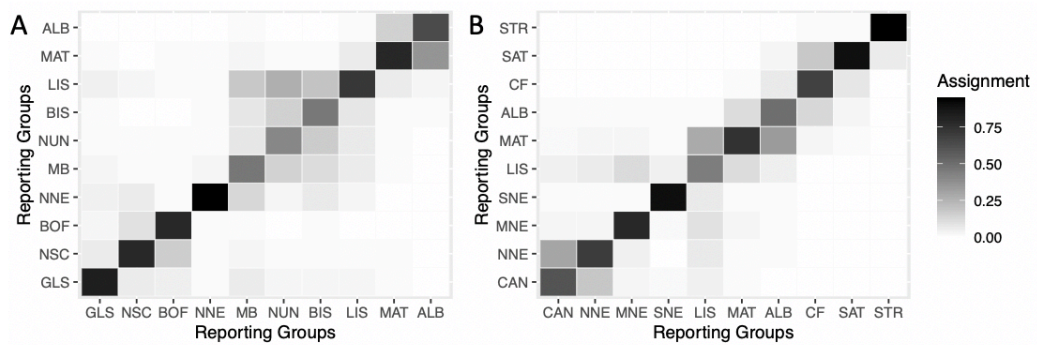


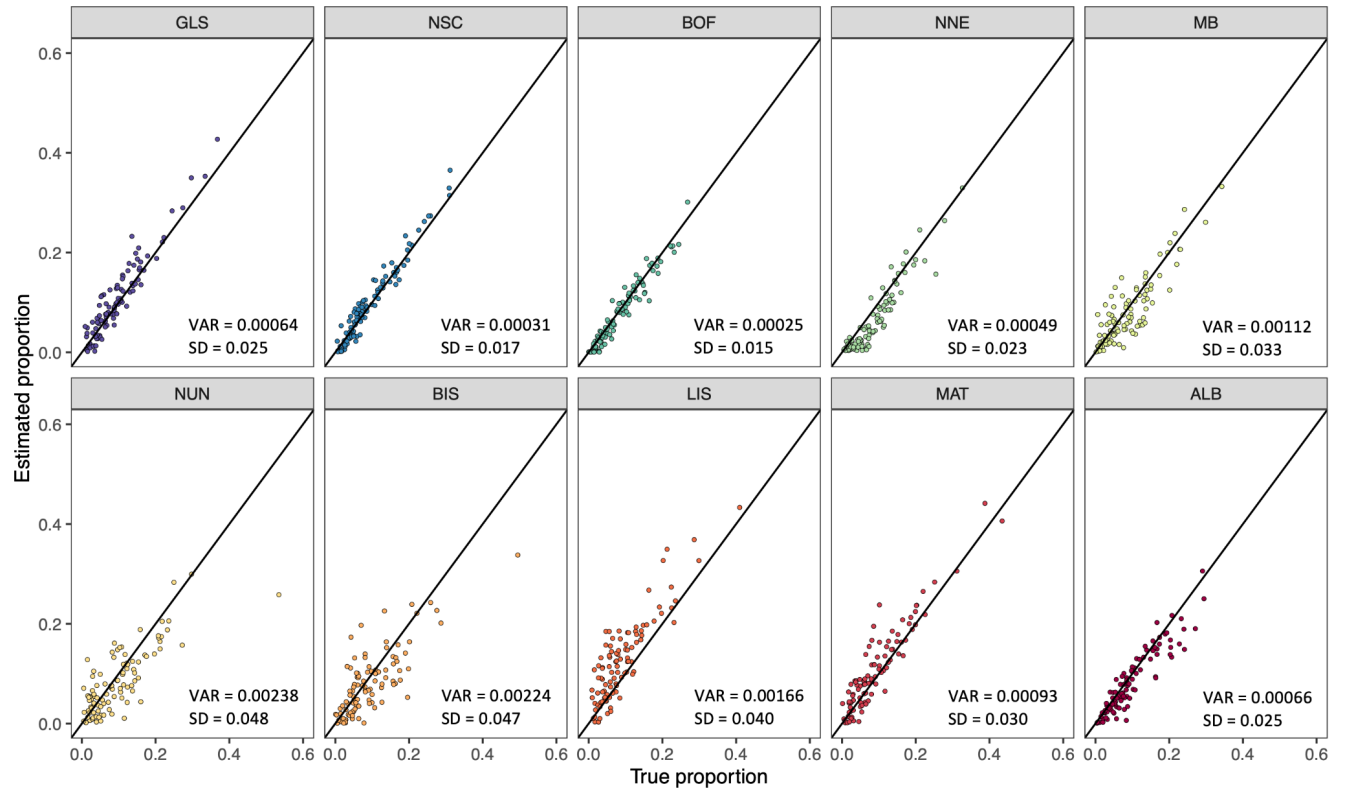
Supplementary material for “Spatial and temporal genetic stock composition of river herring bycatch in southern New England Atlantic herring and mackerel fisheries”

Kerry Reid, Jennifer A. Hoey, Benjamin I. Gahagan, Bradley P. Schondelmeier, Daniel J. Hasselman, Alison A. Bowden, Michael P. Armstrong, John Carlos Garza, Eric P. Palkovacs

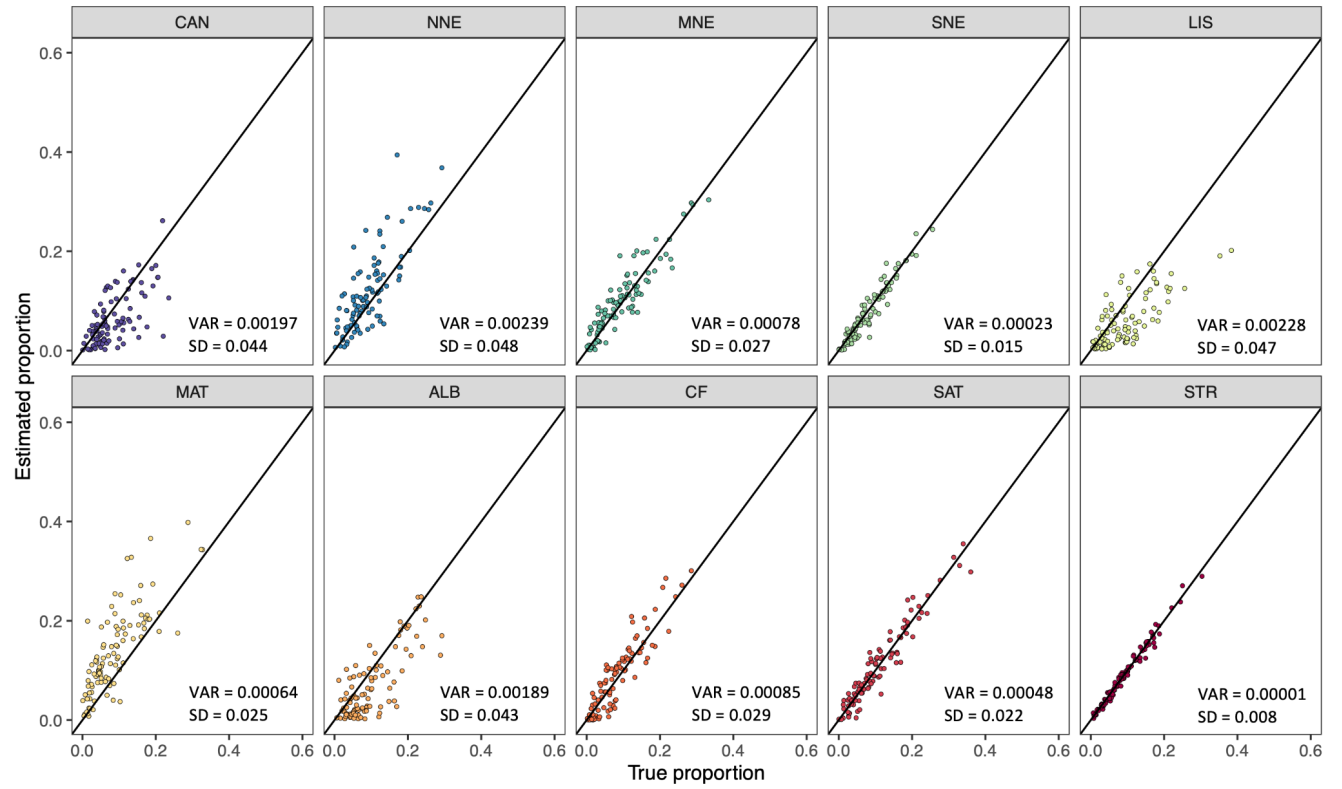
Supplementary Figure S1. Self-assignment analyses reported in Reid et al. (2018) calculated with the likelihood method of Rannala and Mountain (1997) and implemented in GSI-SIM (Anderson et al. 2008) for river herring (A, alewife and B, blueback herring) and summarised by newly defined reporting groups.



Supplementary Figure S2. Simulated and estimated mixing proportions by reporting group for alewife, variance and standard deviation is reported in the right bottom corner of each plot.



Supplementary Figure S3. Simulated and estimated mixing proportions by reporting group for blueback herring, variance and standard deviation is reported in the right bottom corner of each plot.



Supplementary Table S1. Alewife sampling location names, abbreviations, reporting group, and location coordinates.

Sampling location	Location abbrev.	Reporting group	Latitude	Longitude
Garnish River	GAR	GLS	47.2267	-55.3452
Otter Pond	OTT	GLS	51.0872	-56.8668
Miramichi River	MIR	GLS	46.9665	-65.5783
Richibucto River	RIC	GLS	46.6579	-64.8628
Tidnish River	TID	GLS	45.9768	-64.0447
River Phillip	RPH	GLS	45.8389	-63.7576
Wallace River	WAL	GLS	45.8116	-63.5158
Waughs River	WAU	GLS	45.6969	-63.2685
Hillsborough River	HIL	GLS	46.3515	-62.8713
Tracadie Bay	TRA	GLS	46.3896	-62.9909
Margaree River	MAR	GLS	46.4167	-61.0815
Bras d'Or Lakes	BRA	GLS	45.8464	-60.8211
West River	WES	NSC	44.9265	-62.5445
Sullivan Pond Outlet	SUL	NSC	44.6715	-63.5633
Sackville River	SAK	NSC	44.7308	-63.6620
LaHave River	LHV	NSC	44.3967	-64.5369
Argyle Brook	ARG	NSC	43.7930	-65.8669
Kiack Brook	KIA	NSC	43.8209	-65.9468
Tusket River	TUS	NSC	43.8633	-65.9816
Gaspereau River	GAS	BOF	45.0773	-64.3160
Shubenacadie River	SHU	BOF	44.9318	-63.5343
Peticodiac River	PET	BOF	46.0537	-64.8417
Saint John River	SJR	BOF	45.9535	-66.8651
St. Croix River (Dennis Stream)	SCDEN	NNE	45.1938	-67.2593
St. Croix River (Milltown Dam)	SCMIL	NNE	45.1776	-67.2938
Little River	LIT	NNE	44.9722	-67.0894
Dennys River	DEN	NNE	45.0385	-67.3577
East Machias River	EMA	NNE	44.7566	-67.3624
Narraguagus River	NAR	NNE	44.4906	-68.0050
West Bay Pond	WBP	NNE	44.4882	-68.0460
Mt. Desert Island	MDI	NNE	44.3591	-68.3466
Union River	UNI	NNE	44.5437	-68.4288

Bagaduce River (Wight Pond)	WIG	NNE	44.4509	-68.6731
Bagaduce River (Walker Pond)	BWAL	NNE	44.3395	-68.6872
Bagaduce River (Pierce Pond)	PIE	NNE	44.4808	-68.7259
Orland River	ORL	NNE	44.5697	-68.7430
Penobscot River (Milford)	PMIL	NNE	44.9404	-68.6443
Penobscot River (Souadabscook Stream)	PSOU	NNE	44.7491	-68.8326
Penobscot River (Veazie Dam)	PVEA	NNE	44.8327	-68.7006
Penobscot River (Blackman Stream)	PBLA	NNE	44.8860	-68.6476
St. George River	STG	NNE	44.2383	-69.2766
Medomak River Falls	MDK	NNE	44.0959	-69.3780
Damariscotta River	DAM	NNE	44.0605	-69.5260
Sheepscot River	SHE	NNE	44.0763	-69.6014
Kennebec River (Sewell Pond)	SEW	NNE	43.8691	-69.7823
Eastern River (Dresden Mills Dam)	DRE	NNE	44.1065	-69.7292
Seven Mile Stream (Webber Pond Dam)	WEB	NNE	44.4028	-69.6717
Sebasticook River	SEB	NNE	44.5802	-69.5542
Kennebec River (Lockwood Dam)	LOC	NNE	44.5458	-69.6272
Androscoggin River	AND	NNE	43.9204	-69.9670
Presumpscot River	PRE	NNE	43.7202	-70.2723
Saco River	SAC	NNE	43.4953	-70.4461
Cocheco River	COC	NNE	43.1964	-70.8738
Oyster River	OYS	NNE	43.1309	-70.9187
Lamprey River	LAM	NNE	43.0809	-70.9339
Exeter River	EXE	NNE	42.9811	-70.9444
Merrimack River	MER	NNE	42.7016	-71.1645
Parker River	PAR	MB	42.7501	-70.9292
Mystic River	MYS	MB	42.4153	-71.1381
Back River	BAC	MB	42.2154	-70.9231
Town Brook	TOW	MB	41.9543	-70.6642
Stony Brook	STN	MB	41.7445	-70.1125
Herring River	HER	NUN	41.6819	-70.1224
Mashpee River	MAS	NUN	41.6158	-70.4792
Coonamessett River	COON	NUN	41.5853	-70.5726
Monument River	MON	NUN	41.7368	-70.6245
Nemasket River	NEM	BIS	41.8907	-71.0846
Nonquit Pond	NON	BIS	41.5607	-71.1968
Gilbert-Stuart Brook	GIL	BIS	41.5184	-71.4463

Saugatucket River	SAU	BIS	41.4521	-71.4954
Thames River	THA	LIS	41.4662	-72.0702
Bride Lake	BRI	LIS	41.3278	-72.2373
Dodge Pond	DOD	LIS	41.3275	-72.1986
Latimer Brook	LAT	LIS	41.3689	-72.2020
Connecticut River	CON	LIS	41.4791	-72.4986
Connecticut River (Wethersfield Cove)	WTH	LIS	41.7252	-72.6558
Mattabessett River	MAT	LIS	41.5907	-72.6668
Mill Creek - Mary Steube	MCR	LIS	41.3506	-72.3023
Mill Brook	MBR	LIS	41.3426	-72.3113
Quinnipiac River	QUI	LIS	41.3635	-72.8770
Housatonic River	HOU	LIS	41.2412	-73.0979
Pequonnock River	PEQ	LIS	41.1969	-73.1864
Mianus River	MIA	LIS	41.0490	-73.5853
Peconic River	PEC	LIS	40.9172	-72.6534
Carlls River	CAR	LIS	40.7038	-73.3276
Hudson River	HUD	MAT	41.2121	-73.9427
Hudson River (Black Creek)	BLA	MAT	41.8245	-73.9590
Delaware River	DEL	MAT	39.7274	-75.4912
Nanticoke River	NAN	MAT	38.4516	-75.8357
Choptank River	CHOP	MAT	38.7124	-75.9975
Northeast River	NRT	MAT	39.5985	-75.9456
Susquehanna River	SUS	MAT	39.6345	-76.1555
Patuxent River	PAT	MAT	38.5875	-76.6779
Potomac River	POT	MAT	38.9314	-77.1168
Rappahannock River	RAP	MAT	37.9176	-76.8189
James River	JAM	MAT	37.3727	-76.8985
Chowan River	CHO	ALB	36.1860	-76.7309
Roanoke River	ROA	ALB	35.8265	-76.8586
Alligator River	ALL	ALB	35.6977	-76.1368

Supplementary Table S2. Blueback herring sampling location names, abbreviations, reporting group, and location coordinates.

Sampling location	Location abbrev.	Reporting group	Latitude	Longitude
Margaree River	MAR	CAN	46.4167	-61.0815
Peticodiac River	PET	CAN	46.0537	-64.8417
Saint John River	SJR	CAN	45.9535	-66.8651
East Machias River	EMA	NNE	44.7509	-67.3815
Orland River	ORL	NNE	44.5697	-68.7430
St. George River	STG	NNE	44.2019	-69.2764
Kennebec River - Lockwood Dam	LOC	NNE	44.5458	-69.6272
Sebasticoak River	SEB	NNE	44.5802	-69.5542
Oyster River	OYS	MNE	43.1309	-70.9187
Exeter River	EXE	MNE	42.9811	-70.9444
Parker River	PAR	MNE	42.7501	-70.9292
Mystic River	MYS	SNE	42.4153	-71.1381
Herring River	HER	SNE	41.6819	-70.1224
Coonamesett River	COON	SNE	41.5853	-70.5726
Monument River	MON	SNE	41.7368	-70.6245
Gilbert-Stuart Brook	GIL	SNE	41.5184	-71.4463
Connecticut River	CON	LIS	41.4791	-72.4986
Connecticut River (Wethersfield Cove)	WCV	LIS	41.7252	-72.6558
Connecticut River (Farmington River)	FAR	LIS	41.8735	-72.6501
Quinnipiac River	QUI	LIS	41.3635	-72.8770
Mianus River	MIA	LIS	41.0490	-73.5853
Hudson River	HUD	MAT	41.2121	-73.9427
Hudson River	ESO	MAT	42.0741	-73.9472
Metedeconk River	MET	MAT	40.0613	-74.1250
Delaware River	DEL	MAT	39.7274	-75.4912
Nanticoke River	NAN	MAT	38.4516	-75.8357
Choptank River	CHOP	MAT	38.7124	-75.9975
Susquehanna River	SUS	MAT	39.6345	-76.1555
Patuxent River	PAT	MAT	38.5875	-76.6779
Potomac River	POT	MAT	38.9314	-77.1168
Rappahannock River	RAP	MAT	37.9176	-76.8189
York River	YOR	MAT	37.5161	-76.7903

James River	JAM	MAT	37.3727	-76.8985
Chowan River	CHO	ALB	36.1860	-76.7309
Roanoke River	ROA	ALB	35.8265	-76.8586
Neuse River	NEU	ALB	35.3240	-77.3428
Cape Fear River - Rice/Town	CF	CF	34.1285	-77.9515
Santee River	SAN	SAT	33.2401	-79.5001
Savannah River	SAV	SAT	32.2314	-81.1460
Altamaha River	ALT	SAT	31.4728	-81.6145
St .John's River	STR	STR	29.6033	-81.6022

Supplementary Table S3. Alewife and blueback herring mixing proportions and mortality estimates within the focal region.

Species															
Alewife															
	STAT regions	Code	YEAR	HW	STAT areas	Sample size Reporting Groups									
Mixing proportions estimates															
						GIS	NSC	BOF	GLS	MB	NUN	BIS	LIS	ALB	
SNE_HW1_15	Southern New England	SNE	2015	1	539/611	924 0.001 (0.000-0.005)	0.003 (0.000-0.010)	0.010 (0.004-0.018)	0.124 (0.102-0.149)	0.016 (0.001-0.039)	0.144 (0.110-0.184)	0.412 (0.368-0.455)	0.133 (0.102-0.170)	0.102 (0.077-0.128)	0.053 (0.036-0.075)
SNE_HW2_14	Southern New England	SNE	2014	2	539/611	916 0.001 (0.000-0.008)	0.000 (0.000-0.001)	0.000 (0.000-0.000)	0.002 (0.000-0.009)	0.002 (0.000-0.019)	0.167 (0.126-0.212)	0.388 (0.341-0.437)	0.398 (0.355-0.443)	0.028 (0.015-0.044)	0.013 (0.005-0.023)
SNE_HW1_14	Southern New England	SNE	2014	1	539/611	1264 0.001 (0.000-0.006)	0.000 (0.000-0.002)	0.000 (0.000-0.000)	0.009 (0.003-0.020)	0.001 (0.000-0.013)	0.138 (0.104-0.175)	0.369 (0.329-0.407)	0.367 (0.328-0.407)	0.095 (0.076-0.116)	0.019 (0.010-0.031)
SNE_HW2_13	Southern New England	SNE	2013	2	539/611	505 0.001 (0.000-0.010)	0.005 (0.000-0.013)	0.001 (0.000-0.007)	0.070 (0.048-0.096)	0.015 (0.000-0.039)	0.162 (0.106-0.220)	0.280 (0.225-0.337)	0.090 (0.050-0.135)	0.296 (0.241-0.350)	0.081 (0.040-0.124)
SNE_HW1_13	Southern New England	SNE	2013	1	539/611	330 0.001 (0.000-0.006)	0.000 (0.000-0.004)	0.000 (0.000-0.003)	0.106 (0.073-0.142)	0.031 (0.000-0.080)	0.164 (0.101-0.232)	0.201 (0.141-0.264)	0.039 (0.010-0.090)	0.347 (0.284-0.413)	0.110 (0.065-0.164)
SNE_HW2_12	Southern New England	SNE	2012	2	539/611	43 0.003 (0.000-0.027)	0.002 (0.000-0.021)	0.001 (0.000-0.009)	0.067 (0.009-0.175)	0.049 (0.000-0.182)	0.043 (0.000-0.257)	0.207 (0.035-0.414)	0.402 (0.147-0.631)	0.211 (0.082-0.368)	0.014 (0.000-0.037)
SNE_HW1_12	Southern New England	SNE	2012	1	539/611	343 0.001 (0.000-0.008)	0.009 (0.001-0.024)	0.000 (0.000-0.002)	0.039 (0.019-0.065)	0.008 (0.000-0.035)	0.140 (0.068-0.217)	0.623 (0.546-0.705)	0.094 (0.045-0.157)	0.079 (0.045-0.120)	0.007 (0.000-0.031)
Mortality estimates															
SNE_HW1_15	Southern New England	SNE	2015	1	539/611	612 (0-5060)	1836 (0-10121)	6120 (1236-18219)	75888 (31543-150814)	9792 (309-39474)	88128 (34017-186240)	252144 (113803-460541)	81396 (31543-172070)	62424 (23812-129558)	32436 (11132-75913)
SNE_HW2_14	Southern New England	SNE	2014	2	539/611	285 (0-4599)	0 (0-574)	0 (0-0)	571 (0-5174)	571 (0-10924)	47702 (16964-121893)	110830 (45910-251261)	113686 (47795-254711)	7998 (2019-25298)	371673-13224)
SNE_HW1_14	Southern New England	SNE	2014	1	539/611	518 (0-6017)	0 (0-2005)	0 (0-0)	4670 (1116-20058)	518 (0-13038)	71617 (38719-175514)	191498 (122487-408196)	190460 (122114-408196)	49301 (28294-116340)	9860 (3723-31091)
SNE_HW2_13	Southern New England	SNE	2013	2	539/611	1151 (0-14930)	5758 (0-19410)	1151 (0-10451)	80625 (41627-143336)	17276 (0-58230)	186589 (91927-328479)	322500 (195129-503171)	103660 (43362-201567)	340928 (209005-522581)	93294 (38158-185143)
SNE_HW1_13	Southern New England	SNE	2013	1	539/611	1496 (0-13070)	0 (0-8713)	0 (0-6535)	158652 (72006-309334)	46398 (0-174273)	245461 (99625-505392)	300840 (139081-575101)	58371 (9863-196057)	519360 (280135-899684)	164638 (1515-357259)
SNE_HW2_12	Southern New England	SNE	2012	2	539/611	567 (0-7737)	378 (0-6017)	189 (0-2579)	12684 (1102-50148)	9276 (0-52154)	8140 (0-73646)	39188 (4289-118637)	76105 (18013-180821)	39945 (10048-105455)	2650 (0-30662)
SNE_HW1_12	Southern New England	SNE	2012	1	539/611	338 (0-4133)	3042 (214-12400)	0 (0-1033-394)	13182 (4070-33585)	2704 (0-18084)	47320 (14567-112123)	210575 (116968-364271)	31772 (9640-81121)	26702 (9640-62003)	236 (0-16017)
Blueback															
Mixing proportions estimates															
						CAN	NNE	MNE	SNE	LIS	MAT	ALB	CF	SAT	
SNE_HW1_15	Southern New England	SNE	2015	1	539/611	145 0.002 (0.000-0.018)	0.162 (0.099-0.233)	0.012 (0.000-0.045)	0.037 (0.011-0.075)	0.002 (0.000-0.017)	0.656 (0.559-0.742)	0.011 (0.000-0.072)	0.000 (0.000-0.006)	0.111 (0.065-0.169)	0.007 (0.000-0.027)
SNE_HW1_13	Southern New England	SNE	2013	1	539/611	183 0.074 (0.000-0.157)	0.254 (0.164-0.347)	0.053 (0.000-0.116)	0.064 (0.026-0.114)	0.078 (0.000-0.175)	0.474 (0.389-0.556)	0.001 (0.000-0.009)	0.000 (0.000-0.002)	0.000 (0.000-0.004)	0.000 (0.000-0.002)
SNE_HW2_12	Southern New England	SNE	2012	2	539/611	99 0.008 (0.000-0.057)	0.064 (0.009-0.133)	0.099 (0.029-0.184)	0.059 (0.019-0.120)	0.046 (0.000-0.163)	0.721 (0.602-0.827)	0.001 (0.000-0.013)	0.000 (0.000-0.002)	0.001 (0.000-0.007)	0.000 (0.000-0.002)
SNE_HW1_12	Southern New England	SNE	2012	1	539/611	379 0.014 (0.000-0.049)	0.120 (0.078-0.165)	0.113 (0.074-0.153)	0.106 (0.074-0.145)	0.110 (0.059-0.166)	0.516 (0.451-0.579)	0.008 (0.000-0.035)	0.000 (0.000-0.002)	0.000 (0.000-0.002)	0.011 (0.003-0.024)
Mortality estimates															
SNE_HW1_15	Southern New England	SNE	2015	1	539/611	580 (0-7288)	31335 (10443-71059)	2515 (0-14879)	6963 (1148-23382)	386 (0-5466)	126891 (58798-224718)	2321 (0-23079)	193 (0-2429)	21277 (6579-50713)	1354 (0-7591)
SNE_HW1_13	Southern New England	SNE	2013	1	539/611	14470 (0-50773)	54476 (22193-119948)	12129 (680-39187)	13193 (3267-37143)	16598 (0-56907)	101504 (53373-193553)	212 (0-3066)	0 (0-1363)	0 (0-340)	0 (0-340)
SNE_HW2_12	Southern New England	SNE	2012	2	539/611	2693 (0-35458)	25398 (944-91930)	38483 (5038-119509)	23859 (2991-83394)	13084 (0-95870)	279771 (95884-543047)	769 (0-11819)	0 (0-1969)	384 (0-4596)	0 (0-1869)
SNE_HW1_12	Southern New England	SNE	2012	1	539/611	3972 (0-20967)	30044 (17063-66933)	28306 (16631-64111)	26568 (16199-58869)	25327 (9719-65724)	129118 (98709-235074)	2234 (0-14918)	0 (0-403)	0 (0-1209)	2731 (167-9273)