the Marsh Hawk and the Blue-headed Vireo was the Solitary Vireo. Some might also remember when the Peregrine Falcon was known as the Duck Hawk and the American Kestrel was known as the Sparrow Hawk. In addition to changes of standardized English names, the scientific names of birds (sometimes referred to as a bird’s Latin name) are also subject to revision. Perhaps most disappointing to birders and researchers in the United States is the loss of the genus *Dendroica* and its assimilation into *Setophaga*. For some, these changes can be confusing and unsettling, and birders sometimes lament the loss of these names and wonder why scientists continually change the names of some of our favorite species. Why do bird names change? In this paper, we aim to explain why the names of birds change and to understand both the prevalence of name changes and the reasons for these changes as they affect the birds of Tennessee.

Taxonomy is the scientific study of the classification of organisms, and the related field of nomenclature is the applied practice of naming organisms. The ultimate goal of modern taxonomy and nomenclature is to mirror evolutionary history and to depict how life evolved from a common ancestor. This pattern is often depicted as an evolutionary tree, with the common ancestor as the original trunk of the tree and the branches as the species that have descended from it. Scientists use the fossil record, DNA and molecular evidence, and morphological features to better understand evolutionary history. Defining and delineating species is not a trivial task. Taxonomists work to delineate species and to discern whether two populations are subspecies of a single species or two separate species. There is no universally accepted standard on how to define them theoretically or operationally, and the issue is one of rank: at what point should two distinctive populations be considered full species instead of subspecies? For example, the Baltimore Oriole (*Icterus galbula*) and Bullock’s Oriole (*I. bullockii*) were previously lumped as a single species, the “Northern Oriole”, until 1995 but are now classified as separate species. Conversely, since 1973, “Myrtle Warbler” in the Eastern US and “Audubon’s Warbler” in the west have been considered two subspecies of a single species, the Yellow-rumped Warbler (*Setophaga coronata*). The Yellow-rumped Warbler also includes two other subspecies, “Goldman’s Warbler” in Guatemala and “Black-fronted Warbler” in Mexico, that are sometimes treated as species. As new data are obtained, our understanding of these relationships sometimes changes. Accordingly, the taxonomy and nomenclature will reflect this new knowledge, and species names will change.

In addition, changes in the evolutionary tree rely on definitions of what a species is and what separates one species from another. In fact, scientists around the world often disagree on how to define a species, and because of this many species concepts exist (Mayden 1997).

The two most commonly used concepts are the Biological Species Concept (Mayr 1942) and the Phylogenetic Species Concept (Cracraft 1983). The Biological Species Concept defines a species as a group of interbreeding or potentially interbreeding populations that are reproductively isolated from other groups (Mayr 1942). It makes sense that if two populations cannot interbreed, they should not belong to the same species. There are, however, limitations to this species concept, and hybrids are particularly problematic (Häuser 1986). Waterfowl hybridize often, meaning that many species of waterfowl are capable of interbreeding but are not necessarily the same species. Two species might be lumped back into one species if the two groups successfully interbreed or show little genetic differentiation.

Phylogenetics is the study of taxa (biological groups) and their evolutionary relationships (Nixon and Wheeler 1990). The Phylogenetic Species Concept defines a species as a group of individuals that share an exclusive evolutionary history (Nixon and Wheeler 1990). Unfortunately, there are also drawbacks to this species concept. First, this concept can be applied *very* specifically, resulting in many more divisions (and species) in the evolutionary tree than there are currently. For instance, the number of named bird species in the world might increase based on small taxonomic differences between current subspecies, not because new species are being discovered (Isaac et al. 2004). However, recent research has shown that this predicted taxonomic inflation is not occurring in birds (Sangster 2009a). Despite known occurrences of hybridization, the Tufted Titmouse was considered conspecific with the Black-crested Titmouse until 2002. While the two populations could interbreed and hybridize, genetic data indicated that each population had unique traits that were not shared by the other population. As a result, they were split into two separate species.

Rearrangements of the evolutionary tree do not occur only at the species level. For example, the Lapland Longspur, Smith's Longspur, Chestnut-collared Longspur, and Snow Bunting were all considered to be members of Emberizidae, the Bunting family. However, these four species share few genetic similarities with other Emberizids and were thus split into a new family, Calcariidae (Alstrom et al. 2008, Klicka et al. 2003). Without genetic data, it was difficult to determine that these species belong in a separate family. With the ever-increasing amount of genetic data available, evolutionary biologists are able to estimate the relationships between species more clearly than is possible with morphological evidence alone. These higher-level changes, however, do not affect a bird's English or scientific name and are not addressed further here.

In this paper we examine the birds of Tennessee and document which species names have changed since 1998, when the 7th edition of the Checklist of North American Birds was released (AOU 1998) and investigate why these changes have occurred.

METHODOLOGY

The American Ornithological Society (AOS, formerly American Ornithologist's Union, AOU) maintains a check-list of North American birds from the Arctic to Panama, including the West Indies and Hawaiian Islands. The most current edition of the check-list, the

seventh, was published in 1998 (AOU 1998). Since 1998, the AOS and AOU have published 19 supplements (Banks et al. 2000, 2002, 2003a, 2003b, 2005, 2006, 2007, 2008, Chesser et al. 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2009, 2010) that update all taxonomic changes for species in North America. Suggested taxonomic changes are submitted, along with a rationale and evidence, and the North American Classification Committee reviews each proposed change to decide what nomenclatural changes are warranted. AOS is also responsible for establishing standardized English names of birds.

We used the 2014 Official List of the Birds of Tennessee compiled by the Tennessee Bird Records Committee and available from the Tennessee Ornithological Society (http://www.tnbirds.org/TBRC/TBRC_checklist.html) to identify bird species that breed in, winter in, migrate through, or are accidental species in the state of Tennessee. We examined all 19 supplements since publication of the latest check-list (AOS 1998) to identify taxonomic changes in the scientific or standardized names for each of the 409 species in the Official List. When a name change was found, we recorded the date, whether the scientific or English name or both changed, and reason for the change. We found several reasons for name changes (Table 1): 1) a change can occur from the *lumping* of two species into a single species; 2) a change can occur from the *splitting* of one species into two or more species; 3) a change can occur from a *generic reallocation* in which one or more species are moved into a different or new genus; 4) the *English name* alone can be changed; and 5) *grammatical changes* can occur, which include changes of the scientific names for nomenclatural “housekeeping” to conform to standards set by the International Commission on Zoological Nomenclature. The data behind these changes varied from case to case but could include genetic (e.g., DNA) information, morphological (different physical appearance) data, reproductive isolation (incapable of interbreeding), and behavior (e.g., song).

RESULTS

Scientific Name Changes. - Of the 409 bird species in Tennessee, 116 species (28%) experienced at least one change in scientific name (Table 2). Of these changes, 89 were due to generic reallocation. An example is the transfer of Garganey, Blue-winged Teal, Cinnamon Teal, and Northern Shoveler from the genus *Anas* to the genus *Spatula* in 2017. The genus *Anas* was deemed “paraphyletic,” meaning some birds in the genus were more closely related to other genera (Gonzalez et al. 2009) geese, swans, the magpie goose and screamers. The genus *Anas* was therefore split, with the shovellers and some teals moved to the previously recognized *Spatula* while other species, such as Mallard, Northern Pintail, and Green-winged Teal, remained in *Anas*. Interestingly, some species underwent more than one generic reallocation during the study period. In 2011, the Tennessee Warbler, Orange-crowned Warbler, and Nashville Warbler were transferred from the genus *Vermivora* to the genus *Oreothlypis* but in 2019 these three warblers were moved from *Oreothlypis* to *Leiothlypis* since it was found that species in *Oreothlypis* formed two well differentiated clades with significant genetic differences (Lovette et al. 2010). The generic reallocation of 89 species accounted for 77% of all name changes.

Table 1. Reasons for change in scientific names with examples for the birds of Tennessee.

Reason for change	Description	Number	Example	Citation
Lumping	Combination of two or more species into one species	1 (1%)	Lumping of Thayer's Gull (<i>Larus thayeri</i>) into Iceland Gull (<i>Larus glaucoides</i>)	(Snell 1989)
Splitting	Division of one species into two or more species	17 (15%)	Black Scoter (<i>Melanitta americana</i>): Treated as a separate species from Common Scoter (<i>Melanitta nigra</i>)	Sangster (2009b)
Generic Reallocation	One or more species are moved into a different or new genus	89 (77%)	Snow Goose: Change in genus from <i>Chen caerulescens</i> to <i>Anser caerulescens</i>	Ottenburghs et al. (2016)
Grammatical Change	Changes of Latin name to fit proper gender	8 (7%)	Purple Gallinule: Change from <i>Porphyrio martinica</i> to <i>Porphyrio martinicus</i>	Gibson and Baker (2012)

Table 2. Birds of Tennessee that have had a change in the scientific name, standardized English name, or both from 2000 to 2019 with the year and reason for the name change.

Standardized English name	Scientific name	Year	Reason
Snow Goose	<i>Anser caerulescens</i>	2017	Generic reallocation
Ross's Goose	<i>Anser rossii</i>	2017	Generic reallocation
Cackling Goose	<i>Branta hutchinsii</i>	2004	Species split
Garganey	<i>Spatula querquedula</i>	2017	Generic reallocation
Blue-winged Teal	<i>Spatula discors</i>	2017	Generic reallocation
Cinnamon Teal	<i>Spatula cyanoptera</i>	2017	Generic reallocation
Northern Shoveler	<i>Spatula clypeata</i>	2017	Generic reallocation
Gadwall	<i>Mareca strepera</i>	2017	Generic reallocation
Eurasian Wigeon	<i>Mareca penelope</i>	2017	Generic reallocation
American Wigeon	<i>Mareca americana</i>	2017	Generic reallocation
White-winged Scoter	<i>Melanitta fusca</i>	2019	Species split
Black Scoter	<i>Melanitta americana</i>	2010	Species split
Long-tailed Duck	<i>Clangula hyemalis</i>	2000	English name only
Rock Pigeon	<i>Columba livia</i>	2003	English name only
Band-tailed Pigeon	<i>Patagioenas fasciata</i>	2003	Generic reallocation
Common Ground Dove	<i>Columbina passerina</i>	2019	English name only
White-winged Dove	<i>Zenaida asiatica</i>	2002	Species split
Chuck-will's-widow	<i>Antrostomus carolinensis</i>	2012	Generic reallocation
Eastern Whip-poor-will	<i>Antrostomus vociferus</i>	2012	Generic reallocation
Mexican Violetear	<i>Colibri thalassinus</i>	2008	English name only
Calliope Hummingbird	<i>Selasphorus calliope</i>	2012	Generic reallocation
Clapper Rail	<i>Rallus crepitans</i>	2014	Species split
King Rail	<i>Rallus elegans</i>	2014	Species split
Purple Gallinule	<i>Porphyrio martinicus</i>	2012	Grammar
Common Gallinule	<i>Gallinula galeata</i>	2011	Species split
Sandhill Crane	<i>Antigone canadensis</i>	2016	Generic reallocation
Snowy Plover	<i>Charadrius nivosus</i>	2011	Species split
Ruff	<i>Calidris pugnax</i>	2017	Generic reallocation
Buff-breasted Sandpiper	<i>Calidris subruficollis</i>	2017	Generic reallocation
Wilson's Snipe	<i>Gallinago delicata</i>	2002	Species split
Spotted Sandpiper	<i>Actitis macularius</i>	2004	Grammar
Willet	<i>Tringa semipalmata</i>	2006	Generic reallocation
Red Phalarope	<i>Phalaropus fulicarius</i>	2002	Grammar
South Polar Skua	<i>Stercorarius maccormicki</i>	2001	Generic reallocation
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	2008	Generic reallocation
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	2008	Generic reallocation
Little Gull	<i>Hydrocoloeus minutus</i>	2008	Generic reallocation
Laughing Gull	<i>Leucophaeus atricilla</i>	2008	Generic reallocation
Franklin's Gull	<i>Leucophaeus pipixcan</i>	2008	Generic reallocation

Standardized English name	Scientific name	Year	Reason
Ring-billed Gull	<i>Larus delawarensis</i>	2008	Generic reallocation
California Gull	<i>Larus californicus</i>	2008	Generic reallocation
Herring Gull	<i>Larus argentatus</i>	2008	Generic reallocation
Iceland Gull	<i>Larus glaucoides</i>	2008	Species lump
Lesser Black-backed Gull	<i>Larus fuscus</i>	2008	Generic reallocation
Glaucous Gull	<i>Larus hyperboreus</i>	2009	Generic reallocation
Great Black-backed Gull	<i>Larus marinus</i>	2010	Generic reallocation
Sooty Tern	<i>Onychoprion fuscatus</i>	2006	Generic reallocation
Least Tern	<i>Sternula antillarum</i>	2006	Generic reallocation
Gull-billed Tern	<i>Gelochelidon nilotica</i>	2006	Generic reallocation
Caspian Tern	<i>Hydroprogne caspia</i>	2006	Generic reallocation
Royal Tern	<i>Thalasseus maximus</i>	2006	Generic reallocation
Band-rumped Storm-Petrel	<i>Oceanodroma castro</i>	2019	Generic reallocation
Great Shearwater	<i>Ardenna gravis</i>	2017	Generic reallocation
Brown Pelican	<i>Pelecanus occidentalis</i>	2008	Species split
Least Bittern	<i>Ixobrychus exilis</i>	2010	Species split
Roseate Spoonbill	<i>Platalea ajaja</i>	2002	Generic reallocation
Northern Harrier	<i>Circus hudsonius</i>	2017	Species split
Snowy Owl	<i>Bubo scandiacus</i>	2003	Generic reallocation
Belted Kingfisher	<i>Megaceryle alcyon</i>	2007	Generic reallocation
Downy Woodpecker	<i>Dryobates pubescens</i>	2018	Generic reallocation
Red-cockaded Woodpecker	<i>Dryobates borealis</i>	2018	Generic reallocation
Hairy Woodpecker	<i>Dryobates villosus</i>	2018	Generic reallocation
Northern Shrike	<i>Lanius borealis</i>	2017	Species split
Red-eyed Vireo	<i>Vireo olivaceus</i>	2018	Species split
Barn Swallow	<i>Hirundo rustica</i>	2000	Grammar
Cave Swallow	<i>Petrochelidon fulva</i>	2000	Grammar
Black-capped Chickadee	<i>Poecile atricapillus</i>	2000	Grammar
Tufted Titmouse	<i>Baeolophus bicolor</i>	2002	Species split
House Wren	<i>Troglodytes aedon</i>	2006	Generic reallocation
Winter Wren	<i>Troglodytes hiemalis</i>	2010	Species split
Bewick's Wren	<i>Thryomanes bewickii</i>	2006	Generic reallocation
Pine Siskin	<i>Spinus pinus</i>	2009	Generic reallocation
American Goldfinch	<i>Spinus tristis</i>	2009	Generic reallocation
Lapland Longspur	<i>Calcarius lapponicus</i>	2010	Generic reallocation
Chestnut-collared Longspur	<i>Calcarius ornatus</i>	2010	Generic reallocation
Smith's Longspur	<i>Calcarius pictus</i>	2010	Generic reallocation
McCown's Longspur	<i>Rhynchophanes mccownii</i>	2010	Generic reallocation
Snow Bunting	<i>Plectrophenax nivalis</i>	2010	Generic reallocation
Bachman's Sparrow	<i>Peucaea aestivalis</i>	2010	Generic reallocation
Black-throated Sparrow	<i>Amphispiza bilineata</i>	2010	Generic reallocation

Standardized English name	Scientific name	Year	Reason
American Tree Sparrow	<i>Spizelloides arborea</i>	2015	Generic reallocation
Dark-eyed Junco	<i>Junco hyemalis</i>	2017	Species split
LeConte's Sparrow	<i>Ammospiza leconteii</i>	2018	Generic reallocation
Nelson's Sparrow	<i>Ammospiza nelsoni</i>	2018	Generic reallocation
Henslow's Sparrow	<i>Centronyx henslowii</i>	2018	Generic reallocation
Ovenbird	<i>Seiurus aurocapilla</i>	2003	Grammar
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	2004	Grammar
Louisiana Waterthrush	<i>Parkesia motacilla</i>	2010	Generic reallocation
Northern Waterthrush	<i>Parkesia noveboracensis</i>	2010	Generic reallocation
Blue-winged Warbler	<i>Vermivora cyanoptera</i>	2010	Multiple
Tennessee Warbler	<i>Oreothlypis peregrina</i>	2011	Generic reallocation
Orange-crowned Warbler	<i>Oreothlypis celata</i>	2011	Generic reallocation
Nashville Warbler	<i>Oreothlypis ruficapilla</i>	2011	Generic reallocation
Connecticut Warbler	<i>Oporornis agilis</i>	2011	Generic reallocation
MacGillivray's Warbler	<i>Geothlypis tolmiei</i>	2011	Generic reallocation
Mourning Warbler	<i>Geothlypis philadelphia</i>	2011	Generic reallocation
Kentucky Warbler	<i>Geothlypis formosa</i>	2011	Generic reallocation
Hooded Warbler	<i>Setophaga citrina</i>	2011	Generic reallocation
Kirtland's Warbler	<i>Setophaga kirtlandii</i>	2011	Generic reallocation
Cape May Warbler	<i>Setophaga tigrina</i>	2011	Generic reallocation
Cerulean Warbler	<i>Setophaga cerulea</i>	2011	Generic reallocation
Northern Parula	<i>Setophaga americana</i>	2011	Generic reallocation
Magnolia Warbler	<i>Setophaga magnolia</i>	2011	Generic reallocation
Bay-breasted Warbler	<i>Setophaga castanea</i>	2011	Generic reallocation
Blackburnian Warbler	<i>Setophaga fusca</i>	2011	Generic reallocation
Yellow Warbler	<i>Setophaga petechia</i>	2011	Generic reallocation
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	2011	Generic reallocation
Blackpoll Warbler	<i>Setophaga striata</i>	2011	Generic reallocation
Black-throated Blue Warbler	<i>Setophaga caerulescens</i>	2011	Generic reallocation
Palm Warbler	<i>Setophaga palmarum</i>	2011	Generic reallocation
Yellow-rumped Warbler	<i>Setophaga coronata</i>	2011	Generic reallocation
Yellow-throated Warbler	<i>Setophaga dominica</i>	2011	Generic reallocation
Prairie Warbler	<i>Setophaga discolor</i>	2011	Generic reallocation
Black-throated Gray Warbler	<i>Setophaga nigrescens</i>	2011	Generic reallocation
Townsend's Warbler	<i>Setophaga townsendi</i>	2011	Generic reallocation
Black-throated Green Warbler	<i>Setophaga virens</i>	2011	Generic reallocation
Canada Warbler	<i>Cardellina canadensis</i>	2011	Generic reallocation
Wilson's Warbler	<i>Cardellina pusilla</i>	2011	Generic reallocation
Blue Grosbeak	<i>Passerina caerulea</i>	2002	Generic reallocation
Lazuli Bunting	<i>Passerina amoena</i>	2005	Generic reallocation

Seventeen changes in the scientific name (15%) were due to the splitting of one species into two or more species, including the splitting of Common Gallinule (*Gallinula galeata*) in the Americas from Common Moorhen (*G. chloropus*) in Eurasia, based on differences in vocalizations and bill morphology (Constantine 2006), and DNA evidence (Groenenberg et al. 2008). Another example includes the splitting of Clapper Rail into multiple species. Previously Clapper Rail was long treated as a wide-ranging species comprising multiple subspecies. Phylogenetic data and evidence of reproductive isolation between the subspecies led the species to be split into three species (Maley and Brumfield 2013, Chesser et al. 2014). The nominate subspecies (*Rallus longirostris longirostris*) was found to be restricted to the mangroves and marshes of Central and South America, and the form is now known as the Mangrove Rail. The North American subspecies *R. l. crepitans* was elevated to species and kept the standardized name Clapper Rail.

The Black Scoter (*Melanitta americana*) in North America was formerly recognized as a subspecies of the Old World Common Scoter (*M. nigra*), but due to differences in mating calls it is now recognized as a distinct species (Sangster 2009b). In this case the standardized English name used by the AOS was unchanged while the species name was updated. Similarly, the Northern Harrier (*Circus hudsonius*) was split from the Hen Harrier (*C. cyaneus*) based on morphology, plumage, and breeding habitat (Etherington and Mobley 2016) and the scientific name changed while the use of the name Northern Harrier was retained. Only one (1%) change was due to the lumping of two species into one: the lumping of “Thayer’s Gull” into Iceland Gull (*Larus glaucooides*).

Of the 18 species-level changes, three (16%) were due solely to genetic evidence, seven (38%) were based on reproductive isolation and morphology, and eight (44%) were due to a combination of both genetic and morphological data. Eight (7%) changes were due to grammatical changes or nomenclatural housekeeping, which include changes of the scientific name so that the gender of the genus aligns with the gender of the species. For instance, the name of the Red Phalarope was changed from *Phalaropus fulicaria* to *Phalaropus fulicarius* and the name of Spotted Sandpiper from *Actitis macularia* to *Actitis macularius* to align the gender of the specific epithet with the gender of the genus to conform to standards set by the International Commission on Zoological Nomenclature.

Standardized English Name Changes. - Eight standardized English names changed since 1998. North American populations of the Common Moorhen were changed to the previously used Common Gallinule following a splitting of the species between the New and Old World forms. In 2002, differences in vocalizations and morphology resulted in the splitting of Common Snipe (*Galligano galligano*) into two species, which resulted in the recognition of a new species, *G. delicata*, now known as Wilson’s Snipe. The Mexican Violetear, *Colibri thalassinus*, was formerly considered conspecific with *C. cyanotus*. When they were lumped together, they held the common name of “Green Violetear.” However, due to differences in plumage the two species were split: *C. thalassinus* was given the name Mexican Violetear and *C. cyanotus* was given the name Lesser Violetear (Remsen et al. 2015).

Four species underwent a change in their English name with no change in the scientific name or in the overall taxonomy of the bird. The Greater Shearwater (*Ardenna gravis*)

became Great Shearwater to align better with worldwide usage (Chesser et al. 2014). The Common Ground-Dove (*Columbina passerina*) lost its hyphen to better conform with the AOS guideline for English names and is now Common Ground Dove (Chesser et al. 2019). In 2003, Rock Dove (*Columba livia*) was changed to Rock Pigeon to conform with British nomenclature, following the British Ornithologist's Union's decision in 1992. Nelson's Sparrow (*Ammospiza nelsoni*) was renamed from Nelson's Sharp-tailed Sparrow because the name was "considered unnecessarily cumbersome" (Chesser et al. 2009). Also, the Oldsquaw was changed to Long-tailed Duck. This species is listed as "vulnerable" under the IUCN red list. To better conserve the species, conservationists needed the help of Native Americans and thus changed the name to Long-tailed Duck (Banks et al. 2000). The term "squaw" is considered by some to be offensive, and the name was changed to reflect increasing cultural sensitivity, to promote inclusivity, and to conform to worldwide usage.

DISCUSSION

A bird's scientific name can be changed, its English name can be changed, or both. Several issues can bring about these kinds of change: two species can be lumped into one, one species can be split into two or more, or a species or higher taxonomic group might be incorrectly placed on the evolutionary tree.

Scientific Name Changes

We found that 77% of all taxonomic change in birds of Tennessee occurred due to generic reallocation. While defining a new species might be "sexier" than the rearrangement of the evolutionary tree, above-species-level reorganization is the primary and prominent driver of changes in the scientific names of Tennessee's birds. For instance, three of our woodpeckers, the Downy, Red-cockaded, and Hairy woodpeckers, were formerly placed in the genus *Picoides*. Genetic analyses have shown, however, that all species in this genus have not descended from the same common ancestor (Fuchs and Pons 2015, Shakya et al. 2017, Weibel and Moore 2002a, 2002b; Winkler et al. 2014). These woodpeckers were thus moved to the genus *Dryobates* (Fig. 1). These phylogenetic rearrangements can reveal surprising relationships and new insights (Shakya et al. 2017). Downy Woodpecker and Hairy Woodpecker, for example, are not especially closely related (Fig. 2), and their morphological similarity results not from shared ancestry but from natural selection, perhaps convergent evolution or interspecific mimicry (Leighton et al. 2018). Shakya et al. (2017) used citizen science data from Project FeederWatch to test hypotheses to explain this plumage similarity and concluded that Downy Woodpeckers do not avoid attacks from Hairy Woodpeckers but instead benefit from other species mistaking them for Hairy Woodpeckers. Remarkably, this interspecific mimicry in plumage patterns appears to occur repeatedly in woodpeckers (Benz et al. 2015, Shakya et al. 2017, Miller et al. 2019) and in other avian groups (Weckstein 2005, Jønsson et al. 2010). These insights would not have been possible without understanding the evolutionary history of these groups, and this example illustrates the importance of updating bird names to reflect our understanding of their evolutionary history.

At the species level, changes in the scientific are driven by splitting a single species into two or more species and only rarely by lumping two species into a single species. This finding is consistent with those of Vaidya et al. (2018), who found that splitting rates have accelerated and lumping rates have decreased since the 1970s. The evidence for splitting species is multifaceted. Molecular data are just as prevalent as morphological, reproductive, and behavioral evidence, and in many cases, multiple lines of evidence are used to warrant splitting species.

English Name Changes

For English names, it was a combination of scientific discovery, desire for nomenclatural consistency, and cultural sensitivity that provoked change. While changes via scientific reasoning are expected, the change of Rock Dove to Rock Pigeon was based mainly on the decision to align the US name for the bird with the British name. The change from Oldsquaw to Long-tailed Duck conforms to worldwide usage and reflects increased cultural sensitivity and aims to promote inclusivity and participation of Native Americans to better protect the species. Such changes certainly add a human element to these nomenclatural changes.

This study is limited by both time and area. Only the years 2000-2019 were analyzed, and only the birds of Tennessee were studied. Future work could expand the breadth of this study to all bird species of North America or globally. Another topic to look into is to compare the year of the change with the evidence used to support the change to determine whether modern scientific techniques (e.g., DNA and molecular evidence) are increasingly being used compared to more traditional evidence from morphology and behavior. Our findings demonstrate how fluid and incomplete our understanding of the evolutionary history of birds is. New data and continued study will surely introduce additional name changes. So stay tuned!

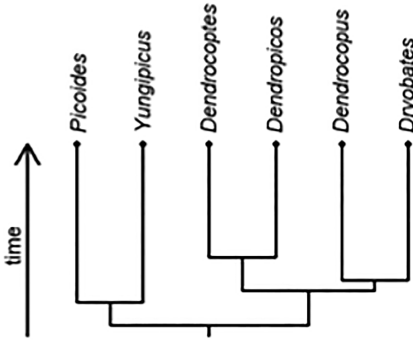


Figure 1. Evolutionary tree showing the distant relationship between *Picoides* and *Dryobates* woodpeckers. The genus *Picoides* includes American Three-toed Woodpecker and Black-backed Woodpecker. *Dryobates* includes Downy, Ladder-backed, Red-cockaded, and Hairy woodpeckers, and all three were previously classified as *Picoides*. *Picoides* is most closely related to *Yungipicus*, the pygmy woodpeckers native to Asia. *Dryobates* is most closely related to *Dendrocopus*, a genus of Eurasian and north African species that includes the Great Spotted Woodpecker. *Dryobates* is also more closely related to two other genera than it is to *Picoides*. *Dendrocoptes* includes three Eurasian species, including the Middle Spotted Woodpecker, and *Dendropicos* is a genus of sub-Saharan African woodpeckers that includes the Cardinal Woodpecker.

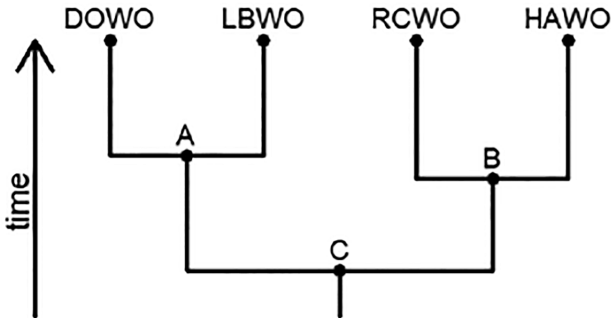


Figure 2. Evolutionary tree of *Dryobates* woodpeckers. Downy Woodpecker (DOWO) and Hairy Woodpecker (HAWO) are not sister taxa. Downy Woodpecker is more closely related to Ladder-backed Woodpecker (LBWO), sharing a common ancestor at node A. Hairy Woodpecker is more closely related to Red-cockaded Woodpecker (RCWO), having a common ancestor at node B. Downy and Hairy woodpeckers share a more distant ancestor (node C), and their morphological similarity is due to evolutionary convergence or mimicry, not to shared ancestry. For simplicity, not all *Dryobates* species are included.

ACKNOWLEDGMENTS

We thank Dr. Stefan Woltmann, Austin Peay State University, for reviewing the manuscript.

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