

Table S1. Z-score and p-values of multiple pairwise comparison of lobster population density by year and substrate type (B=Boulder, L=Ledge, S= Sediment) using Dunn’s test with Bonferroni correction (p < 0.05 sig. level)

Comparison	Z	p	Comparison	Z	p	Comparison	Z	p
1995 B - 1995 L	9.740	5.63E-20	1995 L - 1999 S	3.610	8.46E-02	1999 L - 2019 L	-3.924	2.41E-02
1995 B - 1995 S	10.571	1.12E-23	1995 S - 1999 S	3.679	6.47E-02	1999 S - 2019 L	-3.911	2.54E-02
1995 L - 1995 S	0.089	1.00E+00	1996 B - 1999 S	8.896	1.60E-16	2000 B - 2019 L	8.656	1.35E-15
1995 B - 1996 B	4.451	2.36E-03	1996 L - 1999 S	0.258	1.00E+00	2000 L - 2019 L	-4.050	1.42E-02
1995 L - 1996 B	-6.822	2.48E-09	1996 S - 1999 S	1.937	1.00E+00	2000 S - 2019 L	-2.818	1.00E+00
1995 S - 1996 B	-7.586	9.08E-12	1997 B - 1999 S	16.367	9.13E-58	2019 B - 2019 L	1.271	1.00E+00
1995 B - 1996 L	17.105	3.78E-63	1997 L - 1999 S	1.977	1.00E+00	1995 B - 2019 S	3.329	2.40E-01
1995 L - 1996 L	5.021	1.42E-04	1997 S - 1999 S	2.928	9.40E-01	1995 L - 2019 S	-3.463	1.47E-01
1995 S - 1996 L	5.367	2.21E-05	1998 B - 1999 S	16.601	1.89E-59	1995 S - 2019 S	-3.642	7.47E-02
1996 B - 1996 L	15.016	1.60E-48	1998 L - 1999 S	1.099	1.00E+00	1996 B - 2019 S	0.805	1.00E+00
1995 B - 1996 S	14.882	1.20E-47	1998 S - 1999 S	1.273	1.00E+00	1996 L - 2019 S	-7.159	2.25E-10
1995 L - 1996 S	2.788	1.00E+00	1999 B - 1999 S	17.078	6.00E-63	1996 S - 2019 S	-5.644	4.59E-06
1995 S - 1996 S	2.940	9.06E-01	1999 L - 1999 S	0.193	1.00E+00	1997 B - 2019 S	7.712	3.41E-12
1996 B - 1996 S	12.404	6.82E-33	1995 B - 2000 B	-5.241	4.42E-05	1997 L - 2019 S	-5.212	5.14E-05
1996 L - 1996 S	-2.873	1.00E+00	1995 L - 2000 B	-15.039	1.13E-48	1997 S - 2019 S	-4.373	3.38E-03
1995 B - 1997 B	-6.986	7.79E-10	1995 S - 2000 B	-16.416	4.08E-58	1998 B - 2019 S	8.081	1.78E-13
1995 L - 1997 B	-17.291	1.51E-64	1996 B - 2000 B	-10.900	3.20E-25	1998 L - 2019 S	-6.129	2.43E-07
1995 S - 1997 B	-19.127	4.13E-79	1996 L - 2000 B	-24.244	2.09E-127	1998 S - 2019 S	-5.722	2.91E-06
1996 B - 1997 B	-13.818	5.45E-41	1996 S - 2000 B	-22.033	3.86E-105	1999 B - 2019 S	8.596	2.29E-15
1996 L - 1997 B	-28.488	4.56E-176	1997 B - 2000 B	1.382	1.00E+00	1999 L - 2019 S	-6.033	4.43E-07
1996 S - 1997 B	-26.201	7.07E-149	1997 L - 2000 B	-18.782	2.94E-76	1999 S - 2019 S	-5.910	9.46E-07
1995 B - 1997 L	12.867	1.91E-35	1997 S - 2000 B	-17.730	6.83E-68	2000 B - 2019 S	6.727	4.79E-09
1995 L - 1997 L	2.302	1.00E+00	1998 B - 2000 B	2.170	1.00E+00	2000 L - 2019 S	-6.109	2.77E-07
1995 S - 1997 L	2.376	1.00E+00	1998 L - 2000 B	-20.797	1.28E-93	2000 S - 2019 S	-4.761	5.32E-04
1996 B - 1997 L	10.204	5.24E-22	1998 S - 2000 B	-18.766	3.96E-76	2019 B - 2019 S	-1.029	1.00E+00
1996 L - 1997 L	-2.690	1.00E+00	1999 B - 2000 B	3.114	5.09E-01	2019 L - 2019 S	-1.761	1.00E+00
1996 S - 1997 L	-0.241	1.00E+00	1999 L - 2000 B	-16.172	2.20E-56	1995 B - 2021 B	2.156	1.00E+00
1997 B - 1997 L	21.647	1.78E-101	1999 S - 2000 B	-14.977	2.84E-48	1995 L - 2021 B	-7.206	1.59E-10
1995 B - 1997 S	11.753	1.89E-29	1995 B - 2000 L	11.672	4.91E-29	1995 S - 2021 B	-7.777	2.05E-12
1995 L - 1997 S	1.101	1.00E+00	1995 L - 2000 L	3.811	3.82E-02	1996 B - 2021 B	-1.690	1.00E+00
1995 S - 1997 S	1.088	1.00E+00	1995 S - 2000 L	3.897	2.69E-02	1996 L - 2021 B	-13.503	4.17E-39
1996 B - 1997 S	8.911	1.39E-16	1996 B - 2000 L	9.405	1.44E-18	1996 S - 2021 B	-11.367	1.69E-27
1996 L - 1997 S	-4.216	6.86E-03	1996 L - 2000 L	0.329	1.00E+00	1997 B - 2021 B	8.862	2.17E-16
1996 S - 1997 S	-1.744	1.00E+00	1996 S - 2000 L	2.092	1.00E+00	1997 L - 2021 B	-9.962	6.17E-21
1997 B - 1997 S	20.604	7.02E-92	1997 B - 2000 L	17.268	2.27E-64	1997 S - 2021 B	-8.859	2.22E-16
1997 L - 1997 S	-1.317	1.00E+00	1997 L - 2000 L	2.119	1.00E+00	1998 B - 2021 B	9.285	4.48E-18
1995 B - 1998 B	-7.492	1.88E-11	1997 S - 2000 L	3.115	5.08E-01	1998 L - 2021 B	-11.442	7.11E-28
1995 L - 1998 B	-17.430	1.34E-65	1998 B - 2000 L	17.481	5.50E-66	1998 S - 2021 B	-10.410	6.14E-23
1995 S - 1998 B	-19.145	2.93E-79	1998 L - 2000 L	1.205	1.00E+00	1999 B - 2021 B	9.990	4.65E-21
1996 B - 1998 B	-13.960	7.57E-42	1998 S - 2000 L	1.380	1.00E+00	1999 L - 2021 B	-9.751	5.03E-20
1996 L - 1998 B	-27.901	7.12E-169	1999 B - 2000 L	17.966	9.87E-70	1999 S - 2021 B	-9.213	8.77E-18

Comparison	Z	p	Comparison	Z	p	Comparison	Z	p
1996 S - 1998 B	-25.683	4.94E-143	1999 L - 2000 L	0.247	1.00E+00	2000 B - 2021 B	7.146	2.46E-10
1997 B - 1998 B	-0.957	1.00E+00	1999 S - 2000 L	0.045	1.00E+00	2000 L - 2021 B	-9.650	1.36E-19
1997 L - 1998 B	-21.576	8.35E-101	2000 B - 2000 L	15.745	2.05E-53	2000 S - 2021 B	-7.721	3.19E-12
1997 S - 1998 B	-20.554	1.97E-91	1995 B - 2000 S	9.542	3.88E-19	2019 B - 2021 B	-4.378	3.31E-03
1995 B - 1998 L	14.552	1.57E-45	1995 L - 2000 S	2.223	1.00E+00	2019 L - 2021 B	-3.817	3.73E-02
1995 L - 1998 L	3.564	1.01E-01	1995 S - 2000 S	2.238	1.00E+00	2019 S - 2021 B	-1.770	1.00E+00
1995 S - 1998 L	3.741	5.05E-02	1996 B - 2000 S	7.258	1.08E-10	1995 B - 2021 L	11.003	1.02E-25
1996 B - 1998 L	12.083	3.58E-31	1996 L - 2000 S	-1.186	1.00E+00	1995 L - 2021 L	1.040	1.00E+00
1996 L - 1998 L	-1.349	1.00E+00	1996 S - 2000 S	0.449	1.00E+00	1995 S - 2021 L	1.019	1.00E+00
1996 S - 1998 L	1.215	1.00E+00	1997 B - 2000 S	14.564	1.31E-45	1996 B - 2021 L	8.196	6.84E-14
1997 B - 1998 L	24.024	4.28E-125	1997 L - 2000 S	0.573	1.00E+00	1996 L - 2021 L	-3.900	2.65E-02
1997 L - 1998 L	1.284	1.00E+00	1997 S - 2000 S	1.496	1.00E+00	1996 S - 2021 L	-1.609	1.00E+00
1997 S - 1998 L	2.663	1.00E+00	1998 B - 2000 S	14.830	2.60E-47	1997 B - 2021 L	18.893	3.59E-77
1998 B - 1998 L	23.817	6.09E-123	1998 L - 2000 S	-0.309	1.00E+00	1997 L - 2021 L	-1.236	1.00E+00
1995 B - 1998 S	13.179	3.20E-37	1998 S - 2000 S	-0.086	1.00E+00	1997 S - 2021 L	-0.001	1.00E+00
1995 L - 1998 S	3.059	6.12E-01	1999 B - 2000 S	15.314	1.71E-50	1998 B - 2021 L	18.968	8.65E-78
1995 S - 1998 S	3.173	4.16E-01	1999 L - 2000 S	-1.001	1.00E+00	1998 L - 2021 L	-2.490	1.00E+00
1996 B - 1998 S	10.626	6.25E-24	1999 S - 2000 S	-1.129	1.00E+00	1998 S - 2021 L	-2.046	1.00E+00
1996 L - 1998 S	-1.554	1.00E+00	2000 B - 2000 S	13.277	8.74E-38	1999 B - 2021 L	19.520	2.06E-82
1996 S - 1998 S	0.778	1.00E+00	2000 L - 2000 S	-1.205	1.00E+00	1999 L - 2021 L	-2.835	1.00E+00
1997 B - 1998 S	21.370	6.95E-99	1995 B - 2019 B	7.269	1.00E-10	1999 S - 2021 L	-2.834	1.00E+00
1997 L - 1998 S	0.899	1.00E+00	1995 L - 2019 B	-3.974	1.95E-02	2000 B - 2021 L	16.467	1.74E-58
1997 S - 1998 S	2.168	1.00E+00	1995 S - 2019 B	-4.440	2.48E-03	2000 L - 2021 L	-3.005	7.32E-01
1998 B - 1998 S	21.359	8.83E-99	1996 B - 2019 B	3.468	1.45E-01	2000 S - 2021 L	-1.449	1.00E+00
1998 L - 1998 S	-0.301	1.00E+00	1996 L - 2019 B	-11.137	2.29E-26	2019 B - 2021 L	5.259	3.99E-05
1995 B - 1999 B	-8.273	3.59E-14	1996 S - 2019 B	-8.518	4.48E-15	2019 L - 2021 L	1.963	1.00E+00
1995 L - 1999 B	-18.001	5.27E-70	1997 B - 2019 B	16.765	1.21E-60	2019 S - 2021 L	4.246	6.00E-03
1995 S - 1999 B	-19.710	4.92E-84	1997 L - 2019 B	-7.021	6.10E-10	2021 B - 2021 L	8.357	1.77E-14
1996 B - 1999 B	-14.682	2.31E-46	1997 S - 2019 B	-5.692	3.46E-06	1995 B - 2021 S	9.283	4.56E-18
1996 L - 1999 B	-28.284	1.48E-173	1998 B - 2019 B	16.778	9.82E-61	1995 L - 2021 S	0.529	1.00E+00
1996 S - 1999 B	-26.113	7.10E-148	1998 L - 2019 B	-8.716	7.92E-16	1995 S - 2021 S	0.477	1.00E+00
1997 B - 1999 B	-2.035	1.00E+00	1998 S - 2019 B	-7.624	6.78E-12	1996 B - 2021 S	6.579	1.31E-08
1997 L - 1999 B	-22.095	9.77E-106	1999 B - 2019 B	17.420	1.61E-65	1996 L - 2021 S	-3.831	3.53E-02
1997 S - 1999 B	-21.094	2.49E-96	1999 L - 2019 B	-7.255	1.11E-10	1996 S - 2021 S	-1.846	1.00E+00
1998 B - 1999 B	-1.048	1.00E+00	1999 S - 2019 B	-6.828	2.37E-09	1997 B - 2021 S	15.693	4.69E-53
1998 L - 1999 B	-24.298	5.69E-128	2000 B - 2019 B	13.699	2.84E-40	1997 L - 2021 S	-1.515	1.00E+00
1998 S - 1999 B	-21.873	1.29E-103	2000 L - 2019 B	-7.222	1.41E-10	1997 S - 2021 S	-0.426	1.00E+00
1995 B - 1999 L	11.881	4.08E-30	2000 S - 2019 B	-5.254	4.11E-05	1998 B - 2021 S	15.919	1.29E-54
1995 L - 1999 L	3.674	6.60E-02	1995 B - 2019 L	5.363	2.25E-05	1998 L - 2021 S	-2.622	1.00E+00
1995 S - 1999 L	3.764	4.61E-02	1995 L - 2019 L	-1.226	1.00E+00	1998 S - 2021 S	-2.235	1.00E+00
1996 B - 1999 L	9.553	3.47E-19	1995 S - 2019 L	-1.324	1.00E+00	1999 B - 2021 S	16.468	1.71E-58
1996 L - 1999 L	0.025	1.00E+00	1996 B - 2019 L	3.045	6.42E-01	1999 L - 2021 S	-2.966	8.34E-01
1996 S - 1999 L	1.873	1.00E+00	1996 L - 2019 L	-4.588	1.23E-03	1999 S - 2021 S	-2.970	8.22E-01
1997 B - 1999 L	17.827	1.19E-68	1996 S - 2019 L	-3.123	4.94E-01	2000 B - 2021 S	13.910	1.53E-41
1997 L - 1999 L	1.909	1.00E+00	1997 B - 2019 L	9.644	1.43E-19	2000 L - 2021 S	-3.127	4.88E-01

Comparison	Z	p	Comparison	Z	p	Comparison	Z	p
1997 S - 1999 L	2.948	8.83E-01	1997 L - 2019 L	-2.839	1.00E+00	2000 S - 2021 S	-1.676	1.00E+00
1998 B - 1999 L	18.022	3.61E-70	1997 S - 2019 L	-2.017	1.00E+00	2019 B - 2021 S	4.095	1.17E-02
1998 L - 1999 L	0.953	1.00E+00	1998 B - 2019 L	9.975	5.44E-21	2019 L - 2021 S	1.556	1.00E+00
1998 S - 1999 L	1.143	1.00E+00	1998 L - 2019 L	-3.688	6.25E-02	2019 S - 2021 S	3.684	6.34E-02
1999 B - 1999 L	18.517	4.13E-74	1998 S - 2019 L	-3.380	2.00E-01	2021 B - 2021 S	7.057	4.69E-10
1995 B - 1999 S	11.120	2.77E-26	1999 B - 2019 L	10.457	3.77E-23	2021 L - 2021 S	-0.407	1.00E+00

Table S2. Variance to Mean Ratio (VMR > 1 indicates an aggregated population, VMR < 1 indicates an evenly dispersed population, VMR ~ 1 indicate a randomly distributed population) and results of *t*-test (if  $t_{\text{obv}} > t_{\text{crit}}$  at 0.05 level, then the distribution significantly different from a random distribution)

Year	VMR	Observed <i>t</i> -value	Critical <i>t</i> -value
1995	1.465252	14.53866	1.961179
1996	1.521572	22.97583	1.960575
1997	1.525058	19.38807	1.960834
1998	1.543027	18.60611	1.960975
1999	1.297589	8.160677	1.961543
2000	1.315361	8.153764	1.96174
2019	0.963285	-0.97382	1.961651
2021	0.992158	-0.20851	1.961643

Table S3. Z-score and p-values of multiple pairwise comparison of lobster shelter use (0=No Shelter, 1=Rocky, 2=Sediment, 3=Algae) by year using Dunn’s test with Bonferroni correction ( $p < 0.05$  sig. level)

Comparisons	Z	p	Comparisons	Z	p	Comparisons	Z	p
1996 0 - 1996 1	-5.078	6.70E-05	1999 1 - 2000 0	6.079	2.13E-07	1996 3 - 2019 3	-1.929	1.00E+00
1996 0 - 1996 2	0.151	1.00E+00	1999 2 - 2000 0	-1.118	1.00E+00	1997 0 - 2019 3	-3.351	1.41E-01
1996 1 - 1996 2	4.010	1.06E-02	1999 3 - 2000 0	0.531	1.00E+00	1997 1 - 2019 3	3.242	2.08E-01
1996 0 - 1996 3	-0.652	1.00E+00	1996 0 - 2000 1	-5.504	6.50E-06	1997 3 - 2019 3	-1.523	1.00E+00
1996 1 - 1996 3	4.369	2.19E-03	1996 1 - 2000 1	-0.124	1.00E+00	1998 0 - 2019 3	-2.994	4.84E-01
1996 2 - 1996 3	-0.663	1.00E+00	1996 2 - 2000 1	-4.230	4.10E-03	1998 1 - 2019 3	2.569	1.00E+00
1996 0 - 1997 0	0.448	1.00E+00	1996 3 - 2000 1	-4.751	3.55E-04	1998 2 - 2019 3	-2.830	8.17E-01
1996 1 - 1997 0	5.994	3.59E-07	1997 0 - 2000 1	-6.560	9.43E-09	1998 3 - 2019 3	-1.018	1.00E+00
1996 2 - 1997 0	0.185	1.00E+00	1997 1 - 2000 1	0.069	1.00E+00	1999 0 - 2019 3	-3.076	3.68E-01
1996 3 - 1997 0	1.146	1.00E+00	1997 3 - 2000 1	-4.806	2.70E-04	1999 1 - 2019 3	3.214	2.30E-01
1996 0 - 1997 1	-5.771	1.39E-06	1998 0 - 2000 1	-6.401	2.72E-08	1999 2 - 2019 3	-2.658	1.00E+00
1996 1 - 1997 1	-0.193	1.00E+00	1998 1 - 2000 1	-0.612	1.00E+00	1999 3 - 2019 3	-1.877	1.00E+00
1996 2 - 1997 1	-4.356	2.32E-03	1998 2 - 2000 1	-4.923	1.50E-04	2000 0 - 2019 3	-2.515	1.00E+00
1996 3 - 1997 1	-4.989	1.07E-04	1998 3 - 2000 1	-4.317	2.78E-03	2000 1 - 2019 3	3.031	4.28E-01
1997 0 - 1997 1	-6.927	7.57E-10	1999 0 - 2000 1	-6.769	2.28E-09	2000 2 - 2019 3	-2.558	1.00E+00
1996 0 - 1997 3	-1.345	1.00E+00	1999 1 - 2000 1	0.012	1.00E+00	2000 3 - 2019 3	-1.663	1.00E+00

Comparisons	Z	p	Comparisons	Z	p	Comparisons	Z	p
1996 1 - 1997 3	4.315	2.81E-03	1999 2 - 2000 1	-4.499	1.20E-03	2019 0 - 2019 3	-0.672	1.00E+00
1996 2 - 1997 3	-1.169	1.00E+00	1999 3 - 2000 1	-4.892	1.75E-04	2019 1 - 2019 3	1.240	1.00E+00
1996 3 - 1997 3	-0.615	1.00E+00	2000 0 - 2000 1	-5.741	1.65E-06	2019 2 - 2019 3	-2.061	1.00E+00
1997 0 - 1997 3	-1.974	1.00E+00	1996 0 - 2000 2	0.741	1.00E+00	1996 0 - 2021 0	-2.096	1.00E+00
1997 1 - 1997 3	5.128	5.14E-05	1996 1 - 2000 2	4.209	4.50E-03	1996 1 - 2021 0	3.558	6.55E-02
1996 0 - 1998 0	-0.023	1.00E+00	1996 2 - 2000 2	0.528	1.00E+00	1996 2 - 2021 0	-1.725	1.00E+00
1996 1 - 1998 0	5.786	1.27E-06	1996 3 - 2000 2	1.203	1.00E+00	1996 3 - 2021 0	-1.358	1.00E+00
1996 2 - 1998 0	-0.179	1.00E+00	1997 0 - 2000 2	0.459	1.00E+00	1997 0 - 2021 0	-2.804	8.85E-01
1996 3 - 1998 0	0.707	1.00E+00	1997 1 - 2000 2	4.501	1.19E-03	1997 1 - 2021 0	4.287	3.18E-03
1997 0 - 1998 0	-0.535	1.00E+00	1997 3 - 2000 2	1.678	1.00E+00	1997 3 - 2021 0	-0.852	1.00E+00
1997 1 - 1998 0	6.808	1.74E-09	1998 0 - 2000 2	0.796	1.00E+00	1998 0 - 2021 0	-2.403	1.00E+00
1997 3 - 1998 0	1.527	1.00E+00	1998 1 - 2000 2	4.123	6.56E-03	1998 1 - 2021 0	3.548	6.81E-02
1996 0 - 1998 1	-5.147	4.64E-05	1998 2 - 2000 2	0.026	1.00E+00	1998 2 - 2021 0	-2.410	1.00E+00
1996 1 - 1998 1	0.429	1.00E+00	1998 3 - 2000 2	2.000	1.00E+00	1998 3 - 2021 0	-0.309	1.00E+00
1996 2 - 1998 1	-3.926	1.52E-02	1999 0 - 2000 2	0.876	1.00E+00	1999 0 - 2021 0	-2.460	1.00E+00
1996 3 - 1998 1	-4.375	2.13E-03	1999 1 - 2000 2	4.483	1.29E-03	1999 1 - 2021 0	4.268	3.46E-03
1997 0 - 1998 1	-6.213	9.12E-08	1999 2 - 2000 2	-0.079	1.00E+00	1999 2 - 2021 0	-2.276	1.00E+00
1997 1 - 1998 1	0.723	1.00E+00	1999 3 - 2000 2	1.334	1.00E+00	1999 3 - 2021 0	-1.272	1.00E+00
1997 3 - 1998 1	-4.389	2.00E-03	2000 0 - 2000 2	1.017	1.00E+00	2000 0 - 2021 0	-1.917	1.00E+00
1998 0 - 1998 1	-6.038	2.74E-07	2000 1 - 2000 2	4.396	1.94E-03	2000 1 - 2021 0	3.999	1.12E-02
1996 0 - 1998 2	0.789	1.00E+00	1996 0 - 2000 3	-0.897	1.00E+00	2000 2 - 2021 0	-2.173	1.00E+00
1996 1 - 1998 2	4.680	5.03E-04	1996 1 - 2000 3	4.103	7.16E-03	2000 3 - 2021 0	-1.081	1.00E+00
1996 2 - 1998 2	0.542	1.00E+00	1996 2 - 2000 3	-0.855	1.00E+00	2019 0 - 2021 0	0.056	1.00E+00
1996 3 - 1998 2	1.301	1.00E+00	1996 3 - 2000 3	-0.245	1.00E+00	2019 1 - 2021 0	2.101	1.00E+00
1997 0 - 1998 2	0.479	1.00E+00	1997 0 - 2000 3	-1.407	1.00E+00	2019 2 - 2021 0	-1.623	1.00E+00
1997 1 - 1998 2	5.063	7.24E-05	1997 1 - 2000 3	4.695	4.67E-04	2019 3 - 2021 0	0.725	1.00E+00
1997 3 - 1998 2	1.850	1.00E+00	1997 3 - 2000 3	0.342	1.00E+00	1996 0 - 2021 1	-3.636	4.87E-02
1998 0 - 1998 2	0.859	1.00E+00	1998 0 - 2000 3	-0.980	1.00E+00	1996 1 - 2021 1	1.972	1.00E+00
1998 1 - 1998 2	4.628	6.49E-04	1998 1 - 2000 3	4.086	7.71E-03	1996 2 - 2021 1	-2.850	7.68E-01
1996 0 - 1998 3	-1.833	1.00E+00	1998 2 - 2000 3	-1.492	1.00E+00	1996 3 - 2021 1	-2.882	6.93E-01
1996 1 - 1998 3	3.851	2.06E-02	1998 3 - 2000 3	0.819	1.00E+00	1997 0 - 2021 1	-4.513	1.12E-03
1996 2 - 1998 3	-1.529	1.00E+00	1999 0 - 2000 3	-0.934	1.00E+00	1997 1 - 2021 1	2.493	1.00E+00
1996 3 - 1998 3	-1.095	1.00E+00	1999 1 - 2000 3	4.677	5.11E-04	1997 3 - 2021 1	-2.624	1.00E+00
1997 0 - 1998 3	-2.518	1.00E+00	1999 2 - 2000 3	-1.472	1.00E+00	1998 0 - 2021 1	-4.218	4.32E-03
1997 1 - 1998 3	4.623	6.64E-04	1999 3 - 2000 3	-0.106	1.00E+00	1998 1 - 2021 1	1.763	1.00E+00
1997 3 - 1998 3	-0.548	1.00E+00	2000 0 - 2000 3	-0.612	1.00E+00	1998 2 - 2021 1	-3.543	6.95E-02
1998 0 - 1998 3	-2.099	1.00E+00	2000 1 - 2000 3	4.469	1.38E-03	1998 3 - 2021 1	-2.096	1.00E+00
1998 1 - 1998 3	3.877	1.85E-02	2000 2 - 2000 3	-1.375	1.00E+00	1999 0 - 2021 1	-4.420	1.73E-03
1998 2 - 1998 3	-2.215	1.00E+00	1996 0 - 2019 0	-2.143	1.00E+00	1999 1 - 2021 1	2.459	1.00E+00
1996 0 - 1999 0	-0.120	1.00E+00	1996 1 - 2019 0	3.505	8.00E-02	1999 2 - 2021 1	-3.276	1.85E-01
1996 1 - 1999 0	6.046	2.61E-07	1996 2 - 2019 0	-1.760	1.00E+00	1999 3 - 2021 1	-2.898	6.58E-01
1996 2 - 1999 0	-0.254	1.00E+00	1996 3 - 2019 0	-1.405	1.00E+00	2000 0 - 2021 1	-3.645	4.69E-02
1996 3 - 1999 0	0.646	1.00E+00	1997 0 - 2019 0	-2.856	7.53E-01	2000 1 - 2021 1	2.289	1.00E+00
1997 0 - 1999 0	-0.673	1.00E+00	1997 1 - 2019 0	4.226	4.17E-03	2000 2 - 2021 1	-3.173	2.65E-01
1997 1 - 1999 0	7.264	6.61E-11	1997 3 - 2019 0	-0.907	1.00E+00	2000 3 - 2021 1	-2.600	1.00E+00
1997 3 - 1999 0	1.519	1.00E+00	1998 0 - 2019 0	-2.458	1.00E+00	2019 0 - 2021 1	-1.721	1.00E+00

Comparisons	Z	p	Comparisons	Z	p	Comparisons	Z	p
1998 0 - 1999 0	-0.113	1.00E+00	1998 1 - 2019 0	3.488	8.53E-02	2019 1 - 2021 1	0.333	1.00E+00
1998 1 - 1999 0	6.409	2.56E-08	1998 2 - 2019 0	-2.445	1.00E+00	2019 2 - 2021 1	-2.747	1.00E+00
1998 2 - 1999 0	-0.953	1.00E+00	1998 3 - 2019 0	-0.365	1.00E+00	2019 3 - 2021 1	-0.935	1.00E+00
1998 3 - 1999 0	2.134	1.00E+00	1999 0 - 2019 0	-2.519	1.00E+00	2021 0 - 2021 1	-1.778	1.00E+00
1996 0 - 1999 1	-5.759	1.49E-06	1999 1 - 2019 0	4.207	4.54E-03	1996 0 - 2021 2	0.114	1.00E+00
1996 1 - 1999 1	-0.142	1.00E+00	1999 2 - 2019 0	-2.307	1.00E+00	1996 1 - 2021 2	4.583	8.03E-04
1996 2 - 1999 1	-4.336	2.54E-03	1999 3 - 2019 0	-1.323	1.00E+00	1996 2 - 2021 2	-0.048	1.00E+00
1996 3 - 1999 1	-4.972	1.16E-04	2000 0 - 2019 0	-1.970	1.00E+00	1996 3 - 2021 2	0.698	1.00E+00
1997 0 - 1999 1	-6.925	7.63E-10	2000 1 - 2019 0	3.941	1.42E-02	1997 0 - 2021 2	-0.275	1.00E+00
1997 1 - 1999 1	0.062	1.00E+00	2000 2 - 2019 0	-2.205	1.00E+00	1997 1 - 2021 2	5.081	6.60E-05
1997 3 - 1999 1	-5.116	5.48E-05	2000 3 - 2019 0	-1.129	1.00E+00	1997 3 - 2021 2	1.298	1.00E+00
1998 0 - 1999 1	-6.809	1.72E-09	1996 0 - 2019 1	-3.907	1.64E-02	1998 0 - 2021 2	0.144	1.00E+00
1998 1 - 1999 1	-0.670	1.00E+00	1996 1 - 2019 1	1.667	1.00E+00	1998 1 - 2021 2	4.560	8.99E-04
1998 2 - 1999 1	-5.045	7.94E-05	1996 2 - 2019 1	-3.050	4.01E-01	1998 2 - 2021 2	-0.641	1.00E+00
1998 3 - 1999 1	-4.607	7.17E-04	1996 3 - 2019 1	-3.154	2.83E-01	1998 3 - 2021 2	1.721	1.00E+00
1999 0 - 1999 1	-7.275	6.06E-11	1997 0 - 2019 1	-4.811	2.64E-04	1999 0 - 2021 2	0.233	1.00E+00
1996 0 - 1999 2	0.838	1.00E+00	1997 1 - 2019 1	2.141	1.00E+00	1999 1 - 2021 2	5.063	7.24E-05
1996 1 - 1999 2	4.310	2.87E-03	1997 3 - 2019 1	-2.941	5.74E-01	1999 2 - 2021 2	-0.705	1.00E+00
1996 2 - 1999 2	0.612	1.00E+00	1998 0 - 2019 1	-4.535	1.01E-03	1999 3 - 2021 2	0.857	1.00E+00
1996 3 - 1999 2	1.299	1.00E+00	1998 1 - 2019 1	1.418	1.00E+00	2000 0 - 2021 2	0.441	1.00E+00
1997 0 - 1999 2	0.559	1.00E+00	1998 2 - 2019 1	-3.743	3.19E-02	2000 1 - 2021 2	4.895	1.73E-04
1997 1 - 1999 2	4.606	7.21E-04	1998 3 - 2019 1	-2.419	1.00E+00	2000 2 - 2021 2	-0.614	1.00E+00
1997 3 - 1999 2	1.779	1.00E+00	1999 0 - 2019 1	-4.762	3.37E-04	2000 3 - 2021 2	0.916	1.00E+00
1998 0 - 1999 2	0.898	1.00E+00	1999 1 - 2019 1	2.103	1.00E+00	2019 0 - 2021 2	1.991	1.00E+00
1998 1 - 1999 2	4.227	4.15E-03	1999 2 - 2019 1	-3.453	9.72E-02	2019 1 - 2021 2	3.511	7.82E-02
1998 2 - 1999 2	0.111	1.00E+00	1999 3 - 2019 1	-3.188	2.51E-01	2019 2 - 2021 2	0.040	1.00E+00
1998 3 - 1999 2	2.102	1.00E+00	2000 0 - 2019 1	-3.950	1.37E-02	2019 3 - 2021 2	2.440	1.00E+00
1999 0 - 1999 2	0.980	1.00E+00	2000 1 - 2019 1	1.956	1.00E+00	2021 0 - 2021 2	1.950	1.00E+00
1999 1 - 1999 2	4.588	7.87E-04	2000 2 - 2019 1	-3.350	1.42E-01	2021 1 - 2021 2	3.276	1.85E-01
1996 0 - 1999 3	-0.834	1.00E+00	2000 3 - 2019 1	-2.872	7.17E-01	1996 0 - 2021 3	-2.447	1.00E+00
1996 1 - 1999 3	4.460	1.44E-03	2019 0 - 2019 1	-2.043	1.00E+00	1996 1 - 2021 3	3.238	2.11E-01
1996 2 - 1999 3	-0.798	1.00E+00	1996 0 - 2019 2	0.057	1.00E+00	1996 2 - 2021 3	-1.979	1.00E+00
1996 3 - 1999 3	-0.150	1.00E+00	1996 1 - 2019 2	3.911	1.61E-02	1996 3 - 2021 3	-1.702	1.00E+00
1997 0 - 1999 3	-1.372	1.00E+00	1996 2 - 2019 2	-0.080	1.00E+00	1997 0 - 2021 3	-3.200	2.41E-01
1997 1 - 1999 3	5.166	4.19E-05	1996 3 - 2019 2	0.569	1.00E+00	1997 1 - 2021 3	3.939	1.43E-02
1997 3 - 1999 3	0.484	1.00E+00	1997 0 - 2019 2	-0.283	1.00E+00	1997 3 - 2021 3	-1.247	1.00E+00
1998 0 - 1999 3	-0.921	1.00E+00	1997 1 - 2019 2	4.251	3.73E-03	1998 0 - 2021 3	-2.821	8.40E-01
1998 1 - 1999 3	4.502	1.18E-03	1997 3 - 2019 2	1.068	1.00E+00	1998 1 - 2021 3	3.193	2.47E-01
1998 2 - 1999 3	-1.454	1.00E+00	1998 0 - 2019 2	0.078	1.00E+00	1998 2 - 2021 3	-2.668	1.00E+00
1998 3 - 1999 3	0.993	1.00E+00	1998 1 - 2019 2	3.822	2.33E-02	1998 3 - 2021 3	-0.703	1.00E+00
1999 0 - 1999 3	-0.871	1.00E+00	1998 2 - 2019 2	-0.622	1.00E+00	1999 0 - 2021 3	-2.913	6.29E-01
1999 1 - 1999 3	5.152	4.53E-05	1998 3 - 2019 2	1.428	1.00E+00	1999 1 - 2021 3	3.918	1.57E-02
1999 2 - 1999 3	-1.433	1.00E+00	1999 0 - 2019 2	0.150	1.00E+00	1999 2 - 2021 3	-2.503	1.00E+00
1996 0 - 2000 0	-0.363	1.00E+00	1999 1 - 2019 2	4.231	4.08E-03	1999 3 - 2021 3	-1.638	1.00E+00
1996 1 - 2000 0	5.212	3.27E-05	1999 2 - 2019 2	-0.686	1.00E+00	2000 0 - 2021 3	-2.311	1.00E+00
1996 2 - 2000 0	-0.435	1.00E+00	1999 3 - 2019 2	0.701	1.00E+00	2000 1 - 2021 3	3.661	4.40E-02

Comparisons	Z	p	Comparisons	Z	p	Comparisons	Z	p
1996 3 - 2000 0	0.346	1.00E+00	2000 0 - 2019 2	0.335	1.00E+00	2000 2 - 2021 3	-2.400	1.00E+00
1997 0 - 2000 0	-0.887	1.00E+00	2000 1 - 2019 2	4.127	6.45E-03	2000 3 - 2021 3	-1.422	1.00E+00
1997 1 - 2000 0	6.085	2.05E-07	2000 2 - 2019 2	-0.602	1.00E+00	2019 0 - 2021 3	-0.333	1.00E+00
1997 3 - 2000 0	1.081	1.00E+00	2000 3 - 2019 2	0.760	1.00E+00	2019 1 - 2021 3	1.733	1.00E+00
1998 0 - 2000 0	-0.390	1.00E+00	2019 0 - 2019 2	1.659	1.00E+00	2019 2 - 2021 3	-1.877	1.00E+00
1998 1 - 2000 0	5.364	1.42E-05	2019 1 - 2019 2	2.948	5.62E-01	2019 3 - 2021 3	0.367	1.00E+00
1998 2 - 2000 0	-1.104	1.00E+00	1996 0 - 2019 3	-2.638	1.00E+00	2021 0 - 2021 3	-0.389	1.00E+00
1998 3 - 2000 0	1.624	1.00E+00	1996 1 - 2019 3	2.697	1.00E+00	2021 1 - 2021 3	1.405	1.00E+00
1999 0 - 2000 0	-0.307	1.00E+00	1996 2 - 2019 3	-2.160	1.00E+00	2021 2 - 2021 3	-2.251	1.00E+00

Table S4. p-values of multiple pair-wise comparison of lobster size frequency distributions across years using Kolmogorov-Smirnov test ( $p < 0.05$  sig. level)

Comparison	Statistic	p
1996 - 1997	0.111	0.111
1996 - 1998	0.093	0.001
1996 - 1999	0.112	0.000
1996 - 2000	0.085	0.010
1996 - 2019	0.315	0.000
1996 - 2021	0.218	0.000
1997 - 1998	0.051	0.081
1997 - 1999	0.034	0.541
1997 - 2000	0.088	0.001
1997 - 2019	0.422	0.000
1997 - 2021	0.322	0.000
1998 - 1999	0.043	0.330
1998 - 2000	0.046	0.328
1998 - 2019	0.392	0.000
1998 - 2021	0.298	0.000
1999 - 2000	0.068	0.043
1999 - 2019	0.421	0.000
1999 - 2021	0.325	0.000
2000 - 2019	0.382	0.000
2000 - 2021	0.275	0.000
2019 - 2021	0.187	0.000

Table S5. Results from multiple pairwise comparison of lobster claw number across time period and substrate type (B=Boulder, L=Ledge, S= Sediment) using Dunn’s test with Bonferroni correction ( $p < 0.05$  sig. level)

Comparison	Z	p.unadj	p.adj
1995to2000 B - 1995to2000 L	1.194	0.232	1.000
1995to2000 B - 1995to2000 S	6.298	0.000	0.000
1995to2000 L - 1995to2000 S	3.191	0.001	0.021
1995to2000 B - 2019to2021 B	-1.186	0.236	1.000
1995to2000 L - 2019to2021 B	-1.730	0.084	1.000
1995to2000 S - 2019to2021 B	-5.793	0.000	0.000
1995to2000 B - 2019to2021 L	-0.327	0.744	1.000
1995to2000 L - 2019to2021 L	-0.960	0.337	1.000
1995to2000 S - 2019to2021 L	-3.432	0.001	0.009
2019to2021 B - 2019to2021 L	0.237	0.813	1.000
1995to2000 B - 2019to2021 S	2.153	0.031	0.470
1995to2000 L - 2019to2021 S	1.125	0.261	1.000
1995to2000 S - 2019to2021 S	-1.233	0.217	1.000
2019to2021 B - 2019to2021 S	2.510	0.012	0.181
2019to2021 L - 2019to2021 S	1.775	0.076	1.000

Table S6. p-values of multiple pairwise comparison of lobster claw number across time period and shelter type (0=No Shelter, 1=Rocky, 2=Sediment, 3=Algae) using Dunn’s test with Bonferroni correction ( $p < 0.05$  sig. level)

<b>Comparison</b>	<b>Z</b>	<b>p.unadj</b>	<b>p.adj</b>
1995to2000 0 - 1995to2000 1	-4.645	0.000	0.000
1995to2000 0 - 1995to2000 2	6.186	0.000	0.000
1995to2000 1 - 1995to2000 2	9.070	0.000	0.000
1995to2000 0 - 1995to2000 3	-2.183	0.029	0.813
1995to2000 1 - 1995to2000 3	3.163	0.002	0.044
1995to2000 2 - 1995to2000 3	-7.733	0.000	0.000
1995to2000 0 - 2019to2021 0	-0.057	0.954	1.000
1995to2000 1 - 2019to2021 0	3.459	0.001	0.015
1995to2000 2 - 2019to2021 0	-5.818	0.000	0.000
1995to2000 3 - 2019to2021 0	1.685	0.092	1.000
1995to2000 0 - 2019to2021 1	-5.169	0.000	0.000
1995to2000 1 - 2019to2021 1	-2.190	0.029	0.799
1995to2000 2 - 2019to2021 1	-9.348	0.000	0.000
1995to2000 3 - 2019to2021 1	-3.921	0.000	0.002
2019to2021 0 - 2019to2021 1	-4.217	0.000	0.001
1995to2000 0 - 2019to2021 2	1.979	0.048	1.000
1995to2000 1 - 2019to2021 2	3.130	0.002	0.049
1995to2000 2 - 2019to2021 2	-1.143	0.253	1.000
1995to2000 3 - 2019to2021 2	2.598	0.009	0.262
2019to2021 0 - 2019to2021 2	1.962	0.050	1.000
2019to2021 1 - 2019to2021 2	3.518	0.000	0.012
1995to2000 0 - 2019to2021 3	-2.842	0.004	0.125
1995to2000 1 - 2019to2021 3	0.231	0.817	1.000
1995to2000 2 - 2019to2021 3	-7.758	0.000	0.000
1995to2000 3 - 2019to2021 3	-1.380	0.168	1.000
2019to2021 0 - 2019to2021 3	-2.430	0.015	0.423
2019to2021 1 - 2019to2021 3	1.494	0.135	1.000
2019to2021 2 - 2019to2021 3	-2.952	0.003	0.088