

Ecography

**ECOG-02937**

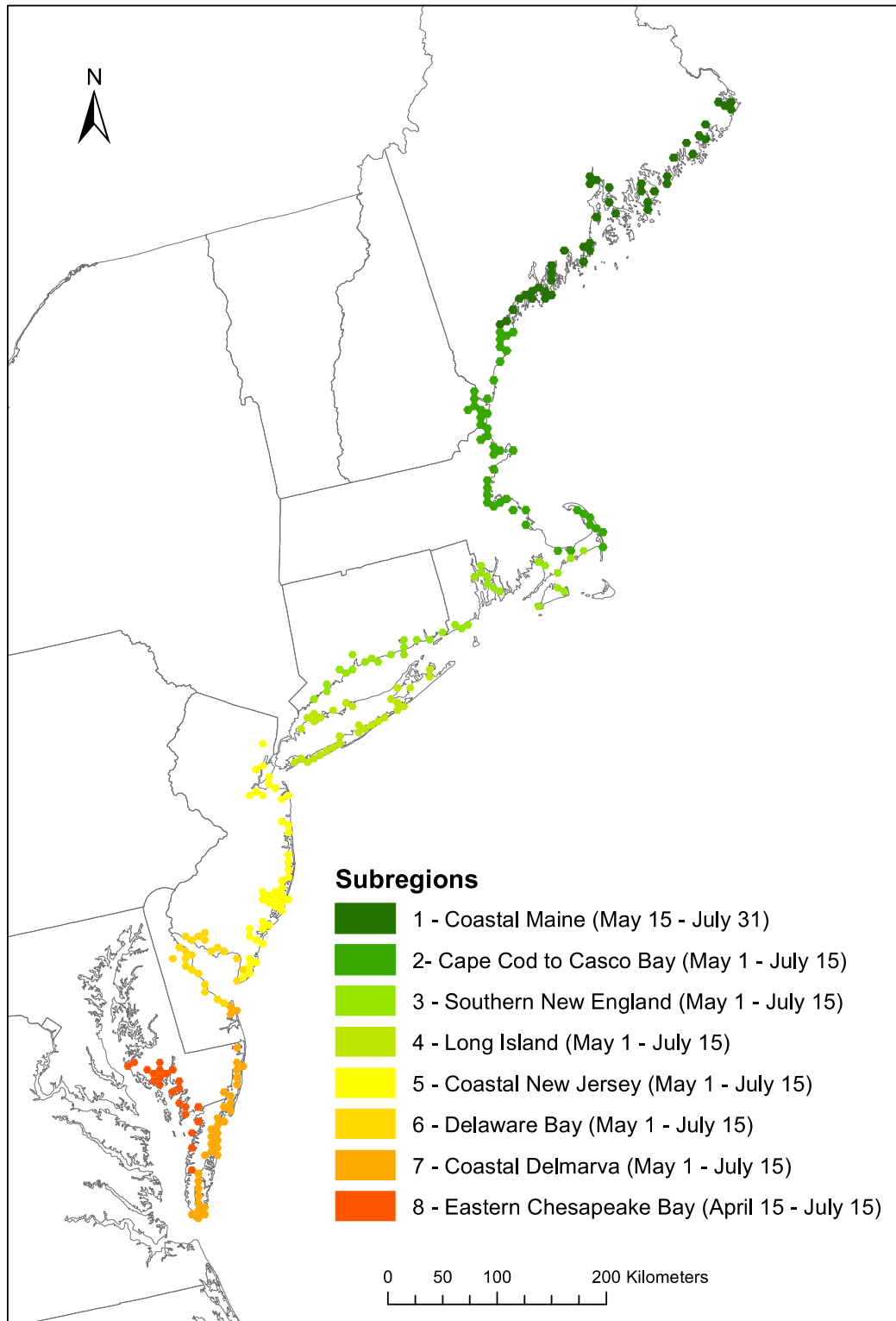
Correll, M. D., Wiest, W. A., Hodgman, T. P., Kelley, J. P., McGill, B. J., Elphick, C. S., Shriver, W. G., Conway, M., Field, C. R. and Olsen, B. J. 2017. A Pleistocene disturbance event describes modern diversity patterns in tidal marsh birds. – *Ecography* doi: 10.1111/ecog.02937

**Supplementary material**

## Appendix 1: Geomorphological processes of tidal marsh establishment after the Last Glacial Maximum (LGM)

The formation and persistence of tidal marshes can only occur in a relatively small window of environmental conditions, and is largely contingent on the local rate of sea-level rise in an area (Bertness 2007). Local rates of sea-level rise entered this window in the Chesapeake Bay, Virginia fairly soon after the LGM ~20,000 ya, facilitating the establishment of tidal marsh communities during this time period. At the same time, marshes in New England were still covered in ice (Boulton and Clark 1990). Deglaciation did not occur in Maine, the northernmost part of our study area, until ~15,000 ya (Ridge et al. 2012), after which large fluctuations in sea levels driven largely by isostatic rebound prevented the formation of tidal marsh communities until ~7,000 ya (Engelhart et al. 2011, Engelhart and Horton 2012).

Appendix 2. Primary Sampling Units surveyed 2011 – 2014, labeled by biological subregion based on watersheds and geomorphic features on the landscape (Weist et al



2016). Each subregion indicated the survey period used by observers for tidal marsh bird surveys.

Appendix 3. Species list and Marsh Specialization Index (MSI) values for point counts conducted in coastal marshes from Maine to Virginia 2011 – 2014. The “LGM” column indicates if a species was detected in marshes under ice during the Last Glacial Maximum (LGM, denoted “N”), in marshes south of the LGM (denoted “S”), or both (denoted “NS”).

<b>BBL Code</b>	<b>Common Name</b>	<b>Latin Name</b>	<b>MSI</b>	<b>LGM</b>
ACFL	Acadian Flycatcher	<i>Empidonax virescens</i>	NA	S
ALFL	Alder Flycatcher	<i>Empidonax alnorum</i>	0.64	NS
AMBI	American Bittern	<i>Botaurus lentiginosus</i>	NA	S
ABDU	American Black Duck	<i>Anas rubripes</i>	0.98	NS
AMCR	American Crow	<i>Corvus brachyrhynchos</i>	0.15	NS
AMGO	American Goldfinch	<i>Spinus tristis</i>	0.23	NS
AMKE	American Kestrel	<i>Falco sparverius</i>	NA	N
AMOY	American Oystercatcher	<i>Haematopus palliatus</i>	1	NS
AMRO	American Robin	<i>Turdus migratorius</i>	0.04	NS
BAEA	Bald Eagle	<i>Haliaeetus leucocephalus</i>	0.74	NS
BAOR	Baltimore Oriole	<i>Icterus galbula</i>	0.05	NS
BANS	Bank Swallow	<i>Riparia riparia</i>	0.48	NS
BARS	Barn Swallow	<i>Hirundo rustica</i>	0.65	NS
BEKI	Belted Kingfisher	<i>Megaceryle alcyon</i>	0.66	NS
BLSK	Black Skimmer	<i>Rynchops niger</i>	0.98	NS
BBPL	Black-bellied Plover	<i>Pluvialis squatarola</i>	1	NS
BCCH	Black-capped Chickadee	<i>Poecile atricapillus</i>	0.05	N
BCNH	Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	0.95	NS
BNST	Black-necked Stilt	<i>Himantopus mexicanus</i>	0.85	S
BTNW	Black-throated Green Warbler	<i>Setophaga virens</i>	NA	N
BLPW	Blackpoll Warbler	<i>Setophaga striata</i>	NA	N
BLGR	Blue Grosbeak	<i>Passerina caerulea</i>	0.07	S
BLJA	Blue Jay	<i>Cyanocitta cristata</i>	0.04	NS
BGGN	Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	NA	NS
BTGR	Boat-tailed Grackle	<i>Quiscalus major</i>	0.95	NS
BOBO	Bobolink	<i>Dolichonyx oryzivorus</i>	0.46	NS
BRPE	Brown Pelican	<i>Pelecanus occidentalis</i>	NA	S
BRTH	Brown Thrasher	<i>Toxostoma rufum</i>	NA	NS
BHCO	Brown-headed Cowbird	<i>Molothrus ater</i>	0.16	NS
BHNU	Brown-headed Nuthatch	<i>Sitta pusilla</i>	NA	S
CANG	Canada Goose	<i>Branta canadensis</i>	0.73	NS
CACH	Carolina Chickadee	<i>Poecile carolinensis</i>	NA	S

## Appendix 3 continued

<b>BBL Code</b>	<b>Common Name</b>	<b>Latin Name</b>	<b>MSI</b>	<b>LGM</b>
CARW	Carolina Wren	<i>Thryothorus ludovicianus</i>	0.05	NS
CATE	Caspian Tern	<i>Hydroprogne caspia</i>	NA	S
CAEG	Cattle Egret	<i>Bubulcus ibis</i>	NA	S
CEDW	Cedar Waxwing	<i>Bombycilla cedrorum</i>	0.05	NS
CSWA	Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	NA	N
CHSW	Chimney Swift	<i>Chaetura pelagica</i>	0.1	NS
CHSP	Chipping Sparrow	<i>Spizella passerina</i>	0.01	NS
CLRA	Clapper Rail	<i>Rallus crepitans</i>	0.99	NS
CLSW	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	0.18	NS
COEI	Common Eider	<i>Somateria mollissima</i>	0.86	N
COGR	Common Grackle	<i>Quiscalus quiscula</i>	0.25	NS
COLO	Common Loon	<i>Gavia immer</i>	NA	N
COMO	Common Moorhen	<i>Gallinula chloropus</i>	NA	S
CORA	Common Raven	<i>Corvus corax</i>	NA	N
COTE	Common Tern	<i>Sterna hirundo</i>	0.99	NS
COYE	Common Yellowthroat	<i>Geothlypis trichas</i>	0.61	NS
COHA	Cooper's Hawk	<i>Accipiter cooperii</i>	NA	N
DEJU	Dark-eyed Junco	<i>Junco hyemalis</i>	0.4	N
DCCO	Double-crested Cormorant	<i>Phalacrocorax auritus</i>	0.94	NS
DOWO	Downy Woodpecker	<i>Picoides pubescens</i>	NA	NS
DUNL	Dunlin	<i>Calidris alpina</i>	1	NS
EABL	Eastern Bluebird	<i>Sialia sialis</i>	NA	NS
EAKI	Eastern Kingbird	<i>Tyrannus tyrannus</i>	0.36	NS
EAME	Eastern Meadowlark	<i>Sturnella magna</i>	0.21	S
EAPH	Eastern Phoebe	<i>Sayornis phoebe</i>	0.09	NS
EATO	Eastern Towhee	<i>Pipilo erythrophthalmus</i>	0.06	NS
EAWP	Eastern Wood-Pewee	<i>Contopus virens</i>	0.03	NS
EUST	European Starling	<i>Sturnus vulgaris</i>	0.21	NS
FISP	Field Sparrow	<i>Spizella pusilla</i>	NA	NS
FICR	Fish Crow	<i>Corvus ossifragus</i>	0.3	NS
FOTE	Forster's Tern	<i>Sterna forsteri</i>	0.97	NS
GADW	Gadwall	<i>Anas strepera</i>	NA	N
GLIB	Glossy Ibis	<i>Plegadis falcinellus</i>	0.93	NS
GRSP	Grasshopper Sparrow	<i>Ammodramus savannarum</i>	NA	NS
GRCA	Gray Catbird	<i>Dumetella carolinensis</i>	0.11	NS
GBBG	Great Black-backed Gull	<i>Larus marinus</i>	0.95	NS
GBHE	Great Blue Heron	<i>Ardea herodias</i>	0.76	NS
GCFL	Great Crested Flycatcher	<i>Myiarchus crinitus</i>	NA	NS
GREG	Great Egret	<i>Ardea alba</i>	0.97	NS
GRYE	Greater Yellowlegs	<i>Tringa melanoleuca</i>	1	NS
GRHE	Green Heron	<i>Butorides virescens</i>	0.62	NS
GWTE	Green-winged Teal	<i>Anas crecca</i>	NA	N

<b>BBL Code</b>	<b>Common Name</b>	<b>Latin Name</b>	<b>MSI</b>	<b>LGM</b>
HAWO	Hairy Woodpecker	<i>Picoides villosus</i>	NA	N
HETH	Hermit Thrush	<i>Catharus guttatus</i>	NA	N
HERG	Herring Gull	<i>Larus argentatus</i>	0.93	NS
HOLA	Horned Lark	<i>Eremophila alpestris</i>	NA	N
HOFI	House Finch	<i>Haemorhous mexicanus</i>	0.09	NS
HOSP	House Sparrow	<i>Passer domesticus</i>	0.09	NS
HOWR	House Wren	<i>Troglodytes aedon</i>	0.1	NS
INBU	Indigo Bunting	<i>Passerina cyanea</i>	0.02	NS
KILL	Killdeer	<i>Charadrius vociferus</i>	0.33	NS
KIRA	King Rail	<i>Rallus elegans</i>	NA	S
LAGU	Laughing Gull	<i>Leucophaeus atricilla</i>	0.89	NS
LEBI	Least Bittern	<i>Ixobrychus exilis</i>	0.87	NS
LEFL	Least Flycatcher	<i>Empidonax minimus</i>	NA	N
LESA	Least Sandpiper	<i>Calidris minutilla</i>	1	NS
LETE	Least Tern	<i>Sternula antillarum</i>	0.99	NS
LEYE	Lesser Yellowlegs	<i>Tringa flavipes</i>	1	NS
LBHE	Little Blue Heron	<i>Egretta caerulea</i>	0.96	NS
MALL	Mallard	<i>Anas platyrhynchos</i>	0.85	NS
MAGO	Marbled Godwit	<i>Limosa fedoa</i>	NA	S
MAWR	Marsh Wren	<i>Cistothorus palustris</i>	0.99	NS
MODO	Mourning Dove	<i>Zenaida macroura</i>	0.07	NS
MUSW	Mute Swan	<i>Cygnus olor</i>	0.96	NS
NESP	Nelson's Sparrow	<i>Ammodramus nelsoni</i>	1	NS
NOBO	Northern Bobwhite	<i>Colinus virginianus</i>	NA	N
NOCA	Northern Cardinal	<i>Cardinalis cardinalis</i>	0.04	NS
NOFL	Northern Flicker	<i>Colaptes auratus</i>	0.08	NS
NOHA	Northern Harrier	<i>Circus cyaneus</i>	NA	NS
NOMO	Northern Mockingbird	<i>Mimus polyglottos</i>	0.09	NS
NOPA	Northern Parula	<i>Setophaga americana</i>	0.07	NS
NRWS	Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	0.45	NS
OROR	Orchard Oriole	<i>Icterus spurius</i>	0.18	NS
OSPR	Osprey	<i>Pandion haliaetus</i>	0.91	NS
OVEN	Ovenbird	<i>Seiurus aurocapilla</i>	NA	N
PAWA	Palm Warbler	<i>Setophaga palmarum</i>	NA	S
PESA	Pectoral Sandpiper	<i>Calidris melanotos</i>	NA	NS
PEFA	Peregrine Falcon	<i>Falco peregrinus</i>	NA	NS
PBGR	Pied-billed Grebe	<i>Podilymbus podiceps</i>	NA	N
PIWO	Pileated Woodpecker	<i>Dryocopus pileatus</i>	NA	N
PIWA	Pine Warbler	<i>Setophaga pinus</i>	NA	NS
PIPL	Piping Plover	<i>Charadrius melodus</i>	NA	N

Appendix 3 continued

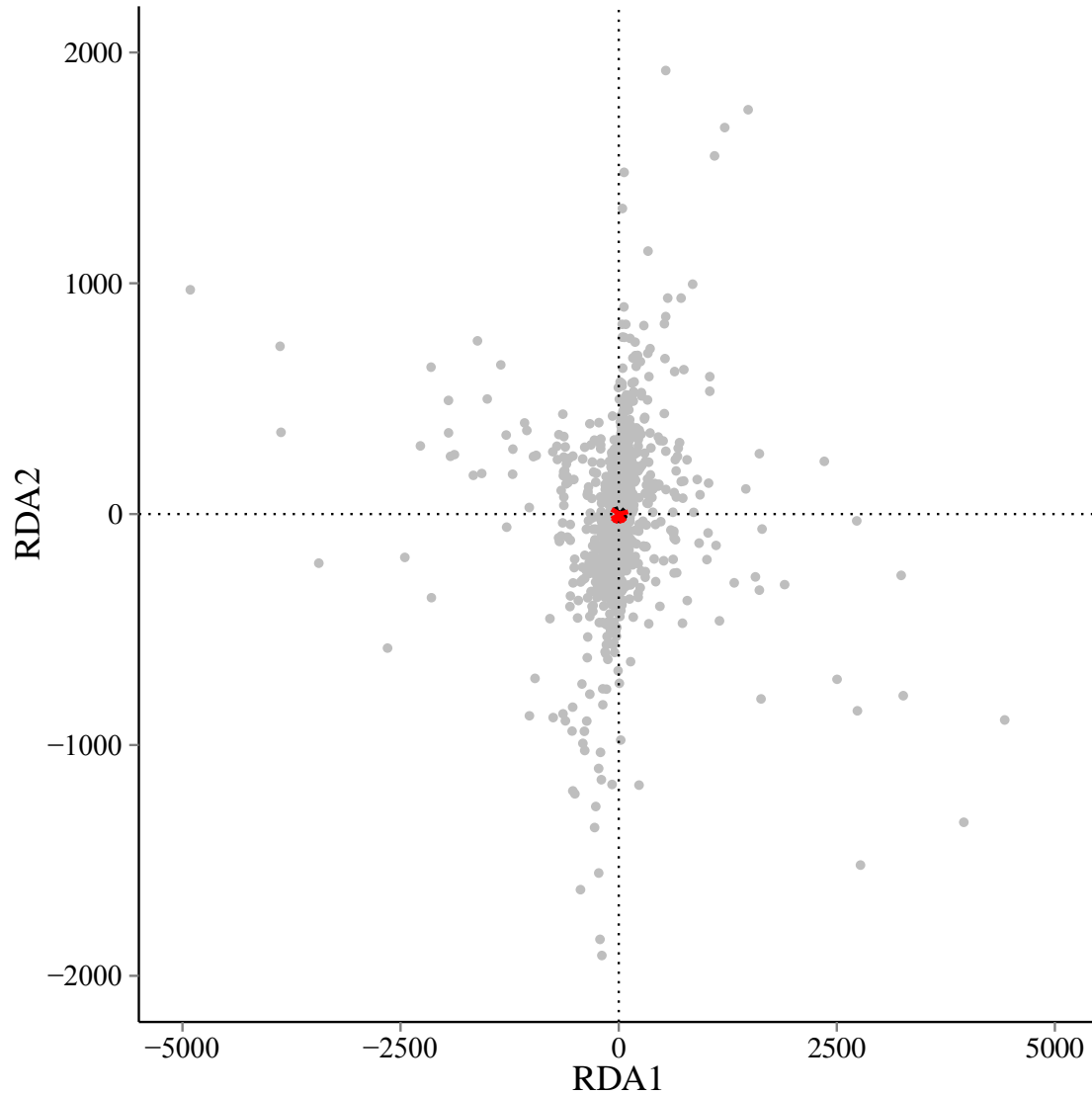
<b>BBL Code</b>	<b>Common Name</b>	<b>Latin Name</b>	<b>MSI</b>	<b>LGM</b>
PRAW	Prairie Warbler	<i>Setophaga discolor</i>	NA	NS
PUFI	Purple Finch	<i>Haemorhous purpureus</i>	NA	N
PUMA	Purple Martin	<i>Progne subis</i>	0.29	NS
REKN	Red Knot	<i>Calidris canutus</i>	1	NS
RBWO	Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	NA	NS
RBME	Red-breasted Merganser	<i>Mergus serrator</i>	1	N
RBNU	Red-breasted Nuthatch	<i>Sitta canadensis</i>	NA	N
REVI	Red-eyed Vireo	<i>Vireo olivaceus</i>	NA	NS
RTHA	Red-tailed Hawk	<i>Buteo jamaicensis</i>	0.4	NS
RTLO	Red-throated Loon	<i>Gavia stellata</i>	NA	N
RWBL	Red-winged Blackbird	<i>Agelaius phoeniceus</i>	0.86	NS
RBGU	Ring-billed Gull	<i>Larus delawarensis</i>	0.85	NS
ROPI	Rock Pigeon	<i>Columba livia</i>	NA	N
ROST	Roseate Tern	<i>Sterna dougallii</i>	NA	NS
ROYT	Royal Tern	<i>Thalasseus maximus</i>	NA	NS
RTHU	Ruby-throated Hummingbird	<i>Archilochus colubris</i>	NA	NS
RUTU	Ruddy Turnstone	<i>Arenaria interpres</i>	1	NS
SALS	Saltmarsh Sparrow	<i>Ammodramus caudacutus</i>	1	NS
SAND	Sanderling	<i>Calidris alba</i>	1	NS
SAVS	Savannah Sparrow	<i>Passerculus sandwichensis</i>	0.76	NS
SCTA	Scarlet Tanager	<i>Piranga olivacea</i>	NA	N
SESP	Seaside Sparrow	<i>Ammodramus maritimus</i>	0.99	NS
SEWR	Sedge Wren	<i>Cistothorus platensis</i>	NA	S
SEPL	Semipalmated Plover	<i>Charadrius semipalmatus</i>	1	NS
SESA	Semipalmated Sandpiper	<i>Calidris pusilla</i>	1	NS
SSHA	Sharp-shinned Hawk	<i>Accipiter striatus</i>	NA	NS
SBDO	Short-billed Dowitcher	<i>Limnodromus griseus</i>	1	NS
SNGO	Snow Goose	<i>Chen caerulescens</i>	NA	N
SNEG	Snowy Egret	<i>Egretta thula</i>	0.98	NS
SOSA	Solitary Sandpiper	<i>Tringa solitaria</i>	NA	N
SOSP	Song Sparrow	<i>Melospiza melodia</i>	0.72	NS
SORA	Sora	<i>Porzana carolina</i>	NA	S
SPSA	Spotted Sandpiper	<i>Actitis macularius</i>	1	NS
SUTA	Summer Tanager	<i>Piranga rubra</i>	NA	S
SWSP	Swamp Sparrow	<i>Melospiza georgiana</i>	0.83	NS
TRES	Tree Swallow	<i>Tachycineta bicolor</i>	0.83	NS
TRHE	Tricolored Heron	<i>Egretta tricolor</i>	1	NS
TUTI	Tufted Titmouse	<i>Baeolophus bicolor</i>	0.01	NS
TUVU	Turkey Vulture	<i>Cathartes aura</i>	0.04	NS



Appendix 3 continued

<b>BBL Code</b>	<b>Common Name</b>	<b>Latin Name</b>	<b>MSI</b>	<b>LGM</b>
VIRA	Virginia Rail	<i>Rallus limicola</i>	0.96	NS
WAVI	Warbling Vireo	<i>Vireo gilvus</i>	NA	N
WHIM	Whimbrel	<i>Numenius phaeopus</i>	1	S
WHIB	White Ibis	<i>Eudocimus albus</i>	1	S
WBNU	White-breasted Nuthatch	<i>Sitta carolinensis</i>	NA	N
WEVI	White-eyed Vireo	<i>Vireo griseus</i>	NA	NS
WRSA	White-rumped Sandpiper	<i>Calidris fuscicollis</i>	NA	S
WTSP	White-throated Sparrow	<i>Zonotrichia albicollis</i>	NA	N
WITU	Wild Turkey	<i>Meleagris gallopavo</i>	NA	N
WILL	Willet	<i>Tringa semipalmata</i>	0.98	NS
WIFL	Willow Flycatcher	<i>Empidonax traillii</i>	0.68	NS
WODU	Wood Duck	<i>Aix sponsa</i>	NA	NS
WOTH	Wood Thrush	<i>Hylocichla mustelina</i>	NA	N
YEWA	Yellow Warbler	<i>Setophaga petechia</i>	0.69	NS
YBCH	Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	NA	S
YCNH	Yellow-crowned Night-Heron	<i>Nyctanassa violacea</i>	1	NS
YRWA	Yellow-rumped Warbler	<i>Setophaga coronata</i>	NA	NS
YTWA	Yellow-throated Warbler	<i>Setophaga dominica</i>	NA	S

Appendix 4. Results of a redundancy analysis modeling change in rarefied richness, evenness, total number of individuals (N), and total biomass supported before (2011 – 2012) and after (2013 – 2014) Hurricane Sandy by degree of storm surge experienced during the hurricane (adjusted  $R^2 = <0.001$ ).



Appendix 5. Table of Community Habitat Specialism Index (CHSI) of coastal marshes by latitude, organized by marsh patch.

<b>Patch ID</b>	<b>CHSI</b>	<b>Latitude</b>	<b>Patch ID</b>	<b>CHSI</b>	<b>Latitude</b>
1287	0.900	37.2759	8572	0.913	39.0712
2556	0.740	37.1256	8724	0.764	39.2335
2941	0.950	37.5991	8751	0.761	39.1704
2994	0.964	37.6099	8878	0.923	39.0842
3102	0.906	37.5850	8906	0.923	39.2986
3146	0.965	37.6885	8938	0.922	39.3364
3182	0.888	37.6897	8943	0.907	39.3434
3559	0.921	37.7916	8953	0.786	39.3295
4069	0.905	37.9021	8975	0.822	39.3420
4158	0.782	37.9010	8984	0.749	39.2887
4301	0.898	37.9181	8986	0.810	39.4000
4341	0.641	38.0241	9053	0.943	39.4398
4386	0.878	37.7771	9077	0.922	39.4462
4428	0.923	38.0396	9095	0.913	39.5273
4469	0.749	37.9727	9096	0.831	39.5207
4473	0.833	37.9610	9121	0.809	39.5562
4603	0.721	38.0509	9138	0.840	39.5887
4793	0.926	38.0481	9158	0.854	39.7355
4834	0.799	38.0881	9173	0.822	39.8042
4953	0.729	38.0548	9179	0.814	39.8371
4959	0.834	37.9122	9188	0.776	39.8769
5041	0.798	38.1874	9191	0.693	39.8931
5130	0.498	38.2707	9238	0.605	40.0741
5285	0.550	38.3397	9245	0.711	40.1095
5363	0.604	38.4530	9248	0.772	40.1162
5392	0.786	38.2579	9249	0.650	40.1287
5409	0.906	38.2309	9260	0.436	40.3150
5422	0.727	38.4839	9279	0.564	40.3334
5788	0.640	38.4064	9280	0.657	40.3261
5895	0.452	38.4145	9281	0.653	40.3299
7118	0.759	38.6709	9282	0.486	40.3348
7186	0.658	38.6858	9290	0.593	40.3353
7220	0.781	38.6939	9307	0.656	40.3571
7221	0.717	38.6811	9315	0.527	40.4301
7239	0.733	38.6867	9322	0.452	40.4418
7257	0.770	38.6945	9323	0.569	40.3744
7585	0.575	38.7574	9324	0.563	40.4177
7737	0.797	38.7991	9343	0.678	40.4410
8096	0.715	38.9344	9345	0.603	40.4220
8158	0.807	38.9418	9347	0.768	40.4471
8169	0.863	38.9661	9350	0.647	40.4298
8223	0.647	38.9467	9352	0.664	40.4367
8392	0.897	39.0128	9354	0.657	40.4434
8423	0.884	39.0360	9356	0.799	40.4517
8511	0.962	39.0724	9402	0.597	40.5526

## Appendix 5 continued

<b>Patch ID</b>	<b>CHSI</b>	<b>Latitude</b>	<b>Patch ID</b>	<b>CHSI</b>	<b>Latitude</b>
9413	0.728	40.6029	10118	0.609	40.9355
9419	0.623	40.6111	10145	0.750	41.1275
9428	0.710	40.6122	10164	0.757	41.1339
9433	0.772	40.6320	10312	0.665	41.2064
9435	0.548	40.6238	10313	0.795	41.0298
9450	0.861	40.5975	10326	0.342	41.2100
9477	0.757	40.6092	10328	0.701	41.2135
9510	0.671	40.6164	10332	0.710	41.2112
9513	0.891	40.6000	10337	0.611	41.2182
9515	0.876	40.5949	10342	0.775	41.2205
9519	0.890	40.6119	10348	0.880	41.2290
9536	0.979	40.5925	10359	0.575	41.2352
9589	0.964	40.6113	10405	0.805	41.2527
9596	0.995	40.6124	10418	0.382	41.2673
9606	0.997	40.6263	10419	0.717	41.2686
9618	0.955	40.6315	10420	0.839	41.2591
9622	0.924	40.6211	10429	0.590	41.2701
9632	0.948	40.6285	10430	0.487	41.2580
9650	0.843	40.6304	10432	0.471	41.2685
9653	0.959	40.6436	10433	0.758	41.2612
9654	0.977	40.6356	10434	0.461	41.2693
9657	0.990	40.6442	10435	0.804	41.2850
9664	0.961	40.6414	10436	0.732	41.2642
9673	0.909	40.6459	10437	0.809	41.2634
9677	0.890	40.6487	10451	0.549	41.2657
9681	0.907	40.6514	10455	0.734	41.2601
9751	0.661	40.7273	10459	0.822	41.2674
9758	0.673	40.7290	10460	0.773	41.2844
9759	0.785	40.7321	10461	0.708	41.3520
9762	0.658	40.7393	10473	0.688	41.2669
9766	0.694	40.8665	10489	0.849	41.2947
9776	0.703	40.7507	10491	0.631	41.2736
9781	0.678	40.7510	10498	0.816	41.2991
9816	0.710	40.9073	10507	0.618	41.3025
9817	0.635	40.9028	10512	0.556	41.3039
9818	0.635	40.8882	10521	0.544	41.3105
9829	0.944	40.7618	10525	0.879	41.2917
9833	0.574	40.9075	10531	0.833	41.3168
9837	0.658	40.8992	10541	0.533	41.3067
9882	0.588	40.9146	10545	0.805	41.3644
9916	0.648	40.9253	10558	0.749	41.3182
9986	0.626	40.9517	10564	0.778	41.3227
9987	0.567	40.9561	10598	0.842	41.3344
9991	0.610	40.9630	10608	0.426	41.3409
10003	0.572	40.9723	10622	0.546	41.3479
10065	0.767	41.0740	10627	0.703	41.3436
10078	0.506	41.0784	10637	0.665	41.3515

Appendix 5 continued

<b>Patch ID</b>	<b>CHSI</b>	<b>Latitude</b>	<b>Patch ID</b>	<b>CHSI</b>	<b>Latitude</b>
10638	0.708	41.3402	11205	0.681	41.7748
10649	0.664	41.3321	11210	0.564	41.6493
10650	0.624	41.3365	11232	0.520	41.6609
10655	0.704	41.3337	11237	0.627	41.6677
10658	0.719	41.3363	11240	0.770	41.7597
10684	0.804	41.3633	11276	0.682	41.6864
10688	0.516	41.3648	11279	0.532	41.6903
10760	0.519	41.3294	11290	0.559	41.6935
10768	0.598	41.3443	11298	0.537	41.6412
10862	0.903	41.3588	11299	0.534	41.6315
10876	0.562	41.3747	11307	0.687	41.6396
10886	0.720	41.3720	11322	0.803	41.6379
10888	0.623	41.3835	11373	0.837	41.6510
10898	0.646	41.4008	11374	0.851	41.6521
10910	0.584	41.5455	11383	0.720	41.6536
10924	0.784	41.5569	11389	0.487	41.6564
10925	0.446	41.4253	11405	0.943	41.6368
10926	0.561	41.5605	11406	0.455	41.6764
10934	0.594	41.4349	11408	0.642	41.6707
10962	0.800	41.5849	11417	0.495	41.6870
10968	0.799	41.5820	11430	0.734	41.7248
10972	0.535	41.5919	11443	0.542	41.7085
10983	0.783	41.6277	11484	0.694	41.7647
10999	0.686	41.6305	11503	0.707	41.9990
11001	0.756	41.6387	11504	0.715	41.8209
11006	0.704	41.6420	11507	0.711	42.0132
11010	0.854	41.6469	11511	0.658	42.0221
11020	0.447	41.6621	11520	0.737	41.8953
11025	0.630	41.6905	11522	0.446	41.9317
11026	0.518	41.6899	11533	0.673	41.9891
11043	0.446	41.6982	11535	0.508	41.9950
11044	0.646	41.6779	11539	0.691	42.1181
11045	0.485	41.6812	11541	0.515	42.1345
11057	0.440	41.7106	11550	0.711	42.1509
11063	0.510	41.7152	11551	0.685	42.2271
11067	0.631	41.7157	11553	0.446	42.2284
11082	0.665	41.7089	11554	0.334	42.2313
11100	0.592	41.7128	11556	0.520	42.2316
11102	0.660	41.7035	11557	0.453	42.2386
11105	0.653	41.5551	11558	0.730	42.2282
11116	0.708	41.7312	11564	0.593	42.2414
11129	0.487	41.7362	11571	0.638	42.2574
11137	0.279	41.5772	11574	0.512	42.2689
11139	0.525	41.7334	11576	0.556	42.2402
11147	0.786	41.5702	11577	0.633	42.2471
11152	0.533	41.7385	11581	0.652	42.2741
11195	0.625	41.6289	11584	0.466	42.2685

Appendix 5 continued

<b>Patch ID</b>	<b>CHSI</b>	<b>Latitude</b>	<b>Patch ID</b>	<b>CHSI</b>	<b>Latitude</b>
11585	0.572	42.2578	11822	0.639	43.1225
11587	0.500	42.2500	11823	0.810	43.1139
11597	0.503	42.2606	11827	0.667	43.1278
11598	0.516	42.2392	11832	0.397	43.1251
11613	NA	42.2498	11833	0.384	43.1294
11614	0.441	42.2501	11834	0.436	43.0987
11616	0.594	42.2573	11848	NA	43.1351
11617	0.530	42.2578	11849	0.600	43.1321
11619	0.598	42.2555	11850	0.467	43.1075
11628	0.608	42.2943	11851	0.507	43.1373
11632	0.595	42.3125	11856	0.671	43.1391
11633	0.635	42.3146	11857	0.655	43.1175
11647	0.495	42.3831	11874	0.592	43.1612
11648	0.606	42.3876	11875	NA	43.1562
11650	0.417	42.4057	11887	0.261	43.1762
11651	0.382	42.4156	11917	0.675	43.2550
11655	0.743	42.4370	11924	0.653	43.3530
11657	0.630	42.4568	11935	0.739	43.3619
11659	0.479	42.4939	11936	0.681	43.3823
11660	0.849	42.4972	11937	0.643	43.4173
11661	0.474	42.4915	11939	0.869	43.4397
11669	0.511	42.5318	11941	0.673	43.4521
11671	0.604	42.5391	11943	0.574	43.4651
11677	0.792	42.5416	11946	0.562	43.4742
11683	0.443	42.5480	11947	0.483	43.4798
11714	0.688	42.6209	11948	0.863	43.4757
11724	0.403	42.6324	11952	0.725	43.4938
11726	0.632	42.6499	11953	0.639	43.4941
11733	0.782	42.6565	11964	0.834	43.5800
11746	0.725	42.7242	11965	0.862	43.5648
11749	0.895	42.7636	11980	0.596	43.6530
11758	0.829	42.8889	11982	0.570	43.6655
11760	0.704	42.9574	11984	0.728	43.6650
11764	0.863	42.9667	11985	0.427	43.6761
11767	0.757	42.9985	11987	0.492	43.6787
11769	0.537	43.0059	11988	0.423	43.6890
11770	0.327	43.0328	11992	0.502	43.6952
11771	0.662	43.0401	12007	0.638	43.7557
11772	0.521	43.0509	12010	0.730	43.7724
11773	0.586	43.0464	12013	0.316	43.7778
11779	0.670	43.0517	12046	0.743	43.7409
11780	0.898	43.0752	12047	0.702	43.7511
11782	0.686	43.0734	12053	0.691	43.7807
11801	NA	43.0981	12063	0.540	43.8002
11811	0.467	43.0858	12065	0.448	43.8284
11815	0.652	43.0883	12068	0.447	43.8245
11819	0.647	43.0847	12072	0.592	43.8083

Appendix 5 continued

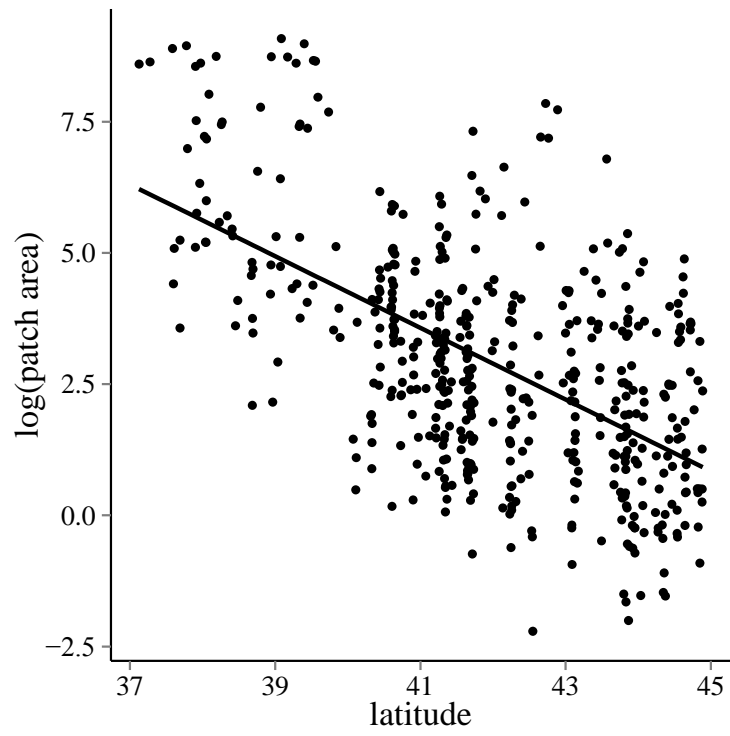
<b>Patch ID</b>	<b>CHSI</b>	<b>Latitude</b>	<b>Patch ID</b>	<b>CHSI</b>	<b>Latitude</b>
12076	0.362	43.8297	12566	0.380	44.0537
12080	0.732	43.7688	12568	0.361	44.0797
12081	0.348	43.8374	12569	0.570	44.0629
12084	0.353	43.8322	12572	0.507	44.0860
12085	0.813	43.8072	12575	0.838	44.0732
12090	0.479	43.8141	12736	0.581	44.2739
12099	0.581	43.8161	12737	0.478	44.2730
12102	0.590	43.8459	12748	0.446	44.2883
12107	0.240	43.8491	12759	0.859	44.2371
12108	NA	43.8226	12770	0.755	44.2483
12115	0.916	43.7824	12775	NA	44.3456
12124	0.546	43.8314	12784	0.537	44.3518
12126	0.862	43.7834	12787	0.610	44.3516
12129	0.729	43.8282	12790	0.775	44.2517
12141	0.425	43.8092	12797	0.329	44.3708
12147	0.659	43.8387	12801	0.247	44.3748
12154	NA	43.8509	12842	0.314	44.3567
12159	0.659	43.8591	12851	0.541	44.3309
12162	NA	43.8508	12859	0.952	44.3747
12172	0.359	43.8620	12862	0.582	44.4635
12180	0.611	43.8660	12863	0.457	44.4669
12182	0.786	43.8292	12864	0.608	44.4680
12192	NA	43.8565	12866	0.558	44.4722
12203	0.345	43.8731	12872	0.298	44.3388
12211	0.801	43.8547	12876	0.930	44.4048
12229	NA	43.8531	12883	0.799	44.4224
12244	0.843	43.8748	12885	0.329	44.4195
12275	0.507	43.8796	12889	0.838	44.4250
12319	0.544	43.9075	12907	0.704	44.5545
12329	0.164	43.9185	12926	0.846	44.5823
12341	0.276	43.9241	12934	0.793	44.5870
12351	NA	43.9294	12936	0.741	44.5935
12378	0.121	43.9301	12959	0.675	44.4329
12389	0.501	43.9495	13104	0.765	44.5524
12396	NA	43.9546	13109	NA	44.5499
12416	0.355	44.0040	13120	0.723	44.5361
12438	0.521	43.9439	13129	0.651	44.5684
12440	0.497	43.9542	13130	0.425	44.5412
12452	0.794	43.9562	13137	0.236	44.5351
12456	NA	44.0226	13139	0.513	44.5440
12468	0.352	43.9746	13150	0.788	44.5386
12490	0.460	43.9907	13197	0.850	44.6179
12541	0.452	44.0698	13201	0.813	44.6338
12544	NA	44.0816	13210	0.397	44.6443
12546	0.671	44.0349	13216	0.698	44.6491
12562	0.711	44.0749	13217	0.627	44.6439
12565	0.572	44.0514	13218	0.413	44.6449

Appendix 5 continued

<b>Patch ID</b>	<b>CHSI</b>	<b>Latitude</b>
13221	0.771	44.6222
13224	0.576	44.6607
13226	0.447	44.6613
13227	0.439	44.6586
13259	0.732	44.7137
13264	0.819	44.7172
13265	0.583	44.7254
13266	0.795	44.7175
13269	0.736	44.7215
13273	0.543	44.7693
13288	0.515	44.8137
13291	0.676	44.8223
13294	NA	44.8259
13305	0.556	44.8218
13306	0.356	44.8484
13322	0.234	44.8442
13325	NA	44.8491
13331	0.760	44.8797
13332	0.618	44.8790
13338	0.764	44.8872
13342	0.711	44.8804



Appendix 6. Linear regression showing a negative relationship between latitude and patch area in tidal marshes between Maine and Virginia, USA (adjusted  $R^2 = 0.33$ ).



Appendix 7. Normalized Difference Vegetation Index (NDVI) values from Maine to Virginia calculated from Landsat multispectral imagery in June – August 2011.

