

## Appendix 2

Evaluating trade-offs in spatial versus temporal replication when estimating avian community composition and predicting species distributions

**Table A2.1.** Common and scientific names of all species used in species accumulation analyses. The subset of species included in species distribution models is indicated by a yes in the SDM column. Species appear in taxonomic order.

Species Code	Common Name	Scientific Name	SDM
WISN	Wilson's Snipe	<i>Gallinago delicata</i>	Yes
MODO	Mourning Dove	<i>Zenaida macroura</i>	
BBCU	Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	
HAWO	Hairy Woodpecker	<i>Dryobates villosus</i>	
DOWO	Downy Woodpecker	<i>Dryobates pubescens</i>	
BBWO	Black-backed Woodpecker	<i>Picoides arcticus</i>	Yes
ATTW	American Three-toed Woodpecker	<i>Picoides dorsalis</i>	
YBSA	Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	Yes
UNSA	Unidentified Sapsucker	<i>Sphyrapicus sp.</i>	
PIWO	Pileated Woodpecker	<i>Dryocopus pileatus</i>	Yes
NOFL	Northern Flicker	<i>Colaptes auratus</i>	Yes
EWPW	Eastern Whip-poor-will	<i>Antrostomus vociferus</i>	
CONI	Common Nighthawk	<i>Chordeiles minor</i>	
EAKI	Eastern Kingbird	<i>Tyrannus tyrannus</i>	
GCFL	Great Crested Flycatcher	<i>Myiarchus crinitus</i>	
EAPH	Eastern Phoebe	<i>Sayornis phoebe</i>	
OSFL	Olive-sided Flycatcher	<i>Contopus cooperi</i>	Yes
WEWP	Western Wood-Pewee	<i>Contopus sordidulus</i>	
YBFL	Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	Yes
ALFL	Alder Flycatcher	<i>Empidonax alnorum</i>	Yes
LEFL	Least Flycatcher	<i>Empidonax minimus</i>	Yes
HOLA	Horned Lark	<i>Eremophila alpestris</i>	
BLJA	Blue Jay	<i>Cyanocitta cristata</i>	Yes
GRAJ	Canada Jay	<i>Perisoreus canadensis</i>	Yes
BHCO	Brown-headed Cowbird	<i>Molothrus ater</i>	
YHBL	Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	
RWBL	Red-winged Blackbird	<i>Agelaius phoeniceus</i>	
WEME	Western Meadowlark	<i>Sturnella neglecta</i>	
BAOR	Baltimore Oriole	<i>Icterus galbula</i>	
RUBL	Rusty Blackbird	<i>Euphagus carolinus</i>	

COGR	Common Grackle	<i>Quiscalus quiscula</i>	
PIGR	Pine Grosbeak	<i>Pinicola enucleator</i>	
PUFI	Purple Finch	<i>Haemorhous purpureus</i>	
HORE	Hoary Redpoll	<i>Acanthis hornemanni</i>	
CORE	Common Redpoll	<i>Acanthis flammea</i>	
AMGO	American Goldfinch	<i>Spinus tristis</i>	
LALO	Lapland Longspur	<i>Calcarius lapponicus</i>	
SMLO	Smith's Longspur	<i>Calcarius pictus</i>	
SAVS	Savannah Sparrow	<i>Passerculus sandwichensis</i>	
LCSP	LeConte's Sparrow	<i>Ammospiza leconteii</i>	Yes
NESP	Nelson's Sparrow	<i>Ammospiza nelsoni</i>	
HASP	Harris's Sparrow	<i>Zonotrichia querula</i>	
WCSP	White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	
WTSP	White-throated Sparrow	<i>Zonotrichia albicollis</i>	Yes
ATSP	American Tree Sparrow	<i>Spizelloides arborea</i>	
CHSP	Chipping Sparrow	<i>Spizella passerina</i>	Yes
CCSP	Clay-colored Sparrow	<i>Spizella pallida</i>	
DEJU	Dark-eyed Junco	<i>Junco hyemalis</i>	Yes
SOSP	Song Sparrow	<i>Melospiza melodia</i>	Yes
LISP	Lincoln's Sparrow	<i>Melospiza lincolni</i>	Yes
SWSP	Swamp Sparrow	<i>Melospiza georgiana</i>	Yes
FOSP	Fox Sparrow	<i>Passerella iliaca</i>	
SPTO	Spotted Towhee	<i>Pipilo maculatus</i>	
RBGR	Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	Yes
WETA	Western Tanager	<i>Piranga ludoviciana</i>	
SCTA	Scarlet Tanager	<i>Piranga olivacea</i>	
BOWA	Bohemian Waxwing	<i>Bombycilla garrulus</i>	
CEDW	Cedar Waxwing	<i>Bombycilla cedrorum</i>	Yes
REVI	Red-eyed Vireo	<i>Vireo olivaceus</i>	Yes
PHVI	Philadelphia Vireo	<i>Vireo philadelphicus</i>	Yes
WAVI	Warbling Vireo	<i>Vireo gilvus</i>	
BHVI	Blue-headed Vireo	<i>Vireo solitarius</i>	Yes
BAWW	Black-and-white Warbler	<i>Mniotilta varia</i>	Yes
NAWA	Nashville Warbler	<i>Leiothlypis ruficapilla</i>	Yes
OCWA	Orange-crowned Warbler	<i>Leiothlypis celata</i>	Yes
TEWA	Tennessee Warbler	<i>Leiothlypis peregrina</i>	Yes
CMWA	Cape May Warbler	<i>Setophaga tigrina</i>	
YEWA	Yellow Warbler	<i>Setophaga petechia</i>	Yes
YRWA	Yellow-rumped Warbler	<i>Setophaga coronata</i>	Yes

MAWA	Magnolia Warbler	<i>Setophaga magnolia</i>	Yes
CSWA	Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	Yes
BBWA	Bay-breasted Warbler	<i>Setophaga castanea</i>	
BLPW	Blackpoll Warbler	<i>Setophaga striata</i>	
BLBW	Blackburnian Warbler	<i>Setophaga fusca</i>	
BTNW	Black-throated Green Warbler	<i>Setophaga virens</i>	
PAWA	Palm Warbler	<i>Setophaga palmarum</i>	Yes
OVEN	Ovenbird	<i>Seiurus aurocapilla</i>	Yes
NOWA	Northern Waterthrush	<i>Parkesia noveboracensis</i>	
CONW	Connecticut Warbler	<i>Oporornis agilis</i>	Yes
MOWA	Mourning Warbler	<i>Geothlypis philadelphia</i>	Yes
COYE	Common Yellowthroat	<i>Geothlypis trichas</i>	Yes
WIWA	Wilson's Warbler	<i>Cardellina pusilla</i>	Yes
CAWA	Canada Warbler	<i>Cardellina canadensis</i>	
AMRE	American Redstart	<i>Setophaga ruticilla</i>	Yes
AMPI	American Pipit	<i>Anthus rubescens</i>	
GRCA	Gray Catbird	<i>Dumetella carolinensis</i>	
BRTH	Brown Thrasher	<i>Toxostoma rufum</i>	
HOWR	House Wren	<i>Troglodytes aedon</i>	
WIWR	Winter Wren	<i>Troglodytes hiemalis</i>	Yes
SEWR	Sedge Wren	<i>Cistothorus platensis</i>	
MAWR	Marsh Wren	<i>Cistothorus palustris</i>	
BRCR	Brown Creeper	<i>Certhia americana</i>	Yes
WBNU	White-breasted Nuthatch	<i>Sitta carolinensis</i>	
RBNU	Red-breasted Nuthatch	<i>Sitta canadensis</i>	Yes
BCCH	Black-capped Chickadee	<i>Poecile atricapillus</i>	Yes
BOCH	Boreal Chickadee	<i>Poecile hudsonicus</i>	Yes
GCKI	Golden-crowned Kinglet	<i>Regulus satrapa</i>	Yes
RCKI	Ruby-crowned Kinglet	<i>Regulus calendula</i>	Yes
VEER	Veery	<i>Catharus fuscescens</i>	
GCTH	Gray-cheeked Thrush	<i>Catharus minimus</i>	
SWTH	Swainson's Thrush	<i>Catharus ustulatus</i>	Yes
HETH	Hermit Thrush	<i>Catharus guttatus</i>	Yes
AMRO	American Robin	<i>Turdus migratorius</i>	Yes
EABL	Eastern Bluebird	<i>Sialia sialis</i>	

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**Table A2.2.** Model summary for generalized additive model fit to mean (across species) log(Brier score) estimates from 500 bootstrap simulations for each combination of number of primary (nPSU) and secondary sample units (nSSU) and temporal replicates (nvisit; see Methods). EDF refers to the effective degrees of freedom Ref df is the reference degrees of freedom and are estimated within the model. Smoother terms included a tensor spline with four basis functions fit to the interaction between nPSU, nSSU and nvisit, in addition to a random effect fit to a factor for bootstrap iteration.

Parameter Estimates				
<i>Parameteric Terms</i>	$\beta$	SE	t-value	p-value
Intercept	2.69	$1.99 \times 10^{-3}$	-1349.00	< 0.001
<i>Smoother terms</i>	EDF	Ref df	F	p-value
te(nPSU, nSSU, nvisit)	62.44	62.99	11257.10	< 0.001
s(bootstrap iteration)	485.33	499.00	35.50	< 0.001