Table S1. Environmental factor levels used for analyses. Habitat classification of geologic and biotic hard bottom habitat factors obtained from Southeast Reef Fish Survey video in the southeastern U.S. Atlantic Ocean from approximately Cape Hatteras, NC to Savannah, GA.

Distance to shelf edge (km)
- 0-19
- 20-39
- 40-59
- 60-79
- 80-99
- 100-119

Depth zones (m)
- Inner shelf (15-20)
- Mid-shelf (21-40)
- Outer shelf (41-60)
- Shelf break (61-110)

Latitude (DD)
- 31-31.9
- 32-32.9
- 33-33.9
- 34-35

Temperature (°C)
- 16-19.4
- 19.5-22.4
- 22.5-25.4
- 25.5-28

Surface geologic class
- Unconsolidated: fine sediment
- Unconsolidated: mixed sediment (fine/shell)
- Mixed: approx. 50/50 covered pavement and fine sediment
- Mixed: approx. 50/50 rock outcrops and fine sediment
- Mixed: approx. 50/50 rock outcrops and shell
- Mixed: approx. 50 covered pavement, and mixed fine sediment and shell
- Mixed: approx. 50/50 rock outcrops, and mixed fine sediment and shell
- Covered pavement
- Rock outcrops

Seafloor morphology
- Ripples - waves
- Irregular (large mounds/hills, ledges, etc.)
- Ripples-waves and irregular

Consolidated substrate vertical relief (max.)
- No consolidated substrate present
- Low relief: approx. < 0.3 m
- Moderate relief: approx. > 0.3 – 1 m
- High relief: approx. > 1 m

Consolidated substrate size
- No consolidated substrate present
- Small to Coarse: ≥50% of consolidated substrate <1 m diameter
- Coarse to Continuous: ≥50% of consolidated substrate >1 m diameter

Undercut height
- No undercut present
- Low relief: approx. < 0.3 m
- Moderate relief: approx. > 0.3 – 1 m
- High relief: approx. > 1 m

Biotic class
- Uncolonized: no apparent biotic growth to < 2% cover
- Algae Bed: ≥ 75% macroalgae
- Mixed: approx. 50/50 macroalgae bed and live bottom
- Live bottom: ≥ 75% coral/sponge/faunal reef, faunal bed
- Unknown class of live bottom

Biota height
- Uncolonized: no apparent biotic growth
- Low profile: ≥ 75% (includes turf, crustose, and emergent biota)
- Mixed: approx. 50/50 low and high relief
- High profile: ≥ 75% biotic growth ~ ≥ 0.15 m (6 inches)

% Biotic cover
- Uncolonized: 0-2% cover
- Sparse: 2-33% cover
- Moderate: 34-66% cover
- Dense: 67-100%

Table S2. Summary of permutational multivariate analysis of variance (*PERMANOVA)* interaction results based on 999 permutations for tests to determine statistical significances of each of the eight factors in the models (PERMANOVA)

Source of variation	df	SS	MS	Pseudo-F	P(perm)
Depth zone x Distance to shelf edge**	3	20498	6832.8	3.732	0.001
Latitude x Bottom temperature**	7	44887	6412.4	3.502	0.001
Depth zone x Latitude**	4	23072	5768.1	3.150	0.001
Bottom temperature x Distance to shelf edge**	9	49984	5553.8	3.033	0.001
Depth zone x Bottom temperature**	7	37506	5358	2.926	0.001
Latitude x Distance to shelf edge**	6	3.07E+04	5114.3	2.793	0.001
Latitude x Consolidated substrate size	6	19985	3330.8	1.819	0.001
Bottom temperature x Biotic class**	8	25298	3162.3	1.727	0.002
Latitude x % Biotic cover	6	18900	3150	1.720	0.006
Undercut height x Consolidated substrate	2	5567.3	2783.6	1.520	0.121
Depth zone x Undercut height**	5	13721	2744.1	1.499	0.046
Depth zone x Biotic class**	5	1.33E+04	2663.7	1.455	0.041
Depth zone x % Biotic cover	7	17974	2567.7	1.402	0.046
Bottom temperature x % Biotic cover	8	20108	2513.5	1.373	0.048
Consolidated substrate size x Biotic class	4	9399.2	2349.8	1.283	0.154
Latitude x Undercut height**	5	11734	2346.8	1.282	0.161
Distance to shelf edge x % Biotic cover	11	25516	2319.6	1.267	0.071
Bottom temperature x Consolidated substrate	6	13510	2251.6	1.230	0.144
Depth zone x Consolidated substrate size	6	13225	2204.1	1.204	0.151
Distance to shelf edge x Biotic class**	10	2.19E+04	2191.4	1.197	0.161
Consolidated substrate size x % Biotic cover	4	8256.5	2064.1	1.127	0.296
Distance to shelf edge x Undercut height**	7	14364	2052	1.121	0.284
Bottom temperature x Undercut height**	6	11628	1938.1	1.059	0.363
Distance to shelf edge x Consolidated substrate	10	18594	1859.4	1.016	0.438
Undercut height x Biotic class**	4	6.55E+03	1637.6	0.894	0.638
Latitude x Biotic class**	7	10404	1486.2	0.812	0.797
Biotic class x % Biotic cover**	4	5872.6	1468.1	0.802	0.773
Undercut height x % Biotic cover**	4	5768.2	1442	0.788	0.765
Res	1286	2.35E+06	1831		
Total	1509	4.66E+06			

** Term has one or more empty cells

Table S3. Results of similarity percentages (*SIMPER*) analysis of fish assemblages (from standardized, fourth-root transformed, Bray-Curtis similarity matrix of species abundance) testing for within-group similarities across factor levels for distance to shelf edge within the southeastern U.S. Atlantic, between Cape Hatteras, NC and Savannah, GA, during 2013-2015. Columns 2-6 for each habitat variable are average abundance (Avg. Abund.), average Bray-Curtis similarity (Avg. Sim.), ratio of similarity contribution to the standard deviation (Sim./SD), individual contribution % (Contrib. %), and cumulative contribution % of the total within-group similarity (Cum. %). Species shown contribute ≥ 0.01 % individually. Discriminator species contributing a cumulative 90% similarity shown in bold font.

	Distance to shelf edge										
0-19 km: *Average similarity: 23.09*						**20-39 km:** *Average similarity: 31.44*					
Species	Av. Abund	Av. Sim	Sim/SD	Contrib %	Cum. %	Species	Av. Abund	Av. Sim	Sim/SD	Contrib %	Cum. %
Red porgy	**1.55**	**11.71**	**0.74**	**50.71**	**50.71**	**Black sea bass**	**1.54**	**9.49**	**0.75**	**30.17**	**30.17**
Almaco	**0.67**	**2.33**	**0.31**	**10.09**	**60.8**	**Red porgy**	**1.17**	**6.34**	**0.69**	**20.17**	**50.34**
Gray triggerfish	**0.66**	**2.03**	**0.29**	**8.78**	**69.58**	**Tomtate**	**1.1**	**4.13**	**0.5**	**13.14**	**63.48**
Lionfish	**0.54**	**1.41**	**0.24**	**6.12**	**75.7**	**Gray triggerfish**	**0.85**	**3.6**	**0.51**	**11.44**	**74.92**
Scamp	**0.48**	**1.14**	**0.25**	**4.94**	**80.64**	**Vermilion snapper**	**0.68**	**1.86**	**0.39**	**5.93**	**80.85**
Greater amberjack	**0.45**	**1.04**	**0.19**	**4.51**	**85.15**	**White grunt**	**0.6**	**1.39**	**0.32**	**4.42**	**85.27**
Vermilion snapper	**0.51**	**0.99**	**0.21**	**4.3**	**89.45**	**Sand perch**	**0.51**	**1.18**	**0.24**	**3.76**	**89.03**
Tomtate	**0.41**	**0.59**	**0.16**	**2.55**	**92**	**Bank sea bass**	**0.43**	**0.91**	**0.25**	**2.89**	**91.93**
Hogfish	**0.29**	**0.42**	**0.13**	**1.84**	**93.84**	**Greater amberjack**	**0.38**	**0.68**	**0.21**	**2.16**	**94.08**
Knobbed porgy	0.29	0.39	0.13	1.68	95.52	Almaco	0.32	0.5	0.21	1.58	95.67
Black sea bass	0.23	0.25	0.09	1.1	96.62	Lionfish	0.25	0.28	0.16	0.9	96.56
Sand tilefish	0.22	0.25	0.1	1.07	97.69	Red snapper	0.23	0.25	0.13	0.81	97.37
Red snapper	0.18	0.16	0.07	0.71	98.4	Scamp	0.24	0.25	0.14	0.79	98.16
Gag	0.16	0.12	0.08	0.51	98.91	*Stenotomus* spp.	0.23	0.22	0.11	0.69	98.85
White grunt	0.13	0.07	0.06	0.32	99.22	Hogfish	0.13	0.09	0.09	0.29	99.14
Banded rudderfish	0.1	0.05	0.05	0.2	99.42	Spottail pinfish	0.14	0.08	0.09	0.25	99.39
Blueline tilefish	0.08	0.04	0.03	0.16	99.58	Gag	0.1	0.05	0.06	0.16	99.54
Snowy grouper	0.06	0.02	0.03	0.09	99.67	Banded rudderfish	0.1	0.04	0.06	0.14	99.68
Atlantic sharpnose shark	0.05	0.01	0.02	0.05	99.72	Planehead filefish	0.09	0.04	0.05	0.12	99.81
Bank sea bass	0.05	0.01	0.03	0.04	99.76	Knobbed porgy	0.06	0.02	0.04	0.06	99.86
Rock hind	0.04	0.01	0.02	0.03	99.79	Atlantic sharpnose shark	0.04	0.01	0.03	0.03	99.89
Graysby	0.04	0.01	0.02	0.03	99.83	Graysby	0.04	0.01	0.03	0.02	99.91
Sandbar shark	0.04	0.01	0.02	0.03	99.85	Cobia	0.04	0.01	0.02	0.02	99.93
Speckled hind	0.03	0	0.02	0.02	99.87	Red grouper	0.03	0.01	0.02	0.02	99.95
Lesser amberjack	0.03	0	0.02	0.02	99.89	Whitebone porgy	0.03	0	0.02	0.01	99.96
Reef butterflyfish	0.03	0	0.01	0.02	99.91	Rock hind	0.03	0	0.02	0.01	99.97
Sand perch	0.03	0	0.02	0.02	99.92	Sand tilefish	0.03	0	0.02	0.01	99.98
Yellowmouth grouper	0.03	0	0.02	0.02	99.94						
Red grouper	0.03	0	0.01	0.01	99.95						
Cobia	0.03	0	0.01	0.01	99.96						
Blue angelfish	0.02	0	0.01	0.01	99.97						
Squirrelfish	0.02	0	0.01	0.01	99.98						
Whitespotted soapfish	0.02	0	0.01	0.01	99.99						
Reticulate moray	0.02	0	0.01	0.01	99.99						
Stenotomus spp.	0.02	0	0.01	0.01	100						

Table S3 (continued).

Distance to shelf edge					

40-59 km: *Average similarity: 44.80*

Species	Av. Abund	Av. Sim	Sim/SD	Contrib %	Cum. %
Black sea bass	**2.44**	**23.86**	**1.95**	**53.27**	**53.27**
Tomtate	**1.28**	**6.62**	**0.75**	**14.78**	**68.05**
Bank sea bass	**0.78**	**3.34**	**0.57**	**7.46**	**75.5**
Red porgy	**0.65**	**2.34**	**0.48**	**5.23**	**80.74**
***Stenotomus* spp.**	**0.69**	**2.26**	**0.35**	**5.04**	**85.78**
Sand perch	**0.52**	**1.56**	**0.33**	**3.48**	**89.25**
White grunt	**0.59**	**1.47**	**0.34**	**3.29**	**92.54**
Gray triggerfish	0.47	1.43	0.34	3.18	95.72
Vermilion snapper	0.5	1	0.28	2.23	97.95
Spottail pinfish	0.22	0.22	0.14	0.5	98.45
Red snapper	0.19	0.22	0.13	0.48	98.94
Greater amberjack	0.19	0.19	0.12	0.43	99.37
Planehead filefish	0.11	0.07	0.07	0.16	99.52
Scamp	0.1	0.05	0.08	0.12	99.65
Atlantic sharpnose shark	0.09	0.05	0.06	0.1	99.75
Almaco	0.09	0.04	0.07	0.09	99.84
Gag	0.07	0.03	0.05	0.06	99.91
Banded rudderfish	0.06	0.02	0.04	0.04	99.95
Knobbed porgy	0.03	0.01	0.02	0.01	99.96
Lionfish	0.03	0	0.02	0.01	99.97
Cobia	0.03	0	0.02	0.01	99.98
Red grouper	0.03	0	0.02	0.01	99.99

60-79 km: *Average similarity: 42.61*

Species	Av. Abund	Av. Sim	Sim/SD	Contrib %	Cum. %
Black sea bass	**2.43**	**26.12**	**1.63**	**61.32**	**61.32**
Tomtate	**1.1**	**5.38**	**0.61**	**12.63**	**73.95**
Bank sea bass	**0.75**	**3.14**	**0.49**	**7.37**	**81.32**
***Stenotomus* spp.**	**0.73**	**2.71**	**0.36**	**6.35**	**87.67**
White grunt	**0.55**	**1.49**	**0.31**	**3.49**	**91.16**
Vermilion snapper	**0.48**	**0.98**	**0.27**	**2.31**	**93.47**
Red porgy	0.32	0.68	0.25	1.6	95.07
Sand perch	0.33	0.62	0.18	1.46	96.53
Gray triggerfish	0.31	0.54	0.21	1.28	97.81
Greater amberjack	0.26	0.33	0.12	0.78	98.59
Red snapper	0.18	0.18	0.13	0.41	99
Spottail pinfish	0.16	0.12	0.11	0.29	99.29
Planehead filefish	0.14	0.11	0.09	0.26	99.55
Almaco	0.11	0.06	0.07	0.15	99.7
Atlantic sharpnose shark	0.08	0.05	0.06	0.11	99.81
Scamp	0.07	0.03	0.05	0.07	99.88
Gag	0.07	0.03	0.05	0.06	99.94
Banded rudderfish	0.04	0.01	0.03	0.02	99.96
Cobia	0.04	0.01	0.03	0.02	99.98
Jackknife fish	0.03	0	0.02	0.01	99.99
Sharksucker	0.02	0	0.01	0.01	99.99

80-99 km: *Average similarity: 55.97*

Species	Av. Abund	Av. Sim	Sim/SD	Contrib %	Cum. %
Black sea bass	**2.76**	**40.65**	**2.84**	**72.63**	**72.63**
Tomtate	**1.36**	**8.65**	**0.68**	**15.45**	**88.08**
***Stenotomus* spp.**	**0.73**	**3.36**	**0.37**	**6**	**94.08**
White grunt	0.42	1.35	0.3	2.4	96.49
Spottail pinfish	0.38	0.86	0.22	1.54	98.03
Bank sea bass	0.29	0.66	0.23	1.17	99.21
Gray triggerfish	0.21	0.3	0.16	0.53	99.73
Gag	0.12	0.07	0.09	0.13	99.87
Scamp	0.09	0.04	0.05	0.08	99.94
Greater amberjack	0.1	0.03	0.05	0.06	100

100-119 km: *Average similarity: 67.24*

Species	Av. Abund	Av. Sim	Sim/SD	Contrib %	Cum. %
Black sea bass	**2.92**	**56.76**	**3.1**	**84.42**	**84.42**
***Stenotomus* spp.**	1.2	9.18	0.63	13.65	98.07
Tomtate	0.44	0.8	0.19	1.2	99.26
Greater amberjack	0.21	0.2	0.08	0.3	99.56
Sand perch	0.21	0.17	0.08	0.26	99.82
Spottail pinfish	0.19	0.12	0.08	0.18	100

Table S4. Results of similarity percentages (*SIMPER*) analysis of fish assemblages (from standardized, fourth-root transformed, Bray-Curtis similarity matrix of species abundance) testing for within-group similarities across factor levels for depth zone within the southeastern U.S. Atlantic, between Cape Hatteras, NC and Savannah, GA, during 2013-2015. Columns 2-6 for each habitat variable are average abundance (Avg. Abund.), average Bray-Curtis similarity (Avg. Sim.), ratio of similarity contribution to the standard deviation (Sim./SD), individual contribution % (Contrib. %), and cumulative contribution % of the total within-group similarity (Cum. %). Species shown contribute ≥ 0.01 % individually. Discriminator species contributing a cumulative 90% similarity shown in bold font.

Depth Zone

Inner Shelf 15-20 m: Average similarity: 60.17

Species	Avg. Abund	Avg. Sim.	Sim./SD	Contrib. %	Cum. %
Black sea bass	**2.9**	**51.23**	**2.85**	**85.14**	**85.14**
***Stenotomus* spp.**	**0.93**	**5.74**	**0.47**	**9.54**	**94.68**
Tomtate	0.52	1.41	0.26	2.34	97.02
Gray triggerfish	0.29	0.64	0.21	1.07	98.09
Spottail pinfish	0.34	0.58	0.18	0.97	99.06
Bank sea bass	0.17	0.28	0.12	0.46	99.52
White grunt	0.14	0.11	0.08	0.19	99.71
Greater amberjack	0.12	0.08	0.06	0.13	99.84
Planehead filefish	0.09	0.06	0.06	0.09	99.93
Gag	0.07	0.02	0.05	0.04	99.97
Sand perch	0.06	0.01	0.02	0.02	99.99
Almaco	0.04	0	0.02	0.01	100

Mid-Shelf 21-40 m: Average similarity: 34.97

Species	Avg. Abund	Avg. Sim.	Sim./SD	Contrib. %	Cum. %
Black sea bass	**2**	**16.43**	**1.1**	**46.99**	**46.99**
Tomtate	**1.17**	**5.32**	**0.61**	**15.22**	**62.21**
Red porgy	**0.76**	**2.89**	**0.47**	**8.26**	**70.46**
Bank sea bass	**0.64**	**2.19**	**0.42**	**6.27**	**76.74**
White grunt	**0.61**	**1.6**	**0.34**	**4.59**	**81.32**
Gray triggerfish	**0.55**	**1.6**	**0.34**	**4.57**	**85.89**
Vermilion snapper	**0.56**	**1.31**	**0.32**	**3.74**	**89.64**
***Stenotomus* spp.**	**0.52**	**1.27**	**0.25**	**3.62**	**93.26**
Sand perch	0.45	1.07	0.25	3.07	96.33
Greater amberjack	0.28	0.39	0.15	1.12	97.45
Red snapper	0.18	0.18	0.12	0.51	97.96
Almaco	0.19	0.17	0.11	0.49	98.45
Spottail pinfish	0.16	0.12	0.11	0.34	98.79
Scamp	0.16	0.11	0.1	0.33	99.12
Lionfish	0.13	0.08	0.07	0.24	99.36
Planehead filefish	0.1	0.06	0.07	0.17	99.54
Gag	0.08	0.03	0.05	0.09	99.63
Hogfish	0.08	0.03	0.05	0.09	99.72
Atlantic sharpnose shark	0.07	0.03	0.05	0.08	99.8
Sand tilefish	0.07	0.03	0.03	0.08	99.87
Banded rudderfish	0.06	0.02	0.04	0.06	99.93
Knobbed porgy	0.04	0.01	0.02	0.02	99.95
Cobia	0.03	0.01	0.02	0.02	99.96
Red grouper	0.03	0	0.02	0.01	99.97
Rock hind	0.02	0	0.01	0.01	99.98
Whitebone porgy	0.02	0	0.01	0.01	99.98

Table S4 (continued).

Depth Zone											

Outer Shelf 41-60 m: Average similarity: 23.70

Species	Avg. Abund	Avg. Sim.	Sim./SD	Contrib. %	Cum. %
Red porgy	**1.47**	**10.25**	**0.71**	**43.26**	**43.26**
Gray triggerfish	**0.76**	**2.64**	**0.34**	**11.14**	**54.41**
Almaco	**0.72**	**2.6**	**0.34**	**10.97**	**65.38**
Lionfish	**0.57**	**1.52**	**0.27**	**6.43**	**71.81**
Scamp	**0.49**	**1.16**	**0.27**	**4.9**	**76.71**
Greater amberjack	**0.48**	**1.15**	**0.21**	**4.85**	**81.56**
Tomtate	**0.52**	**0.97**	**0.21**	**4.08**	**85.64**
Vermilion snapper	**0.51**	**0.92**	**0.21**	**3.9**	**89.54**
Knobbed porgy	**0.39**	**0.72**	**0.17**	**3.05**	**92.59**
Hogfish	**0.33**	**0.54**	**0.15**	**2.26**	**94.85**
Black sea bass	0.31	0.44	0.11	1.86	96.71
Red snapper	0.22	0.25	0.1	1.07	97.78
Gag	0.2	0.2	0.1	0.84	98.62
Sand tilefish	0.17	0.14	0.08	0.58	99.2
Banded rudderfish	0.12	0.06	0.06	0.27	99.47
White grunt	0.08	0.03	0.04	0.14	99.61
Atlantic sharpnose shark	0.08	0.02	0.04	0.1	99.71
Graysby	0.06	0.01	0.03	0.05	99.76
Bank sea bass	0.05	0.01	0.03	0.04	99.8
Sandbar shark	0.05	0.01	0.02	0.04	99.84
Yellowmouth grouper	0.03	0	0.02	0.02	99.87
Rock hind	0.03	0	0.02	0.02	99.88
Speckled hind	0.03	0	0.01	0.02	99.9
Reef butterflyfish	0.03	0	0.01	0.02	99.92
Cobia	0.03	0	0.01	0.02	99.94
Stenotomus spp.	0.03	0	0.01	0.01	99.95
Lesser amberjack	0.03	0	0.01	0.01	99.96
Blue angelfish	0.03	0	0.01	0.01	99.97
Sand perch	0.02	0	0.01	0.01	99.98
Whitespotted soapfish	0.02	0	0.01	0.01	99.99

Shelf Break 61-110 m: Average similarity: 28.29

Species	Avg. Abund	Avg. Sim.	Sim./SD	Contrib. %	Cum. %
Red porgy	**1.88**	**20.21**	**0.92**	**71.45**	**71.45**
Almaco	**0.6**	**2.17**	**0.24**	**7.66**	**79.11**
Scamp	**0.47**	**1.24**	**0.22**	**4.37**	**83.48**
Vermilion snapper	**0.45**	**1.02**	**0.17**	**3.61**	**87.09**
Blueline tilefish	**0.44**	**0.99**	**0.16**	**3.51**	**90.59**
Greater amberjack	**0.39**	**0.86**	**0.14**	**3.04**	**93.63**
Lionfish	0.31	0.58	0.12	2.05	95.68
Snowy grouper	0.32	0.56	0.14	1.99	97.66
Gray triggerfish	0.25	0.31	0.1	1.1	98.76
Red snapper	0.17	0.14	0.07	0.5	99.27
Black sea bass	0.12	0.06	0.04	0.21	99.48
Banded rudderfish	0.1	0.05	0.05	0.16	99.64
Red grouper	0.09	0.04	0.03	0.13	99.77
Hogfish	0.06	0.01	0.02	0.05	99.82
Reticulate moray	0.06	0.01	0.02	0.05	99.87
Lesser amberjack	0.06	0.01	0.02	0.05	99.92
Speckled hind	0.05	0.01	0.02	0.04	99.96
Bank sea bass	0.04	0	0.01	0.02	99.97
Gag	0.04	0	0.01	0.01	99.99
Reef butterflyfish	0.04	0	0.01	0.01	100

Table S5. Results of similarity percentages (*SIMPER*) analysis of fish assemblages (from standardized, fourth-root transformed, Bray-Curtis similarity matrix of species abundance) testing for within-group similarities across factor levels for consolidated substrate vertical relief within the southeastern U.S. Atlantic, between Cape Hatteras, NC and Savannah, GA, during 2013-2015. Columns 2-6 for each habitat variable are average abundance (Avg. Abund.), average Bray-Curtis similarity (Avg. Sim.), ratio of similarity contribution to the standard deviation (Sim./SD), individual contribution % (Contrib. %), and cumulative contribution % of the total within-group similarity (Cum. %). Species shown contribute ≥ 0.01 % individually. Discriminator species contributing a cumulative 90% similarity shown in bold font.

Consolidated substrate vertical relief											

No consolidated substrate present: Average similarity: 27.15

Species	Avg. Abund	Avg. Sim.	Sim./SD	Contrib. %	Cum. %
Black sea bass	**1.73**	**14.39**	**0.74**	**53.02**	**53.02**
Red porgy	**0.84**	**3.74**	**0.35**	**13.78**	**66.8**
***Stenotomus* spp.**	**0.67**	**2.29**	**0.31**	**8.42**	**75.22**
Tomtate	**0.6**	**1.73**	**0.31**	**6.36**	**81.59**
Gray triggerfish	**0.47**	**1.18**	**0.23**	**4.35**	**85.94**
Sand perch	**0.46**	**1.16**	**0.23**	**4.29**	**90.22**
Bank sea bass	**0.39**	**0.89**	**0.23**	**3.28**	**93.51**
Greater amberjack	0.29	0.44	0.12	1.61	95.12
Almaco	0.28	0.43	0.11	1.57	96.69
Vermilion snapper	0.26	0.33	0.15	1.23	97.92
White grunt	0.22	0.25	0.13	0.91	98.84
Red snapper	0.14	0.1	0.07	0.37	99.21
Banded rudderfish	0.11	0.06	0.06	0.21	99.43
Hogfish	0.08	0.03	0.03	0.12	99.55
Knobbed porgy	0.07	0.02	0.03	0.09	99.64
Atlantic sharpnose shark	0.06	0.02	0.03	0.08	99.72
Planehead filefish	0.05	0.01	0.03	0.05	99.78
Lionfish	0.05	0.01	0.02	0.05	99.83
Cobia	0.04	0.01	0.02	0.03	99.86
Gag	0.04	0.01	0.02	0.03	99.89
Scamp	0.04	0.01	0.02	0.03	99.91
Sand tilefish	0.03	0.01	0.01	0.02	99.94
Snowy grouper	0.03	0.01	0.01	0.02	99.96
Spottail pinfish	0.03	0	0.02	0.01	99.97
Whitebone porgy	0.02	0	0.01	0.01	99.98
Sharksucker	0.02	0	0.01	0.01	99.98
Lesser amberjack	0.02	0	0.01	0.01	99.99

Low - approximately <0.3 m: Average similarity: 26.40

Species	Avg. Abund	Avg. Sim.	Sim./SD	Contrib. %	Cum. %
Black sea bass	**1.42**	**8.02**	**0.62**	**30.38**	**30.38**
Red porgy	**1.1**	**5.79**	**0.6**	**21.93**	**52.32**
Tomtate	**0.94**	**3.33**	**0.44**	**12.63**	**64.95**
Gray triggerfish	**0.66**	**2.15**	**0.38**	**8.15**	**73.1**
Vermilion snapper	**0.62**	**1.53**	**0.31**	**5.78**	**78.87**
Bank sea bass	**0.47**	**1.15**	**0.3**	**4.35**	**83.22**
White grunt	**0.47**	**0.95**	**0.26**	**3.62**	**86.84**
Almaco	**0.36**	**0.66**	**0.19**	**2.48**	**89.32**
Greater amberjack	**0.35**	**0.59**	**0.17**	**2.25**	**91.58**
Scamp	**0.3**	**0.46**	**0.16**	**1.75**	**93.33**
Lionfish	**0.3**	**0.43**	**0.15**	**1.62**	**94.95**
Sand perch	0.23	0.28	0.14	1.08	96.03
Stenotomus spp.	0.25	0.28	0.13	1.06	97.09
Red snapper	0.22	0.25	0.12	0.96	98.05
Knobbed porgy	0.13	0.08	0.07	0.31	98.36
Gag	0.12	0.08	0.07	0.31	98.67
Spottail pinfish	0.13	0.08	0.09	0.3	98.97
Hogfish	0.13	0.07	0.07	0.28	99.54
Sand tilefish	0.12	0.08	0.06	0.28	99.26
Planehead filefish	0.09	0.05	0.06	0.18	99.71
Banded rudderfish	0.07	0.02	0.04	0.09	99.8
Atlantic sharpnose shark	0.05	0.02	0.04	0.06	99.86
Blueline tilefish	0.05	0.01	0.02	0.05	99.92
Red grouper	0.03	0.01	0.02	0.02	99.94
Snowy grouper	0.02	0	0.01	0.01	99.95
Rock hind	0.02	0	0.02	0.01	99.96
Speckled hind	0.02	0	0.01	0.01	99.96
Cobia	0.02	0	0.01	0.01	99.97
Reticulate moray	0.02	0	0.01	0.01	99.98

Table S5 (continued).

Consolidated substrate vertical relief										
Moderate - approximately > 0.3 – 1 m: Average similarity: 26.36						**High - approximately > 1 m:** Average similarity: 23.79				
Species	Avg. Abund	Avg. Sim.	Sim./SD	Contrib. %	Cum. %	Species	Avg. Abund	Avg. Sim.	Sim./SD	Contrib. %	Cum. %
Red porgy	**1.11**	**5.45**	**0.64**	**20.68**	**20.68**	**Tomtate**	**1.36**	**6.41**	**0.63**	**26.96**	**26.96**
Tomtate	**1.2**	**4.94**	**0.58**	**18.75**	**39.43**	**Red porgy**	**0.95**	**3.74**	**0.51**	**15.73**	**42.69**
Black sea bass	**0.99**	**3.67**	**0.44**	**13.94**	**53.37**	**Lionfish**	**0.77**	**2.85**	**0.34**	**11.97**	**54.66**
Vermilion snapper	**0.79**	**2.14**	**0.36**	**8.12**	**61.49**	**Scamp**	**0.76**	**2.74**	**0.41**	**11.52**	**66.18**
Scamp	**0.61**	**1.66**	**0.4**	**6.28**	**67.77**	**Vermilion snapper**	**0.68**	**1.43**	**0.3**	**6**	**72.18**
White grunt	**0.6**	**1.5**	**0.3**	**5.68**	**73.44**	**Almaco**	**0.5**	**1.17**	**0.27**	**4.93**	**77.11**
Almaco	**0.55**	**1.32**	**0.33**	**5**	**78.44**	**Hogfish**	**0.45**	**1.02**	**0.19**	**4.31**	**81.42**
Lionfish	**0.55**	**1.31**	**0.3**	**4.96**	**83.41**	**Gray triggerfish**	**0.44**	**0.91**	**0.27**	**3.84**	**85.26**
Gray triggerfish	**0.54**	**1.28**	**0.28**	**4.86**	**88.26**	**White grunt**	**0.45**	**0.82**	**0.24**	**3.44**	**88.7**
Greater amberjack	**0.42**	**0.87**	**0.24**	**3.31**	**91.58**	**Greater amberjack**	**0.4**	**0.76**	**0.26**	**3.2**	**91.9**
Bank sea bass	**0.32**	**0.51**	**0.21**	**1.94**	**93.51**	Black sea bass	0.44	0.75	0.22	3.16	95.05
Hogfish	**0.29**	**0.39**	**0.15**	**1.48**	**94.99**	Knobbed porgy	0.26	0.27	0.13	1.13	96.18
Spottail pinfish	0.3	0.39	0.18	1.46	96.46	Red snapper	0.2	0.2	0.13	0.82	97.01
Knobbed porgy	0.27	0.29	0.13	1.11	97.57	Spottail pinfish	0.22	0.19	0.13	0.8	97.81
Gag	0.23	0.27	0.16	1.01	98.58	Gag	0.18	0.14	0.12	0.61	98.42
Red snapper	0.15	0.11	0.09	0.41	98.99	Graysby	0.15	0.09	0.08	0.39	98.81
Graysby	0.14	0.08	0.09	0.29	99.28	Bank sea bass	0.14	0.08	0.09	0.34	99.15
Atlantic sharpnose shark	0.14	0.07	0.06	0.26	99.54	Sand tilefish	0.13	0.08	0.05	0.32	99.47
Sand tilefish	0.09	0.03	0.04	0.12	99.66	Yellowmouth grouper	0.12	0.06	0.08	0.26	99.73
Rock hind	0.07	0.02	0.05	0.09	99.75	Sandbar shark	0.08	0.02	0.03	0.09	99.82
Stenotomus spp.	0.07	0.02	0.04	0.07	99.82	Whitespotted soapfish	0.05	0.01	0.03	0.03	99.85
Banded rudderfish	0.06	0.01	0.03	0.04	99.91	Rock hind	0.05	0.01	0.02	0.03	99.91
Cobia	0.05	0.01	0.04	0.04	99.87	Planehead filefish	0.05	0.01	0.02	0.03	99.93
Gray snapper	0.04	0.01	0.02	0.03	99.93	Gray snapper	0.04	0.01	0.03	0.03	99.88
Planehead filefish	0.04	0.01	0.02	0.02	99.96	Atlantic sharpnose shark	0.05	0	0.02	0.02	99.95
Reef butterflyfish	0.04	0	0.02	0.02	99.97	Red grouper	0.03	0	0.02	0.02	99.97
Red grouper	0.03	0	0.02	0.01	99.98	Squirrelfish	0.03	0	0.02	0.01	99.98
Sandbar shark	0.03	0	0.02	0.01	99.99	Reef butterflyfish	0.02	0	0.02	0.01	99.99
						Reticulate moray	0.02	0	0.02	0.01	100

Table S6. Results of similarity percentages (*SIMPER*) analysis of fish assemblages (from standardized, fourth-root transformed, Bray-Curtis similarity matrix of species abundance) testing for within-group similarities across factor levels for consolidated substrate size within the southeastern U.S. Atlantic, between Cape Hatteras, NC and Savannah, GA, during 2013-2015. Columns 2-6 for each habitat variable are average abundance (Avg. Abund.), average Bray-Curtis similarity (Avg. Sim.), ratio of similarity contribution to the standard deviation (Sim./SD), individual contribution % (Contrib. %), and cumulative contribution % of the total within-group similarity (Cum. %). Species shown contribute ≥ 0.01 % individually. Discriminator species contributing a cumulative 90% similarity shown in bold font.

	Consolidated substrate size										
No consolidated substrate present: Average similarity: 26.85						**Small to Coarse: ≥50% of consolidated substrate <1 m in diameter** Average similarity: 26.76					
Species	Avg. Abund	Avg. Sim.	Sim./SD	Contrib. %	Cum. %	Species	Avg. Abund	Avg. Sim.	Sim./SD	Contrib. %	Cum. %
Black sea bass	**1.71**	**14.1**	**0.73**	**52.51**	**52.51**	**Black sea bass**	**1.51**	**9.2**	**0.67**	**34.37**	**34.37**
Red porgy	**0.84**	**3.75**	**0.35**	**13.95**	**66.46**	**Red porgy**	**1.07**	**5.6**	**0.55**	**20.92**	**55.29**
***Stenotomus* spp.**	**0.67**	**2.27**	**0.31**	**8.45**	**74.9**	**Tomtate**	**0.91**	**3.26**	**0.43**	**12.17**	**67.46**
Tomtate	**0.6**	**1.7**	**0.31**	**6.33**	**81.23**	**Gray triggerfish**	**0.66**	**2.14**	**0.37**	**7.98**	**75.44**
Gray triggerfish	**0.47**	**1.18**	**0.23**	**4.39**	**85.62**	**Vermilion snapper**	**0.6**	**1.55**	**0.32**	**5.79**	**81.23**
Sand perch	**0.46**	**1.16**	**0.23**	**4.33**	**89.95**	**Bank sea bass**	**0.46**	**1.17**	**0.3**	**4.35**	**85.58**
Bank sea bass	**0.39**	**0.89**	**0.23**	**3.31**	**93.26**	**White grunt**	**0.43**	**0.81**	**0.23**	**3.04**	**88.62**
Greater amberjack	0.3	0.47	0.12	1.75	95.01	**Greater amberjack**	**0.32**	**0.52**	**0.15**	**1.94**	**90.56**
Almaco	0.29	0.44	0.12	1.66	96.67	**Almaco**	**0.31**	**0.5**	**0.15**	**1.88**	**92.44**
Vermilion snapper	0.27	0.34	0.15	1.26	97.93	**Sand perch**	**0.3**	**0.47**	**0.18**	**1.76**	**94.19**
White grunt	0.21	0.24	0.12	0.88	98.81	*Stenotomus* spp.	0.29	0.39	0.15	1.47	95.66
Red snapper	0.14	0.11	0.07	0.39	99.2	Red snapper	0.25	0.33	0.13	1.22	96.88
Banded rudderfish	0.11	0.06	0.06	0.22	99.42	Lionfish	0.23	0.25	0.12	0.95	97.82
Hogfish	0.08	0.03	0.03	0.13	99.54	Scamp	0.22	0.24	0.11	0.91	98.73
Knobbed porgy	0.07	0.02	0.02	0.08	99.62	Knobbed porgy	0.11	0.06	0.05	0.23	98.96
Atlantic sharpnose shark	0.06	0.02	0.03	0.08	99.7	Sand tilefish	0.11	0.06	0.05	0.23	99.19
Planehead filefish	0.05	0.02	0.03	0.06	99.76	Hogfish	0.11	0.06	0.06	0.22	99.41
Lionfish	0.05	0.01	0.02	0.05	99.81	Banded rudderfish	0.08	0.03	0.05	0.12	99.54
Scamp	0.04	0.01	0.02	0.03	99.84	Planehead filefish	0.07	0.03	0.05	0.11	99.64
Cobia	0.04	0.01	0.02	0.03	99.87	Gag	0.07	0.03	0.04	0.1	99.74
Gag	0.04	0.01	0.02	0.03	99.9	Spottail pinfish	0.07	0.02	0.04	0.08	99.83
Sand tilefish	0.03	0.01	0.01	0.02	99.93	Blueline tilefish	0.06	0.02	0.02	0.06	99.88
Snowy grouper	0.03	0.01	0.01	0.02	99.95	Atlantic sharpnose shark	0.04	0.01	0.03	0.03	99.92
Blueline tilefish	0.03	0	0.01	0.02	99.97	Snowy grouper	0.03	0.01	0.02	0.02	99.94
Spottail pinfish	0.03	0	0.02	0.01	99.98	Red grouper	0.03	0	0.01	0.01	99.95
Sharksucker	0.02	0	0.01	0.01	99.99	Reef butterflyfish	0.03	0	0.01	0.01	99.96
Jackknife fish	0.02	0	0.01	0.01	99.99	Rock hind	0.02	0	0.01	0.01	99.97

Table S6 (continued).

	Consolidated substrate size				
Coarse to Continuous: ≥50% of consolidated substrate >1 m in diameter					
Average similarity: 25.49					
Species	Avg. Abund	Avg. Sim.	Sim./SD	Contrib. %	Cum. %
Red porgy	**1.11**	**5.55**	**0.64**	**21.76**	**21.76**
Black sea bass	**1.1**	**4.58**	**0.48**	**17.96**	**39.72**
Tomtate	**1.12**	**4.31**	**0.52**	**16.91**	**56.63**
Gray triggerfish	**0.6**	**1.7**	**0.34**	**6.68**	**63.31**
Vermilion snapper	**0.69**	**1.65**	**0.32**	**6.47**	**69.78**
Scamp	**0.53**	**1.34**	**0.31**	**5.26**	**75.05**
White grunt	**0.55**	**1.25**	**0.3**	**4.89**	**79.93**
Lionfish	**0.5**	**1.18**	**0.24**	**4.62**	**84.56**
Almaco	**0.47**	**1.06**	**0.27**	**4.14**	**88.7**
Greater amberjack	**0.39**	**0.74**	**0.22**	**2.88**	**91.58**
Bank sea bass	**0.38**	**0.72**	**0.24**	**2.84**	**94.42**
Spottail pinfish	0.24	0.27	0.16	1.07	95.49
Hogfish	0.23	0.26	0.11	1.01	96.5
Gag	0.21	0.22	0.13	0.88	97.38
Knobbed porgy	0.21	0.2	0.1	0.77	98.15
Red snapper	0.17	0.15	0.1	0.58	98.73
Sand tilefish	0.12	0.08	0.06	0.3	99.03
Stenotomus spp.	0.12	0.07	0.07	0.27	99.3
Planehead filefish	0.09	0.04	0.05	0.15	99.45
Atlantic sharpnose shark	0.09	0.04	0.05	0.14	99.6
Sand perch	0.08	0.03	0.05	0.12	99.72
Graysby	0.08	0.02	0.05	0.09	99.81
Banded rudderfish	0.05	0.01	0.02	0.03	99.88
Rock hind	0.04	0.01	0.03	0.03	99.85
Yellowmouth grouper	0.04	0.01	0.02	0.02	99.9
Red grouper	0.03	0	0.02	0.02	99.92
Cobia	0.03	0	0.02	0.02	99.94
Gray snapper	0.03	0	0.02	0.01	99.95
Sandbar shark	0.03	0	0.02	0.01	99.97
Speckled hind	0.02	0	0.01	0.01	99.97
Whitespotted soapfish	0.02	0	0.01	0.01	99.98
Reticulate moray	0.02	0	0.01	0.01	99.99