



Supplementary Online Material for THE INFLUENCE OF VERTICAL AND HORIZONTAL HABITAT STRUCTURE ON NATIONWIDE PATTERNS OF AVIAN BIODIVERSITY

PATRICK D. CULBERT,^{1,5} VOLKER C. RADELOFF¹, CURTIS H. FLATHER², JOSEF M. KELLNDORFER³,
 CHADWICK D. RITTENHOUSE,⁴ AND ANNA M. PIDGEON¹

¹Department of Forest and Wildlife Ecology, University of Wisconsin, Madison, Wisconsin 53706, USA;

²U.S. Department of Agriculture, Forest Service Rocky Mountain Research Station, Fort Collins, Colorado 80526, USA;

³Woods Hole Research Center, Falmouth, Massachusetts 02540, USA; and

⁴Department of Natural Resources and the Environment, University of Connecticut, Storrs, Connecticut 06269, USA

TABLE S1. Guild membership by species for this study. Guild labels: A = all landbirds, F = forest birds, G = grassland birds, and S = shrubland birds.

Common name	Scientific name	Guilds
Plain Chachalaca	<i>Ortalis vetula</i>	A
Mountain Quail	<i>Oreortyx pictus</i>	A, F, S
Scaled Quail	<i>Callipepla squamata</i>	A, S
California Quail	<i>Callipepla californica</i>	A, F, S
Gambel's Quail	<i>Callipepla gambelii</i>	A, S
Northern Bobwhite	<i>Colinus virginianus</i>	A, F, S
Montezuma Quail	<i>Cyrtonyx montezumae</i>	A
Ruffed Grouse	<i>Bonasa umbellus</i>	A, F
Greater Sage-Grouse	<i>Centrocercus urophasianus</i>	A, S
Willow Ptarmigan	<i>Lagopus lagopus</i>	A
Unidentified Dusky/Sooty Grouse	<i>Dendragapus obscurus/fuliginosus</i>	A, F
Greater Prairie-Chicken	<i>Tympanuchus cupido</i>	A, G
Lesser Prairie-Chicken	<i>Tympanuchus pallidicinctus</i>	A, G
Wild Turkey	<i>Meleagris gallopavo</i>	A, F
Black Vulture	<i>Coragyps atratus</i>	A, F
Turkey Vulture	<i>Cathartes aura</i>	A, F
Osprey	<i>Pandion haliaetus</i>	A, F
Hook-billed Kite	<i>Chondrohierax uncinatus</i>	A
Swallow-tailed Kite	<i>Elanoides forficatus</i>	A, F
White-tailed Kite	<i>Elanus leucurus</i>	A
Mississippi Kite	<i>Ictinia mississippiensis</i>	A, F
Bald Eagle	<i>Haliaeetus leucocephalus</i>	A, F
Northern Harrier	<i>Circus cyaneus</i>	A, G
Sharp-shinned Hawk	<i>Accipiter striatus</i>	A, F
Cooper's Hawk	<i>Accipiter cooperii</i>	A, F
Northern Goshawk	<i>Accipiter gentilis</i>	A, F
Harris's Hawk	<i>Parabuteo unicinctus</i>	A, S
Red-shouldered Hawk	<i>Buteo lineatus</i>	A, F
Broad-winged Hawk	<i>Buteo platypterus</i>	A, F
Gray Hawk	<i>Buteo plagiatus</i>	A
Swainson's Hawk	<i>Buteo swainsoni</i>	A, G
Zone-tailed Hawk	<i>Buteo albonotatus</i>	A
Red-tailed Hawk	<i>Buteo jamaicensis</i>	A, F

(continued)

TABLE S1. Continued

Common name	Scientific name	Guilds
Ferruginous Hawk	<i>Buteo regalis</i>	A, G
Golden Eagle	<i>Aquila chrysaetos</i>	A
White-crowned Pigeon	<i>Patagioenas leucocephala</i>	A
Band-tailed Pigeon	<i>Patagioenas fasciata</i>	A, F
White-winged Dove	<i>Zenaidura asiatica</i>	A, S
Mourning Dove	<i>Zenaidura macroura</i>	A, F
Inca Dove	<i>Columbina inca</i>	A
Common Ground-Dove	<i>Columbina passerina</i>	A, S
White-tipped Dove	<i>Leptotila verreauxi</i>	A
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	A, F
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	A, F
Greater Roadrunner	<i>Geococcyx californianus</i>	A, S
Smooth-billed Ani	<i>Crotophaga ani</i>	A, S
Groove-billed Ani	<i>Crotophaga sulcirostris</i>	A, F, S
Barn Owl	<i>Tyto alba</i>	A, G
Western Screech-Owl	<i>Megascops kennicottii</i>	A, F
Eastern Screech-Owl	<i>Megascops asio</i>	A, F
Great Horned Owl	<i>Bubo virginianus</i>	A, F
Northern Pygmy-Owl	<i>Glaucidium gnoma</i>	A, F
Elf Owl	<i>Micrathene whitneyi</i>	A
Burrowing Owl	<i>Athene cunicularia</i>	A, G
Spotted Owl	<i>Strix occidentalis</i>	A, F
Barred Owl	<i>Strix varia</i>	A, F
Great Gray Owl	<i>Strix nebulosa</i>	A
Long-eared Owl	<i>Asio otus</i>	A, F, S
Short-eared Owl	<i>Asio flammeus</i>	A, G
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	A, F
Lesser Nighthawk	<i>Chordeiles acutipennis</i>	A, S
Common Nighthawk	<i>Chordeiles minor</i>	A, F, G
Common Pauraque	<i>Nyctidromus albicollis</i>	A
Common Poorwill	<i>Phalaenoptilus nuttallii</i>	A, G, S
Chuck-will's-widow	<i>Antrostomus carolinensis</i>	A, F
Buff-collared Nightjar	<i>Antrostomus ridgwayi</i>	A
Unidentified Eastern/Mexican Whip-poor-will	<i>Antrostomus vociferus/arizonae</i>	A, F

(continued)

⁵E-mail: pdculbert@wisc.edu

The following is supplementary to The Auk, Vol. 130, No. 4, pages 656–665.

TABLE S1. Continued.

Common name	Scientific name	Guilds
Black Swift	<i>Cypseloides niger</i>	A
Chimney Swift	<i>Chaetura pelagica</i>	A
Vaux's Swift	<i>Chaetura vauxi</i>	A, F
White-throated Swift	<i>Aeronautes saxatalis</i>	A
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	A, F
Black-chinned Hummingbird	<i>Archilochus alexandri</i>	A, F
Anna's Hummingbird	<i>Calypte anna</i>	A, F
Costa's Hummingbird	<i>Calypte costae</i>	A, S
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>	A
Rufous Hummingbird	<i>Selasphorus rufus</i>	A, F
Allen's Hummingbird	<i>Selasphorus sasin</i>	A, F
Calliope Hummingbird	<i>Selasphorus calliope</i>	A, F
Broad-billed Hummingbird	<i>Cynanthus latirostris</i>	A, F
White-eared Hummingbird	<i>Hylocharis leucotis</i>	A
Belted Kingfisher	<i>Megaceryle alcyon</i>	A, F
Lewis's Woodpecker	<i>Melanerpes lewis</i>	A, F
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	A, F
Acorn Woodpecker	<i>Melanerpes formicivorus</i>	A, F
Gila Woodpecker	<i>Melanerpes uropygialis</i>	A, F
Golden-fronted Woodpecker	<i>Melanerpes aurifrons</i>	A
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	A, F
Williamson's Sapsucker	<i>Sphyrapicus thyroideus</i>	A, F
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	A, F
Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>	A, F
Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>	A, F
Ladder-backed Woodpecker	<i>Picoides scalaris</i>	A, F
Nuttall's Woodpecker	<i>Picoides nuttallii</i>	A, F
Downy Woodpecker	<i>Picoides pubescens</i>	A, F
Hairy Woodpecker	<i>Picoides villosus</i>	A, F
Arizona Woodpecker	<i>Picoides arizonae</i>	A, F
Red-cockaded Woodpecker	<i>Picoides borealis</i>	A, F
White-headed Woodpecker	<i>Picoides albolarvatus</i>	A, F
American Three-toed Woodpecker	<i>Picoides dorsalis</i>	A, F
Black-backed Woodpecker	<i>Picoides arcticus</i>	A, F
Northern Flicker	<i>Colaptes auratus</i>	A, F
Gilded Flicker	<i>Colaptes chrysoides</i>	A
Pileated Woodpecker	<i>Dryocopus pileatus</i>	A, F
Crested Caracara	<i>Caracara cheriway</i>	A
American Kestrel	<i>Falco sparverius</i>	A, F
Merlin	<i>Falco columbarius</i>	A, F
Gyr Falcon	<i>Falco rusticolus</i>	A
Peregrine Falcon	<i>Falco peregrinus</i>	A
Prairie Falcon	<i>Falco mexicanus</i>	A
Northern Beardless-Tyrannulet	<i>Camptostoma imberbe</i>	A
Olive-sided Flycatcher	<i>Contopus cooperi</i>	A, F
Greater Pewee	<i>Contopus pertinax</i>	A, F
Western Wood-Pewee	<i>Contopus sordidulus</i>	A, F
Eastern Wood-Pewee	<i>Contopus virens</i>	A, F
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	A, F
Acadian Flycatcher	<i>Empidonax virescens</i>	A, F
Alder Flycatcher	<i>Empidonax alnorum</i>	A, F, S
Willow Flycatcher	<i>Empidonax traillii</i>	A, S
Least Flycatcher	<i>Empidonax minimus</i>	A, F

(continued)

TABLE S1. Continued.

Common name	Scientific name	Guilds
Hammond's Flycatcher	<i>Empidonax hammondii</i>	A, F
Gray Flycatcher	<i>Empidonax wrightii</i>	A, S
Dusky Flycatcher	<i>Empidonax oberholseri</i>	A, F
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	A, F
Cordilleran Flycatcher	<i>Empidonax occidentalis</i>	A, F
Black Phoebe	<i>Sayornis nigricans</i>	A
Eastern Phoebe	<i>Sayornis phoebe</i>	A, F
Say's Phoebe	<i>Sayornis saya</i>	A
Vermilion Flycatcher	<i>Pyrocephalus rubinus</i>	A, F
Dusky-capped Flycatcher	<i>Myiarchus tuberculifer</i>	A
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	A, S
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	A, F
Brown-crested Flycatcher	<i>Myiarchus tyrannulus</i>	A, F
Great Kiskadee	<i>Pitangus sulphuratus</i>	A, F
Sulphur-bellied Flycatcher	<i>Myiodynastes luteiventris</i>	A
Couch's Kingbird	<i>Tyrannus couchii</i>	A, F, S
Cassin's Kingbird	<i>Tyrannus vociferans</i>	A, F
Thick-billed Kingbird	<i>Tyrannus crassirostris</i>	A
Western Kingbird	<i>Tyrannus verticalis</i>	A, F
Eastern Kingbird	<i>Tyrannus tyrannus</i>	A, F
Gray Kingbird	<i>Tyrannus dominicensis</i>	A, F
Scissor-tailed Flycatcher	<i>Tyrannus forficatus</i>	A, F
Loggerhead Shrike	<i>Lanius ludovicianus</i>	A
White-eyed Vireo	<i>Vireo griseus</i>	A, F, S
Bell's Vireo	<i>Vireo bellii</i>	A, S
Black-capped Vireo	<i>Vireo atricapilla</i>	A
Gray Vireo	<i>Vireo vicinior</i>	A, S
Yellow-throated Vireo	<i>Vireo flavifrons</i>	A, F
Plumbeous Vireo	<i>Vireo plumbeus</i>	A, F
Cassin's Vireo	<i>Vireo cassinii</i>	A, F
Blue-headed Vireo	<i>Vireo solitarius</i>	A, F
Hutton's Vireo	<i>Vireo huttoni</i>	A, F
Warbling Vireo	<i>Vireo gilvus</i>	A, F
Philadelphia Vireo	<i>Vireo philadelphicus</i>	A, F
Red-eyed Vireo	<i>Vireo olivaceus</i>	A, F
Black-whiskered Vireo	<i>Vireo altiloquus</i>	A, F
Gray Jay	<i>Perisoreus canadensis</i>	A, F
Brown Jay	<i>Psilorhinus morio</i>	A
Green Jay	<i>Cyanocorax yncas</i>	A, F, S
Pinyon Jay	<i>Gymnorhinus cyanocephalus</i>	A, F, S
Steller's Jay	<i>Cyanocitta stelleri</i>	A, F
Blue Jay	<i>Cyanocitta cristata</i>	A, F
Florida Scrub-Jay	<i>Aphelocoma coerulescens</i>	A, F, S
Western Scrub-Jay	<i>Aphelocoma californica</i>	A, F, S
Mexican Jay	<i>Aphelocoma wollweberi</i>	A, F
Clark's Nutcracker	<i>Nucifraga columbiana</i>	A, F
Black-billed Magpie	<i>Pica hudsonia</i>	A, F
Yellow-billed Magpie	<i>Pica nuttalli</i>	A, F
American Crow	<i>Corvus brachyrhynchos</i>	A, F
Northwestern Crow	<i>Corvus caurinus</i>	A, F
Fish Crow	<i>Corvus ossifragus</i>	A, F
Chihuahuan Raven	<i>Corvus cryptoleucus</i>	A
Common Raven	<i>Corvus corax</i>	A, F
Horned Lark	<i>Eremophila alpestris</i>	A, G
Purple Martin	<i>Progne subis</i>	A, F
Tree Swallow	<i>Tachycineta bicolor</i>	A, F
Violet-green Swallow	<i>Tachycineta thalassina</i>	A, F
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	A, F
Bank Swallow	<i>Riparia riparia</i>	A, F

(continued)

TABLE S1. Continued.

Common name	Scientific name	Guilds
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	A, F
Cave Swallow	<i>Petrochelidon fulva</i>	A
Barn Swallow	<i>Hirundo rustica</i>	A
Carolina Chickadee	<i>Poecile carolinensis</i>	A, F
Black-capped Chickadee	<i>Poecile atricapillus</i>	A, F
Mountain Chickadee	<i>Poecile gambeli</i>	A, F
Chestnut-backed Chickadee	<i>Poecile rufescens</i>	A, F
Boreal Chickadee	<i>Poecile hudsonicus</i>	A, F
Bridled Titmouse	<i>Baeolophus wollweberi</i>	A, F
Oak Titmouse	<i>Baeolophus inornatus</i>	A, F
Juniper Titmouse	<i>Baeolophus ridgwayi</i>	A, F
Tufted Titmouse	<i>Baeolophus bicolor</i>	A, F
Black-crested Titmouse	<i>Baeolophus atricristatus</i>	A, F
Verdin	<i>Auriparus flaviceps</i>	A, S
Bushtit	<i>Psaltriparus minimus</i>	A, F, S
Red-breasted Nuthatch	<i>Sitta canadensis</i>	A, F
White-breasted Nuthatch	<i>Sitta carolinensis</i>	A, F
Pygmy Nuthatch	<i>Sitta pygmaea</i>	A, F
Brown-headed Nuthatch	<i>Sitta pusilla</i>	A, F
Brown Creeper	<i>Certhia americana</i>	A, F
Rock Wren	<i>Salpinctes obsoletus</i>	A, F
Canyon Wren	<i>Catherpes mexicanus</i>	A, F
House Wren	<i>Troglodytes aedon</i>	A, F, S
Winter Wren	<i>Troglodytes hiemalis</i>	A, F
Sedge Wren	<i>Cistothorus platensis</i>	A, G
Marsh Wren	<i>Cistothorus palustris</i>	A
Carolina Wren	<i>Thryothorus ludovicianus</i>	A, F, S
Bewick's Wren	<i>Thryomanes bewickii</i>	A, F, S
Cactus Wren	<i>Campylorhynchus brunneicapillus</i>	A, S
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	A, F
Black-tailed Gnatcatcher	<i>Poliophtila melanura</i>	A, S
American Dipper	<i>Cinclus mexicanus</i>	A, F
Golden-crowned Kinglet	<i>Regulus satrapa</i>	A, F
Ruby-crowned Kinglet	<i>Regulus calendula</i>	A, F
Wrentit	<i>Chamaea fasciata</i>	A, F, S
Eastern Bluebird	<i>Sialia sialis</i>	A, F
Western Bluebird	<i>Sialia mexicana</i>	A, F
Mountain Bluebird	<i>Sialia currucoides</i>	A, F
Townsend's Solitaire	<i>Myadestes townsendi</i>	A, F
Veery	<i>Catharus fuscescens</i>	A, F
Swainson's Thrush	<i>Catharus ustulatus</i>	A, F
Hermit Thrush	<i>Catharus guttatus</i>	A, F
Wood Thrush	<i>Hylocichla mustelina</i>	A, F
American Robin	<i>Turdus migratorius</i>	A, F
Varied Thrush	<i>Ixoreus naevius</i>	A, F
Gray Catbird	<i>Dumetella carolinensis</i>	A, F, S
Curve-billed Thrasher	<i>Toxostoma curvirostre</i>	A, S
Brown Thrasher	<i>Toxostoma rufum</i>	A, F, S
Long-billed Thrasher	<i>Toxostoma longirostre</i>	A
Bendire's Thrasher	<i>Toxostoma bendirei</i>	A, S
California Thrasher	<i>Toxostoma redivivum</i>	A, S
Le Conte's Thrasher	<i>Toxostoma lecontei</i>	A, S
Crissal Thrasher	<i>Toxostoma crissale</i>	A, S
Sage Thrasher	<i>Oreoscoptes montanus</i>	A, S
Northern Mockingbird	<i>Mimus polyglottos</i>	A, F
American Pipit	<i>Anthus rubescens</i>	A
Sprague's Pipit	<i>Anthus spragueii</i>	A, G
Cedar Waxwing	<i>Bombycilla cedrorum</i>	A, F

(continued)

TABLE S1. Continued.

Common name	Scientific name	Guilds
Phainopepla	<i>Phainopepla nitens</i>	A, F, S
Olive Warbler	<i>Peucedramus taeniatus</i>	A, F
Chestnut-collared Longspur	<i>Calcarius ornatus</i>	A, G
McCown's Longspur	<i>Rhynchophanes mccownii</i>	A, G
Ovenbird	<i>Seiurus aurocapilla</i>	A, F
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	A, F
Louisiana Waterthrush	<i>Parkesia motacilla</i>	A, F
Northern Waterthrush	<i>Parkesia noveboracensis</i>	A, F
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	A, F, S
Blue-winged Warbler	<i>Vermivora cyanoptera</i>	A, F, S
Black-and-white Warbler	<i>Mniotilta varia</i>	A, F
Prothonotary Warbler	<i>Protonotaria citrea</i>	A, F
Swainson's Warbler	<i>Limnithlypis swainsonii</i>	A, F
Tennessee Warbler	<i>Oreothlypis peregrina</i>	A, F
Orange-crowned Warbler	<i>Oreothlypis celata</i>	A, F, S
Lucy's Warbler	<i>Oreothlypis luciae</i>	A, F, S
Nashville Warbler	<i>Oreothlypis ruficapilla</i>	A, F, S
Virginia's Warbler	<i>Oreothlypis virginiae</i>	A, F, S
Connecticut Warbler	<i>Oporornis agilis</i>	A, F, S
MacGillivray's Warbler	<i>Geothlypis tolmiei</i>	A, F, S
Mourning Warbler	<i>Geothlypis philadelphia</i>	A, F, S
Kentucky Warbler	<i>Geothlypis formosa</i>	A, F
Common Yellowthroat	<i>Geothlypis trichas</i>	A, F, G, S
Hooded Warbler	<i>Setophaga citrina</i>	A, F
American Redstart	<i>Setophaga ruticilla</i>	A, F
Cape May Warbler	<i>Setophaga tigrina</i>	A, F
Cerulean Warbler	<i>Setophaga cerulea</i>	A, F
Northern Parula	<i>Setophaga americana</i>	A, F
Magnolia Warbler	<i>Setophaga magnolia</i>	A, F
Bay-breasted Warbler	<i>Setophaga castanea</i>	A, F
Blackburnian Warbler	<i>Setophaga fusca</i>	A, F
Yellow Warbler	<i>Setophaga petechia</i>	A, S
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	A, F, S
Blackpoll Warbler	<i>Setophaga striata</i>	A, F
Black-throated Blue Warbler	<i>Setophaga caerulescens</i>	A, F
Palm Warbler	<i>Setophaga palmarum</i>	A, F, S
Pine Warbler	<i>Setophaga pinus</i>	A, F
Yellow-rumped Warbler	<i>Setophaga coronata</i>	A
Yellow-throated Warbler	<i>Setophaga dominica</i>	A, F
Prairie Warbler	<i>Setophaga discolor</i>	A, F, S
Grace's Warbler	<i>Setophaga graciae</i>	A, F
Black-throated Gray Warbler	<i>Setophaga nigrescens</i>	A, F, S
Townsend's Warbler	<i>Setophaga townsendi</i>	A, F
Hermit Warbler	<i>Setophaga occidentalis</i>	A, F
Golden-cheeked Warbler	<i>Setophaga chrysoparia</i>	A
Black-throated Green Warbler	<i>Setophaga virens</i>	A, F
Canada Warbler	<i>Cardellina canadensis</i>	A, F
Wilson's Warbler	<i>Cardellina pusilla</i>	A, F, S
Red-faced Warbler	<i>Cardellina rubrifrons</i>	A, F
Painted Redstart	<i>Myioborus pictus</i>	A
Yellow-breasted Chat	<i>Icteria virens</i>	A, F, S
Olive Sparrow	<i>Arremonops rufivirgatus</i>	A, S
Green-tailed Towhee	<i>Pipilo chlorurus</i>	A, S
Spotted Towhee	<i>Pipilo maculatus</i>	A, F, S
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	A, F, S
Rufous-crowned Sparrow	<i>Aimophila ruficeps</i>	A, S
Canyon Towhee	<i>Melospiza fusca</i>	A, S

(continued)

TABLE S1. Continued.

Common name	Scientific name	Guilds
California Towhee	<i>Melospiza crissalis</i>	A, S
Abert's Towhee	<i>Melospiza aberti</i>	A
Rufous-winged Sparrow	<i>Peucaea carpalis</i>	A, S
Botteri's Sparrow	<i>Peucaea botterii</i>	A, G
Cassin's Sparrow	<i>Peucaea cassinii</i>	A, G
Bachman's Sparrow	<i>Peucaea aestivalis</i>	A, F
American Tree Sparrow	<i>Spizella arborea</i>	A
Chipping Sparrow	<i>Spizella passerina</i>	A, F
Clay-colored Sparrow	<i>Spizella pallida</i>	A, S
Brewer's Sparrow	<i>Spizella breweri</i>	A, S
Field Sparrow	<i>Spizella pusilla</i>	A, S
Black-chinned Sparrow	<i>Spizella atrogularis</i>	A, F, S
Vesper Sparrow	<i>Poocetes gramineus</i>	A, G
Lark Sparrow	<i>Chondestes grammacus</i>	A, G, S
Five-striped Sparrow	<i>Amphispiza quinquestriata</i>	A
Black-throated Sparrow	<i>Amphispiza bilineata</i>	A, S
Unidentified Sagebrush/ Bell's Sparrow	<i>Artemisospiza nevadensis/belli</i>	A, S
Lark Bunting	<i>Calamospiza melanocorys</i>	A, G
Savannah Sparrow	<i>Passerculus sandwichensis</i>	A, G
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	A, G
Baird's Sparrow	<i>Ammodramus bairdii</i>	A, G
Henslow's Sparrow	<i>Ammodramus henslowii</i>	A, G
Le Conte's Sparrow	<i>Ammodramus leconteii</i>	A, G
Nelson's Sparrow	<i>Ammodramus nelsoni</i>	A
Saltmarsh Sparrow	<i>Ammodramus caudacutus</i>	A
Seaside Sparrow	<i>Ammodramus maritimus</i>	A
Fox Sparrow	<i>Passerella iliaca</i>	A, F, S
Song Sparrow	<i>Melospiza melodia</i>	A, F, S
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	A, F, S
Swamp Sparrow	<i>Melospiza georgiana</i>	A
White-throated Sparrow	<i>Zonotrichia albicollis</i>	A, F, S
Harris's Sparrow	<i>Zonotrichia querula</i>	A
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	A, F, S
Dark-eyed Junco	<i>Junco hyemalis</i>	A, F
Yellow-eyed Junco	<i>Junco phaeonotus</i>	A
Hepatic Tanager	<i>Piranga flava</i>	A, F
Summer Tanager	<i>Piranga rubra</i>	A, F
Scarlet Tanager	<i>Piranga olivacea</i>	A, F
Western Tanager	<i>Piranga ludoviciana</i>	A, F

TABLE S1. Continued.

Common name	Scientific name	Guilds
Northern Cardinal	<i>Cardinalis cardinalis</i>	A, F, S
Pyrrhuloxia	<i>Cardinalis sinuatus</i>	A, S
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	A, F
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	A, F
Blue Grosbeak	<i>Passerina caerulea</i>	A, F, S
Lazuli Bunting	<i>Passerina amoena</i>	A, S
Indigo Bunting	<i>Passerina cyanea</i>	A, F, S
Varied Bunting	<i>Passerina versicolor</i>	A, S
Painted Bunting	<i>Passerina ciris</i>	A, F, S
Dickcissel	<i>Spiza americana</i>	A, G
Bobolink	<i>Dolichonyx oryzivorus</i>	A, G
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	A
Tricolored Blackbird	<i>Agelaius tricolor</i>	A
Eastern Meadowlark	<i>Sturnella magna</i>	A, G
Western Meadowlark	<i>Sturnella neglecta</i>	A, G
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	A
Rusty Blackbird	<i>Euphagus carolinus</i>	A
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	A
Common Grackle	<i>Quiscalus quiscula</i>	A, F
Boat-tailed Grackle	<i>Quiscalus major</i>	A
Great-tailed Grackle	<i>Quiscalus mexicanus</i>	A, F
Bronzed Cowbird	<i>Molothrus aeneus</i>	A
Brown-headed Cowbird	<i>Molothrus ater</i>	A, F
Orchard Oriole	<i>Icterus spurius</i>	A, F
Hooded Oriole	<i>Icterus cucullatus</i>	A
Bullock's Oriole	<i>Icterus bullockii</i>	A
Audubon's Oriole	<i>Icterus graduacauda</i>	A, F
Baltimore Oriole	<i>Icterus galbula</i>	A, F
Scott's Oriole	<i>Icterus parisorum</i>	A, S
Pine Grosbeak	<i>Pinicola enucleator</i>	A, F
House Finch	<i>Haemorhous mexicanus</i>	A, F
Purple Finch	<i>Haemorhous purpureus</i>	A, F
Cassin's Finch	<i>Haemorhous cassinii</i>	A, F
Red Crossbill	<i>Loxia curvirostra</i>	A, F
White-winged Crossbill	<i>Loxia leucoptera</i>	A, F
Pine Siskin	<i>Spinus pinus</i>	A, F
Lesser Goldfinch	<i>Spinus psaltria</i>	A, S
Lawrence's Goldfinch	<i>Spinus lawrencei</i>	A, F
American Goldfinch	<i>Spinus tristis</i>	A, S
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	A, F

(continued)

TABLE S2. Land-cover class definitions used in this study, based on the 2001 National Land Cover Database (NLCD) class numbers.

Land-cover class	2001 NLCD class numbers and names
Water	11-Water
Developed	21-Developed, Open Space
	22-Developed, Low Intensity
	23-Developed, Medium Intensity
	24-Developed, High Intensity
Barren	31-Barren Land
Deciduous forest	41-Deciduous Forest
Evergreen forest	42-Evergreen Forest
Mixed forest	43-Mixed Forest
Shrub-scrub	52-Shrub/Scrub
Grassland	71-Grassland/Herbaceous
Pasture	81-Pasture/Hay
Cultivated crops	82-Cultivated Crops
Woody wetland	90-Woody Wetlands
Herbaceous wetland	95-Emergent Herbaceous Wetlands

TABLE S3. Land-cover class definitions used for landscape configuration (habitat core and edge) analysis, based on 2001 National Land Cover Database (NLCD) class numbers.

Land-cover class for core-edge study	NLCD class numbers
Forest	41-Deciduous Forest
	42-Evergreen Forest
	43-Mixed Forest
Shrubland	52-Shrub/Scrub
Grassland	71-Grassland/Herbaceous
	81-Pasture/Hay

TABLE S4. Univariate R^2 values for nationwide models of avian species richness, for all species and by three habitat guilds. Habitat structure variables are classified as representing vertical structure, horizontal composition, or horizontal configuration. Signs indicate the direction of the relationship, and asterisks indicate statistically significant relationships ($***P < 0.001$, $**P < 0.01$, $*P < 0.05$). Values > 0.15 are bold for emphasis.

Variable	Structure type	All species	Habitat association		
			Forest birds	Grassland birds	Shrubland birds
Mean canopy height	Vertical	0.35(+) ***	0.55(+) ***	0.22(-) ***	0.11(+)**
Standard deviation of canopy height	Vertical	0.32(+) ***	0.53(+) ***	0.25(-) ***	0.12(+)**
Coefficient of variation of canopy height	Vertical	0.07(-)**	0.09(-)**	0.03(+)**	0.03(-)**
Log of mean biomass	Vertical	0.36(+) ***	0.55(+) ***	0.23(-) ***	0.12(+)**
Log of standard deviation of biomass	Vertical	0.23(+) ***	0.35(+) ***	0.14(-)**	0.07(+)**
Coefficient of variation of biomass	Vertical	0.07(-)**	0.10(-)**	0.03(+)**	0.03(-)**
Proportion water	Horizontal composition	0.00(+)*	0.01(+)**	0.01(-)**	0.00(-)
Proportion developed	Horizontal composition	0.00(-)*	0.02(-)**	0.02(-)**	0.00(+)**
Proportion barren	Horizontal composition	0.05(+)**	0.05(+)**	0.00(-)**	0.01(+)**
Proportion deciduous forest	Horizontal composition	0.25(+) ***	0.34(+) ***	0.06(-)**	0.10(+)**
Proportion evergreen forest	Horizontal composition	0.03(+)**	0.06(+)**	0.15(-) ***	0.00(+)
Proportion mixed forest	Horizontal composition	0.08(+)**	0.13(+)**	0.08(-)**	0.00(+)**
Proportion scrub-shrub	Horizontal composition	0.12(-)**	0.25(-) ***	0.00(+)**	0.00(+)**
Proportion grassland	Horizontal composition	0.09(-)**	0.16(-) ***	0.20(+) ***	0.09(-)
Proportion pasture	Horizontal composition	0.03(+)**	0.05(+)**	0.00(-)**	0.02(+)**
Proportion cultivated crops	Horizontal composition	0.02(-)**	0.03(-)**	0.18(+) ***	0.03(-)**
Proportion woody wetland	Horizontal composition	0.00(+)**	0.03(+)**	0.05(-)**	0.00(-)**
Proportion herbaceous wetland	Horizontal composition	0.01(-)**	0.01(-)**	0.00(+)**	0.02(-)**
Number of land cover classes	Horizontal composition	0.12(+)**	0.15(+) ***	0.01(-)	0.01(+)**
Shannon diversity of land cover classes	Horizontal composition	0.13(+)**	0.23(+) ***	0.06(-)**	0.02(+)**
Forest core area	Horizontal configuration	0.17(+) ***	0.26(+) ***	0.18(-) ***	0.03(+)**
Forest edge area	Horizontal configuration	0.35(+) ***	0.54(+) ***	0.28(-) ***	0.12(+)**
Shrubland core area	Horizontal configuration	0.12(-)**	0.22(-) ***	0.00(+)**	0.00(+)**
Shrubland edge area	Horizontal configuration	0.05(-)**	0.12(-)**	0.00(+)	0.00(+)
Grassland core area	Horizontal configuration	0.07(-)**	0.11(-)**	0.20(+) ***	0.08(-)
Grassland edge area	Horizontal configuration	0.01(-)**	0.00(-)**	0.04(+)**	0.00(+)**

TABLE S5. Independent contribution of explanatory variables in models of avian species richness, as calculated by hierarchical partitioning. Within each study area (Conterminous United States, Eastern Broadleaf Forest, Central Appalachian Broadleaf Forest, and Great Plains–Palouse Dry Steppe), models were fit for all birds, forest birds, grassland birds, and shrubland birds. Each column represents a single model, with entries corresponding to the independent contribution of an individual variable, which sum to 100 for each model. Variables marked with “-” were excluded from models on the basis of earlier analysis (see text). Asterisks indicate statistically significant variables (*** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$).

Ecoregion	Conterminous United States				Eastern Broadleaf				Appalachian Broadleaf				Great Plains			
	All	Forest	Grass	Shrub	All	Forest	Grass	Shrub	All	Forest	Grass	Shrub	All	Forest	Grass	Shrub
Vertical structure																
Mean canopy height	17.1***	16.7***	13.1**	14.4***	26.6**	35.3***	34.9***	23.2*	9.4	15.1*	18.8	5.7	-	-	-	-
SD of canopy height	15.1***	16.3***	14.6***	14.7***	21.3**	22.4***	16.9	27.4***	3.3	4.4	3.6	60.3	18.6**	26.2***	14.6*	10.8
Mean biomass	-	-	-	-	-	-	-	-	-	-	-	-	7.1	14.0	19.1	4.1
SD of biomass	-	-	-	-	-	-	-	-	15.2*	8.1	28.0	0.4	-	-	-	-
CV of biomass	-	-	-	-	3.5	9.3*	12.1**	16.0**	-	-	-	-	8.6	6.5	3.7	10.7*
Horizontal composition																
Proportion barren	4.5***	3.7***	3.3**	4.8***	-	-	-	-	-	-	-	-	-	-	-	-
Proportion cultivated crops	3.6***	3.5**	12.3***	5.8***	-	-	-	-	10.8	5.6	18.1	8.9	8.5	7.4	5.6**	7.3
Proportion deciduous forest	12.7***	11.0***	5.4***	13.4***	-	-	-	-	-	-	-	-	10.2	9.4*	4.9**	10.1
Proportion evergreen forest	-	-	-	-	6.8	8.8	6.1	8.6	-	-	-	-	-	-	-	-
Proportion mixed forest	5.1***	5.3***	6.3***	3.6	1.9	2.6	4.4	2.0	-	-	-	-	-	-	-	-
Proportion developed	-	-	-	-	30.3***	15.0***	8.6***	12.0***	43.0***	50.6***	2.6	18.0*	4.5	4.7	7.7	4.7
Proportion herbaceous wetland	-	-	-	-	2.9*	1.1	10.4*	2.9	-	-	-	-	-	-	-	-
Proportion woody wetland	2.6	3.0**	5.3**	4.4	-	-	-	-	-	-	-	-	-	-	-	-
Proportion open water	-	-	-	-	-	-	-	-	-	-	-	-	4.5	3.0	8.6**	7.3*
Proportion pasture	-	-	-	-	3.9	3.7	4.2**	4.9	-	-	-	-	-	-	-	-
Proportion scrub-shrub	-	-	-	-	-	-	-	-	9.8	4.6	12.0	2.0**	4.5	4.3	9.6	6.6
Number of land-cover classes	6.6**	5.7	3.5***	4.0	2.8	1.9*	2.5**	3.1**	6.2	8.5*	8.0	0.7	10.2	8.2	3.7	6.6
Division of land-cover classes	-	-	-	-	-	-	-	-	2.3*	3.1	9.0*	4.0	13.7**	7.3	7.4***	19.2**
Horizontal configuration																
Forest edge	16.7***	16.5***	15.8	14.2*	-	-	-	-	-	-	-	-	-	-	-	-
Shrubland core	6.7**	7.7*	3.8	5.4***	-	-	-	-	-	-	-	-	-	-	-	-
Shrubland edge	4.1***	5.3	3.2***	4.0***	-	-	-	-	-	-	-	-	-	-	-	-
Grassland core	5.2**	5.3	13.2***	11.4*	-	-	-	-	-	-	-	-	4.5	5.7	9.5***	4.9
Grassland edge	-	-	-	-	-	-	-	-	-	-	-	-	5.2	3.4	5.7***	7.7
Model-adjusted R^2	0.46	0.70	0.48	0.27	0.27	0.47	0.42	0.37	0.14	0.16	0.29	0.08	0.48	0.57	0.63	0.40