Supplement 3. The following material includes additional results.

Table S3.1 Summary of group-specific data for movement path modeling. n_obs = number of observations in the model, n_path = number of unique potential movement paths, n_move = total number of observed movements, n_ind = number of unique individuals contributing to movements, mean_move = mean of the response variable, i.e., mean number of movements per potential movement path, including zeros. Coastal sharks = great hammerhead *Sphyrna mokarran*, sandbar *Carcharhinus plumbeus*, lemon *Negaprion brevirostris*, and tiger *Galeocerdo cuvier* sharks.

Species	n_obs	n_path	n_move	n_ind	mean_move
Atlantic tarpon (adult)	112	28	86	24	0.77
Blacktip shark (juvenile)	32	8	25	10	0.78
Cobia (adult)	104	26	16	10	0.15
Bull shark (adult & juvenile)	152	38	115	32	0.76
Coastal sharks (adult & juvenile)	80	20	28	10	0.35
White shark (adult & juvenile)	32	8	10	7	0.31
Smalltooth sawfish (adult & large juv)	80	20	67	22	0.84
Whitespotted eagle ray (adult & juvenile)	48	12	182	23	3.79

Table S3.2. Results for posterior densities of the model coefficients for the movement path models. Coastal sharks = great hammerhead *Sphyrna mokarran*, sandbar *Carcharhinus plumbeus*, lemon *Negaprion brevirostris*, and tiger *Galeocerdo cuvier* sharks. Models with and without interaction terms between season and movement direction were fitted for each species group, and model comparison via leave-one-out cross-validation was used to determine the best-fitting model. Parameter estimates and model weights are provided for the best-fitting models. All reported standard deviations (SD) are proportional to the median absolute deviation, which is more robust for long-tailed distributions than raw posterior SDs. CrI = Credible Interval. Mean_PPD = mean of the predictive posterior distribution (compare to mean_move in Table S3.1)

Coefficient	Mean	SD	CrI 5%	Median	CrI 95%
	Adult Atlantic tarpon *Megalops atlanticus*				
	Model: interaction (weight = 0.72)				
Intercept	-1.42	0.61	-2.43	-1.41	-0.42
SeasonSpring	1.16	0.76	-0.06	1.14	2.45
SeasonSummer	2.19	0.73	0.98	2.18	3.40
SeasonFall	0.01	0.85	-1.40	0.03	1.39
Move_dirS	-0.46	0.83	-1.87	-0.45	0.89
SeasonSpring:Move_dirS	-0.11	1.04	-1.83	-0.11	1.57
SeasonSummer:Move_dirS	-1.27	1.06	-3.02	-1.26	0.50
SeasonFall:Move_dirS	2.40	1.06	0.72	2.36	4.17
Mean_PPD	0.87	0.32	0.47	0.81	1.45

Table S3.2 cont.

Coefficient	Mean	SD	CrI 5%	Median	CrI 95%
		Juvenile blacktip shark *Carcharhinus limbatus*			
		Model: additive (weight = 1.00)			
Intercept	-0.185	0.668	-1.277	-0.186	0.912
SeasonSpring	-1.556	0.943	-3.171	-1.532	-0.037
SeasonSummer	-3.457	1.475	-6.023	-3.357	-1.223
SeasonFall	0.160	0.738	-1.034	0.148	1.418
Move_dirS	0.688	0.673	-0.438	0.693	1.799
Mean_PPD	0.963	0.715	0.344	0.344	1.939
		Cobia *Rachycentron canadum*			
		Model: interaction (weight = 1.00)			
Intercept	-3.769	1.046	-5.585	-3.688	-2.193
SeasonSpring	2.732	1.100	1.033	2.668	4.598
SeasonSummer	1.019	1.269	-1.057	1.023	3.146
SeasonFall	1.005	1.251	-1.023	0.992	3.077
Move_dirS	-0.592	1.209	-2.604	-0.576	1.330
SeasonSpring:Move_dirS	-2.640	1.697	-5.508	-2.589	0.032
SeasonSummer:Move_dirS	1.962	1.420	-0.312	1.934	4.398
SeasonFall:Move_dirS	1.967	1.416	-0.352	1.952	4.351
Mean_PPD	0.161	0.062	0.067	0.154	0.279
		Adult and juvenile bull shark *Carcharhinus leucas*			
		Model: interaction (weight = 0.78)			
Intercept	-1.859	0.612	-2.895	-1.854	-0.885
SeasonSpring	2.385	0.707	1.224	2.371	3.547
SeasonSummer	1.683	0.745	0.476	1.680	2.929
SeasonFall	0.899	0.775	-0.373	0.894	2.196
Move_dirS	-0.043	0.768	-1.314	-0.039	1.218
SeasonSpring:Move_dirS	-1.725	1.003	-3.364	-1.722	-0.085
SeasonSummer:Move_dirS	0.206	0.943	-1.333	0.198	1.773
SeasonFall:Move_dirS	1.463	0.970	-0.165	1.483	3.013
Mean_PPD	0.846	0.258	0.507	0.809	1.316
		Adult and juvenile coastal sharks			
		Model: interaction (weight = 1.00)			
Intercept	-1.610	0.658	-2.725	-1.581	-0.594
SeasonSpring	1.067	0.811	-0.251	1.053	2.446
SeasonSummer	1.037	0.815	-0.306	1.031	2.417
SeasonFall	-1.746	1.246	-3.873	-1.669	0.186
Move_dirS	-0.226	0.899	-1.734	-0.195	1.199
SeasonSpring:Move_dirS	-2.965	1.607	-5.759	-2.874	-0.439
SeasonSummer:Move_dirS	0.669	1.084	-1.118	0.628	2.510
SeasonFall:Move_dirS	1.554	1.466	-0.844	1.560	3.945
Mean_PPD	0.384	0.146	0.200	0.363	0.638

Table S3.2 cont.

Coefficient	Mean	SD	CrI 5%	Median	CrI 95%
	Adult and juvenile white shark *Carcharodon carcharias*				
	Model: interaction (weight = 1.00)				
Intercept	-2.939	1.239	-5.136	-2.854	-1.069
SeasonSpring	3.071	1.239	1.134	3.018	5.197
SeasonSummer	1.473	1.353	-0.711	1.426	3.764
SeasonFall	-1.473	1.880	-4.673	-1.348	1.425
MovedirS	-0.755	0.870	-2.219	-0.736	0.642
Mean_PPD	0.352	0.294	0.094	0.313	0.781
	Adult and large juvenile smalltooth sawfish *Pristis pectinata*				
	Model: interaction (weight = 0.76)				
Intercept	-0.564	0.557	-1.474	-0.561	0.375
SeasonSpring	1.440	0.750	0.208	1.428	2.692
SeasonSummer	-0.311	0.836	-1.636	-0.340	1.079
SeasonFall	-2.102	1.154	-4.014	-2.082	-0.237
Move_dirS	-0.117	0.768	-1.371	-0.129	1.150
SeasonSpring:Move_dirS	-0.464	1.041	-2.188	-0.449	1.212
SeasonSummer:Move_dirS	0.071	1.148	-1.819	0.088	1.973
SeasonFall:Move_dirS	2.876	1.296	0.787	2.854	5.045
Mean_PPD	1.034	0.501	0.512	0.938	1.888
	Adult and juvenile whitespotted eagle ray *Aetobatus narinari*				
	Model: additive (weight = 1.000)				
Intercept	0.851	0.676	-0.172	0.791	2.063
SeasonSpring	0.978	0.823	-0.415	0.975	2.325
SeasonSummer	0.658	0.838	-0.723	0.650	2.034
SeasonFall	0.182	0.843	-1.228	0.169	1.560
Move_dirS	0.216	0.582	-0.760	0.228	1.148
Mean_PPD	0.289	0.080	0.177	0.279	0.435

Table S3.3. Results of marginal means comparisons for season effect, conditioned on movement direction for the movement path models. The contrast was generated between a given season and the mean over all other seasons. MAD = median absolute deviation, CrI = credible interval, pd = probability of direction, ROPE = region of practical equivalence. Percent in ROPE is the proportion of the full posterior density that falls within the ROPE. ROPE range was set as -0.18 to 0.18. Certainty associated with the most probable direction of the effect (positive or negative) is indicated as follows: * = likely existing (>97.5%), ** = probably existing (>99.5%), *** = certainly existing (>99.95%). Significance indicators on % in ROPE are as follows: * = significant (<5%), ** = highly significant (<1%). Coastal sharks = great hammerhead *Sphyrna mokarran*, sandbar *Carcharhinus plumbeus*, lemon *Negaprion brevirostris*, and tiger *Galeocerdo cuvier* sharks.

Movement Direction	Season	Median	MAD	Lower 89% CrI	Upper 89% CrI	pd (%)	% in ROPE
				Adult Atlantic tarpon *Megalops atlanticus*			
N	Winter	-1.12	0.65	-2.10	-0.08	96.43	4.90*
	Spring	0.41	0.62	-0.46	1.50	75.65	19.53
	Summer	1.79	0.56	0.85	2.69	99.88**	0.20**
	Fall	-1.09	0.73	-2.31	-0.01	94.00	6.50
S	Winter	-1.44	0.76	-2.66	-0.20	97.43	3.23*
	Spring	-0.06	0.68	-1.07	1.02	52.95	20.40
	Summer	-0.23	0.72	-1.30	0.95	62.18	19.50
	Fall	1.75	0.58	0.82	2.72	99.75**	0.43**
				Juvenile blacktip shark *Carcharhinus limbatus*			
N and S	Winter	1.623	0.728	0.510	2.770	98.70*	1.53*
	Spring	-0.455	0.955	-2.096	1.048	67.88	13.95
	Summer	-2.860	1.386	-5.411	-0.821	99.05*	0.68**
	Fall	1.819	0.786	0.578	3.121	99.15*	1.55*
				Cobia *Rachycentron canadum*			
N	Winter	-1.535	1.012	-3.338	-0.107	95.13	4.15*
	Spring	2.049	0.773	0.883	3.334	99.58**	0.48**
	Summer	-0.160	1.034	-1.803	1.456	56.48	14.93
	Fall	-0.196	0.991	-1.733	1.455	58.18	14.83
S	Winter	-1.934	1.308	-4.014	0.111	95.35	3.53*
	Spring	-1.714	1.520	-4.249	0.681	89.83	4.73*
	Summer	1.936	0.931	0.519	3.525	98.28*	1.58*
	Fall	1.927	0.962	0.399	3.480	98.08*	1.85*
				Adult and juvenile bull shark *Carcharhinus leucas*			
N	Winter	-1.649	0.644	-2.615	-0.627	99.75**	0.70**
	Spring	1.516	0.507	0.719	2.361	99.88**	0.45**
	Summer	0.591	0.541	-0.262	1.496	85.28	14.35
	Fall	-0.461	0.605	-1.392	0.511	77.88	17.50
S	Winter	-1.625	0.680	-2.603	-0.465	99.35*	0.95**
	Spring	-0.760	0.675	-1.778	0.380	86.98	11.33
	Summer	0.858	0.537	-0.046	1.720	94.80	7.45
	Fall	1.506	0.538	0.655	2.383	99.75**	0.58**

Table S3.3 cont.

Movement Direction	Season	Median	MAD	Lower 89% CrI	Upper 89% CrI	pd (%)	% in ROPE
			Adult and juvenile coastal sharks group				
N	Winter	-0.133	0.715	-1.292	0.994	57.18	19.68
	Spring	1.315	0.729	0.132	2.469	96.48	3.88*
	Summer	1.266	0.721	0.015	2.315	96.08	4.05*
	Fall	-2.372	1.211	-4.345	-0.589	99.10*	1.08*
S	Winter	0.155	0.872	-1.221	1.600	56.00	15.58
	Spring	-2.247	1.466	-4.884	-0.124	96.25	2.40*
	Summer	2.350	0.804	1.035	3.656	99.90**	0.18**
	Fall	-0.104	1.021	-1.793	1.618	54.48	14.48
			Adult and juvenile white shark *Carcharodon carcharias*				
N and S	Winter	-0.977	1.109	-2.918	0.651	82.70	8.88
	Spring	3.020	1.018	1.356	4.643	99.88**	0.10**
	Summer	0.929	1.160	-0.909	2.863	79.58	8.95
	Fall	-2.795	1.819	-5.899	-0.059	96.60	2.15*
			Adult and large juvenile smalltooth sawfish *Pristis pectinata*				
N	Winter	0.325	0.644	-0.721	1.334	69.23	19.38
	Spring	2.222	0.707	1.135	3.414	99.95**	0.10**
	Summer	-0.080	0.801	-1.334	1.257	54.40	18.23
	Fall	-2.439	1.132	-4.193	-0.659	98.83*	1.08*
S	Winter	-0.526	0.686	-1.620	0.618	77.35	15.33
	Spring	0.799	0.670	-0.258	1.931	88.05	11.05
	Summer	-0.826	0.763	-2.009	0.521	85.40	10.48
	Fall	0.516	0.666	-0.524	1.648	78.58	15.50
			Adult and juvenile whitespotted eagle ray *Aetobatus narinari*				
N and S	Winter	-0.642	0.644	-1.617	0.549	82.20	12.28
	Spring	0.671	0.650	-0.430	1.756	85.88	12.28
	Summer	0.245	0.640	-0.831	1.318	64.55	20.73
	Fall	-0.385	0.648	-1.509	0.662	72.53	17.73

Table S3.4. Results of marginal means for pairwise contrasts (N/S) of movement direction within season for the movement path models. Parameter names and explanations are as for Table S3.3. Coastal sharks = great hammerhead *Sphyrna mokarran*, sandbar *Carcharhinus plumbeus*, lemon *Negaprion brevirostris*, and tiger *Galeocerdo cuvier* sharks.

Season	Median	MAD	Lower 89% CI	Upper 89% CI	pd (%)	% in ROPE
			Adult Atlantic tarpon *Megalops atlanticus*			
Winter	0.446	0.838	-0.848	1.816	70.93	15.33
Spring	0.580	0.744	-0.626	1.746	77.45	13.33
Summer	1.734	0.747	0.463	2.885	98.75*	1.08*
Fall	-1.939	0.803	-3.249	-0.697	99.38*	0.90**
			Juvenile blacktip shark *Carcharhinus limbatus*			
All seasons	-0.693	0.680	-1.708	0.448	85.15	12.60
			Cobia *Rachycentron canadum*			
Winter	0.576	1.221	-1.278	2.539	67.93	10.85
Spring	3.056	1.589	0.547	5.661	99.18*	0.78**
Summer	-1.304	1.066	-3.103	0.345	90.05	6.23
Fall	-1.343	1.056	-3.053	0.371	91.03	5.85
			Adult and juvenile bull shark *Carcharhinus leucas*			
Winter	0.039	0.748	-1.177	1.271	51.90	18.78
Spring	1.786	0.704	0.676	2.951	99.15*	1.28*
Summer	-0.165	0.625	-1.101	0.892	59.95	21.73
Fall	-1.421	0.667	-2.544	-0.411	98.08*	2.55*
			Adult and juvenile coastal sharks group			
Winter	0.195	0.909	-1.225	1.624	59.23	16.08
Spring	3.036	1.480	0.891	5.689	99.45*	0.45**
Summer	-0.429	0.705	-1.503	0.787	73.25	16.10
Fall	-1.272	1.359	-3.522	0.852	83.75	5.85
			Adult and juvenile white shark *Carcharodon carcharias*			
All seasons	0.736	0.834	-0.663	2.096	81.58	11.35
			Adult and large juvenile smalltooth sawfish *Pristis pectinata*			
Winter	0.129	0.766	-1.040	1.398	56.95	17.90
Spring	0.588	0.739	-0.623	1.842	78.73	13.08
Summer	0.045	0.961	-1.574	1.547	51.83	14.68
Fall	-2.718	1.206	-4.842	-0.958	99.30*	1.20*
			Adult and juvenile whitespotted eagle ray *Aetobatus narinari*			
All seasons	-0.228	0.562	-1.200	0.627	65.78	22.88

Table S3.5. Regression parameters, standard errors, *z*-values and *P*-values for the top predator detection day generalized linear model. The estimated values for σ^2_{year} and $\sigma^2_{month:year}$ are 5.975e-09 and 7.658e-01, respectively. The reference area for the model was nearshore Charlotte Harbor. Area N = North Florida, TBn = nearshore Tampa Bay, and TBo = offshore Tampa Bay.

Parameter	Estimate	Std. Error	z value	Pr(>|z|)
Intercept	-6.216	0.442	-14.058	<2E-16
AreaN	-0.276	0.401	-0.688	4.91E-01
AreaTBn	1.172	0.274	4.283	1.84E-05
AreaTBo	-0.271	0.333	-0.816	4.15E-01
SeasonSpring	0.470	0.502	0.936	3.49E-01
SeasonSummer	0.965	0.483	1.997	4.58E-02
SeasonWinter	-1.386	0.776	-1.785	7.42E-02
StudyYear 2017	0.575	0.441	1.302	1.93E-01
StudyYear 2018	-2.914	0.721	-4.045	5.24E-05
AreaN : SeasonSpring	-0.608	0.588	-1.034	3.01E-01
AreaTBn : SeasonSpring	-1.620	0.351	-4.614	3.95E-06
AreaTBo : SeasonSpring	-0.460	0.412	-1.116	2.64E-01
AreaN : SeasonSummer	0.376	0.455	0.827	4.08E-01
AreaTBn : SeasonSummer	-2.014	0.317	-6.361	2.00E-10
AreaTBo : SeasonSummer	0.462	0.328	1.408	1.59E-01
AreaN : SeasonWinter	0.350	1.022	0.342	7.32E-01
AreaTBn : SeasonWinter	-1.327	0.916	-1.448	1.48E-01
AreaTBo : SeasonWinter	-0.724	1.051	-0.689	4.91E-01
AreaN : StudyYear 2017	-4.097	0.752	-5.447	5.12E-08
AreaTBn : StudyYear 2017	-1.022	0.287	-3.567	3.61E-04
AreaTBo : StudyYear 2017	-0.950	0.289	-3.284	1.02E-03
AreaN : StudyYear 2018	1.612	0.718	2.246	2.47E-02
AreaTBn : StudyYear 2018	1.656	0.693	2.390	1.68E-02

Table S3.6. Diagnostics results for the top predator detection day generalized linear model. Uniformity test is the one-sample Kolmogorov-Smirnov test, dispersion is a comparison of the standard deviation of residuals from the fitted model to simulated values, and zero-inflation is a comparison of observed to expected number of zeros from simulation. The fitted model is the null hypothesis for each test.

Test	Test statistic	Value	*P*-value
Uniformity	*D*	0.009	0.856
Dispersion	ratioObsSim	0.887	0.575
Zero-inflation	ratioObsSim	0.995	0.712

Table S3.7. Results of marginal means comparisons for season effect, conditioned on area for the top predator detection day generalized linear model. The contrast was generated between a given season and the mean over all other seasons, averaged over study years. *P*-values are adjusted according to the Benjamini & Hochberg (1995) method.

Season	Estimate	Std. Error	df	*T* ratio	*P*-value
Nearshore Charlotte Harbor					
Fall	-0.016	0.454	4234	-0.036	0.971
Spring	0.610	0.451	4234	1.354	0.234
Summer	1.270	0.434	4234	2.927	0.014
Winter	-1.864	0.717	4234	-2.601	0.019
North Florida					
Fall	-0.056	0.555	4234	-0.101	0.920
Spring	-0.240	0.576	4234	-0.416	0.903
Summer	1.733	0.496	4234	3.490	0.002
Winter	-1.437	0.779	4234	-1.844	0.130
Nearshore Tampa Bay					
Fall	1.637	0.439	4234	3.733	0.001
Spring	0.104	0.474	4234	0.220	0.826
Summer	0.238	0.475	4234	0.502	0.821
Winter	-1.980	0.726	4234	-2.727	0.013
Offshore Tampa Bay					
Fall	0.224	0.500	4234	0.448	0.654
Spring	0.237	0.498	4234	0.476	0.654
Summer	2.127	0.465	4234	4.579	<0.0001
Winter	-2.588	0.854	4234	-3.032	0.005

Table S3.8. Results of marginal means comparisons for study year effect, conditioned on area for the top predator detection day generalized linear model. The contrast was generated between a given study year and the mean over all other study years, averaged over season. *P*-values are adjusted according to the Benjamini & Hochberg (1995) method.

Season	Estimate	Std. Error	df	*T* ratio	*P*-value
Nearshore Charlotte Harbor					
2016	1.170	0.481	4234	2.430	0.015
2017	2.032	0.467	4234	4.351	<0.0001
2018	-3.202	0.679	4234	-4.714	<0.0001
North Florida					
2016	2.412	0.548	4234	4.404	<.0001
2017	-2.871	0.816	4234	-3.517	0.001
2018	0.459	0.602	4234	0.762	0.446
Nearshore Tampa Bay					
2016	0.853	0.408	4234	2.089	0.055
2017	0.182	0.413	4234	0.441	0.659
2018	-1.035	0.453	4234	-2.283	0.055
Offshore Tampa Bay					
2016	0.493	0.411	4234	1.200	0.502
2017	-0.069	0.415	4234	-0.166	0.868
2018	-0.424	0.439	4234	-0.965	0.502

Table S3.9 Regression parameters, standard errors, *z*-values and *P*-values for the top predator number of unique individuals per month generalized linear model. The reference area for the model was nearshore Charlotte Harbor. Area N = North Florida, TBn = nearshore Tampa Bay, and TBo = offshore Tampa Bay.

Parameter	Estimate	Std. Error	z value	Pr(>|z|)
Intercept	-3.255	0.337	-9.665	<2.00E-16
AreaN	-0.024	0.510	-0.048	9.62E-01
AreaTBn	0.412	0.449	0.918	3.59E-01
AreaTBo	-0.198	0.477	-0.415	6.78E-01
SeasonSpring	0.029	0.393	0.074	9.41E-01
SeasonSummer	0.053	0.385	0.138	8.90E-01
SeasonWinter	-1.346	0.636	-2.115	3.44E-02
StudyYear2017	0.309	0.329	0.939	3.48E-01
StudyYear2018	-1.790	0.633	-2.829	4.67E-03
AreaN : SeasonSpring	-0.138	0.668	-0.206	8.37E-01
AreaTBn : SeasonSpring	-0.277	0.531	-0.522	6.02E-01
AreaTBo : SeasonSpring	0.503	0.545	0.923	3.56E-01
AreaN : SeasonSummer	0.414	0.604	0.687	4.92E-01
AreaTBn : SeasonSummer	-0.840	0.569	-1.478	1.39E-01
AreaTBo : SeasonSummer	1.054	0.513	2.055	3.99E-02
AreaN : SeasonWinter	0.513	0.930	0.552	5.81E-01
AreaTBn : SeasonWinter	-1.492	1.206	-1.237	2.16E-01
AreaTBo : SeasonWinter	-0.990	1.220	-0.812	4.17E-01
AreaN : StudyYear2017	-2.621	0.817	-3.209	1.33E-03
AreaTBn : StudyYear 2017	-0.396	0.479	-0.826	4.09E-01
AreaTBo : StudyYear 2017	-0.270	0.441	-0.613	5.40E-01
AreaN : StudyYear 2018	0.955	0.755	1.264	2.06E-01
AreaTBn : StudyYear 2018	1.061	0.758	1.4	1.61E-01

Table S3.10. Diagnostics results for the top predator number of unique individuals per month generalized linear model. Test explanations are as in Table S3.6.

Test	Test statistic	Value	*P*-value
Uniformity	*D*	0.050	0.857
Dispersion	ratioObsSim	1.077	0.356
Zero-inflation	ratioObsSim	1.023	0.804

Table S3.11. Results of marginal means comparisons for season effect, conditioned on area for the top predator number of unique individuals per month generalized linear model. The contrast was generated between a given season and the mean over all other seasons, averaged over study years. *P*-values are adjusted according to the Benjamini & Hochberg (1995) method.

Season	Estimate	Std. Error	df	*T* ratio	*P*-value
		Nearshore Charlotte Harbor			
Fall	0.421	0.355	120.0	1.185	0.238
Spring	0.460	0.370	120.0	1.243	0.238
Summer	0.492	0.362	120.0	1.359	0.238
Winter	-1.374	0.599	120.0	-2.292	0.095
		North Florida			
Fall	0.158	0.437	120.0	0.362	0.957
Spring	0.013	0.477	120.0	0.028	0.978
Summer	0.782	0.400	120.0	1.952	0.213
Winter	-0.953	0.614	120.0	-1.554	0.246
		Nearshore Tampa Bay			
Fall	1.291	0.428	120.0	3.013	0.013
Spring	0.961	0.456	120.0	2.109	0.049
Summer	0.242	0.500	120.0	0.483	0.630
Winter	-2.493	1.014	120.0	-2.459	0.031
		Offshore Tampa Bay			
Fall	0.233	0.452	120.0	0.514	0.608
Spring	0.942	0.427	120.0	2.203	0.039
Summer	1.709	0.398	120.0	4.296	0.000
Winter	-2.883	1.010	120.0	-2.855	0.010

Table S3.12. Results of marginal means comparisons for study year effect, conditioned on area for the top predator number of unique individuals per month generalized linear model. The contrast was generated between a given study year and the mean over all other study years, averaged over season. *P*-values are adjusted according to the Benjamini & Hochberg (1995) method.

Season	Estimate	Std. Error	df	*T* ratio	*P*-value
		Nearshore Charlotte Harbor			
2016	0.740	0.401	120	1.848	0.067
2017	1.204	0.376	120	3.198	0.003
2018	-1.944	0.600	120	-3.238	0.003
		North Florida			
2016	1.573	0.460	120	3.419	0.003
2017	-1.894	0.737	120	-2.572	0.017
2018	0.321	0.501	120	0.641	0.523
		Nearshore Tampa Bay			
2016	0.408	0.324	120	1.258	0.316
2017	0.278	0.320	120	0.869	0.387
2018	-0.686	0.376	120	-1.822	0.213
		Offshore Tampa Bay			
2016	0.238	0.272	120	0.876	0.383
2017	0.296	0.259	120	1.145	0.382
2018	-0.535	0.297	120	-1.801	0.223

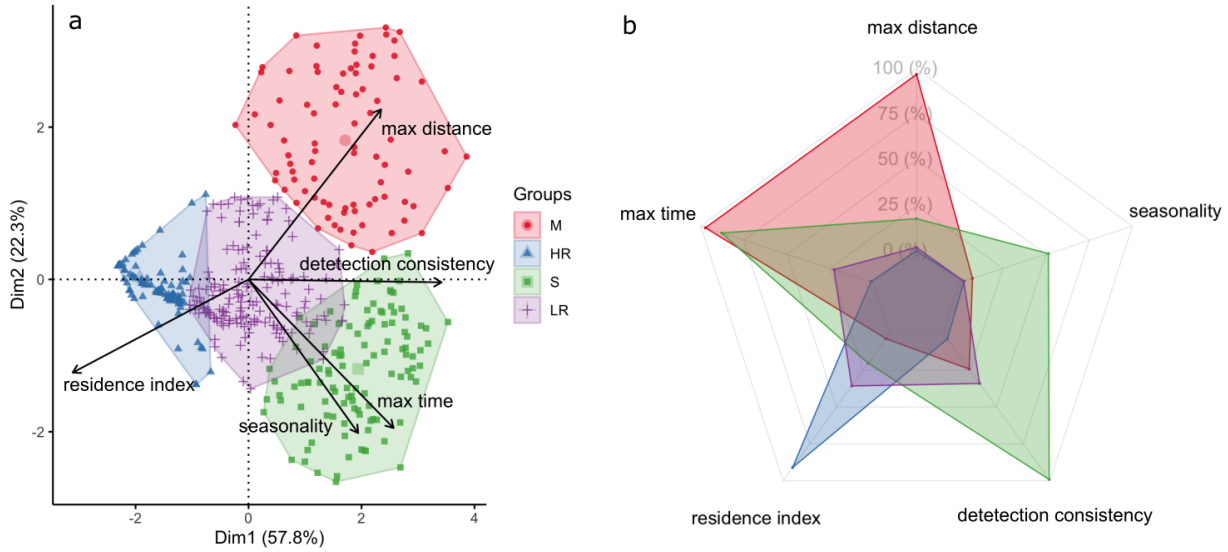

Figure S3.1. Cluster analysis results in the form of a) the biplot of the principle component analysis (PCA) results for clustering variables, displaying the strength and direction of variable correlations (arrows) with respect to the two first principle components, the four movement groups (polygons), and individual data points; and b) a radar plot of group variable means. Numbers in parentheses on the axes of (a) show the proportion of variance explained by the first two PCA dimensions. Movement groups are M = low-detection, long distance movers (red), S = seasonals (green), LR = low-detection residents (purple), HR = high-detection residents (blue). Max time is the 99th quantile of days between successive detection days, distance is the 99th quantile of kilometers between successive detection days, and the detection consistency is the ratio of 99th to 75th quantiles of days between detection days.

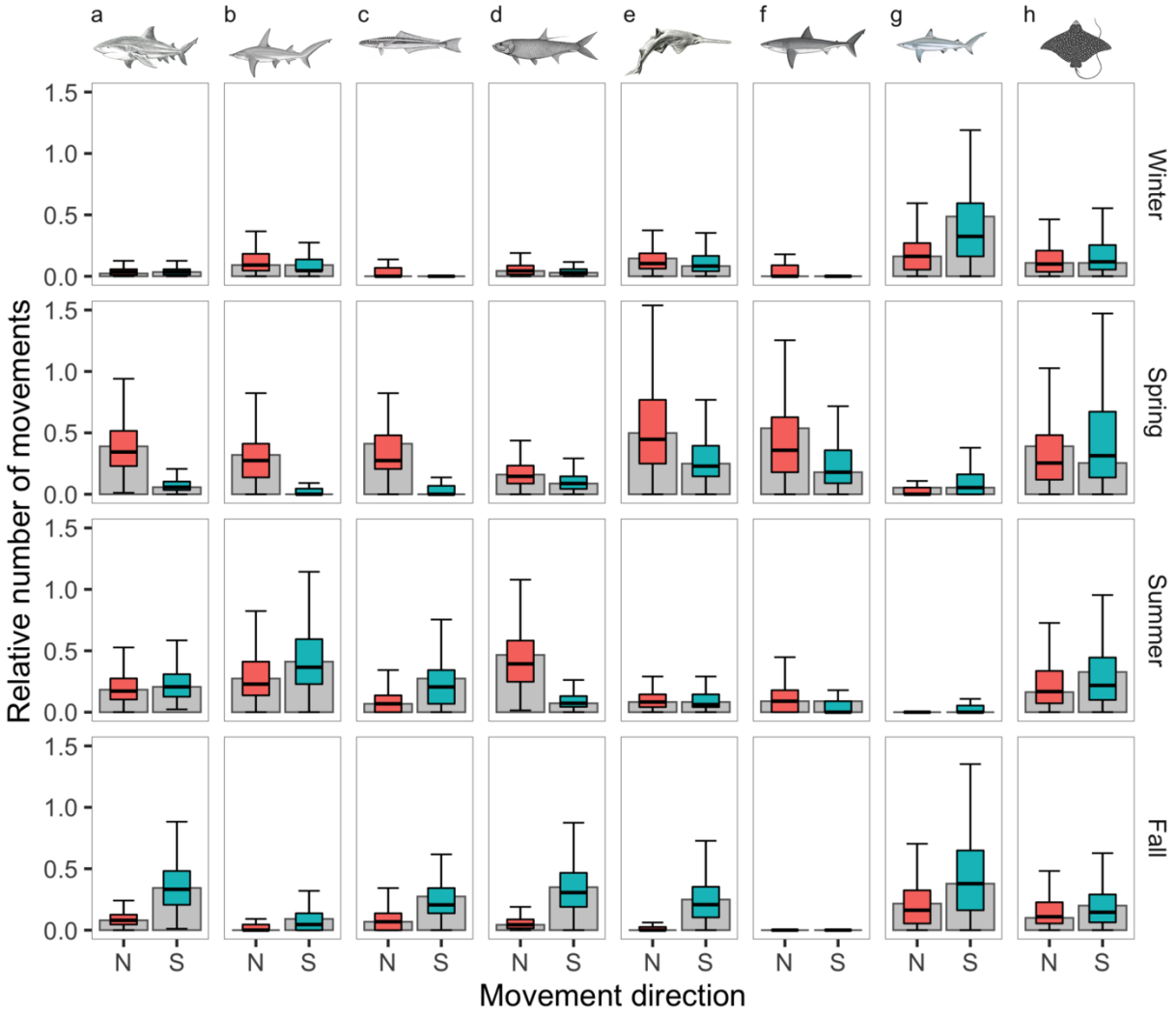

Figure S3.2. Observed (grey bars) and predicted (boxplots) movements by species group, season, and movement direction, relative to the maximum observed movements for each group for the movement path generalized linear models. Predictions were generated from 1000 draws from the posterior predictive distribution of the fitted models. The horizontal boxplot line is the median, upper and lower hinges show the 25th and 75th percentiles, and whiskers extend from the hinge to the smallest (lower) and largest (upper) value no further than 150% of the interquartile range; values outside that range are not shown.

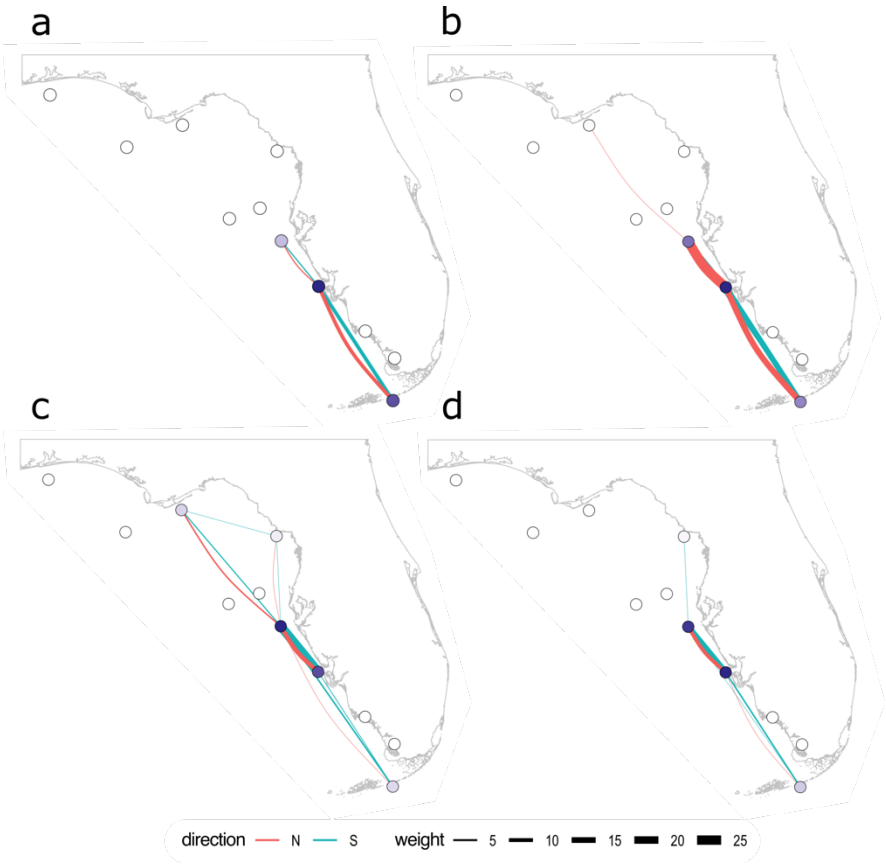

Figure S3.3. Seasonal movement networks for whitespotted eagle ray *Aetobatus narinari*. (a) = winter, (b) = spring, (c) = summer, (d) = fall. Arrays in zones were grouped to only focus on longer distance movements. Southbound movements are drawn in straight, blue lines and northbound movements in curved, red lines. Node color is indicative of network degree, with darker shades indicating higher degree (degree calculations included consecutive detections days at the same node, which are not shown). Line width corresponds to edge weight (number of times a path was used).

LITERATURE CITED

Benjamini Y, Hochberg Y (1995) Controlling the false discovery rate: a practical and powerful approach to multiple testing. J R Stat Soc Ser B 57:289–300 https://www.jstor.org/stable/2346101