

APPENDIX I

DEMERSAL COMMUNITY DATA

Fish Catch Summary Tables and Metrics

Table I-1. 2018 RHMP Demersal Fish Abundances

Scientific Name	Common Name	Dana Point Harbor	Oceanside Harbor	Mission Bay			San Diego Bay										Total Abundance per Taxa	% of Total Abundance	Frequency of Trawl Capture (%)
							North				Central		South						
							B18-10068	B18-10071	B18-10016	B18-10017	B18-10019	B18-10022	B18-10023	B18-10024	B18-10030	B18-10034			
<i>Anchoa compressa</i>	deepbody anchovy	0	43	0	0	0	0	0	0	0	2	0	0	0	0	0	45	0.4	13
<i>Anchoa delicatissima</i>	slough anchovy	0	4	24	203	0	38	0	1	0	245	239	3140	286	596	0	4776	46.7	67
<i>Anisotremus davidsonii</i>	sargo	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0	7
<i>Atherinops affinis</i>	topsmelt	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0.0	13
<i>Cheilotrema saturnum</i>	black croaker	0	0	0	0	0	0	0	0	1	1	1	0	2	1	0	6	0.1	33
<i>Citharichthys sordidus</i>	Pacific sanddab	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0	7
<i>Cymatogaster aggregata</i>	shiner surfperch	63	9	29	0	0	0	0	0	0	0	0	0	0	0	0	101	1.0	20
<i>Embiotoca jacksoni</i>	black surfperch	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0	7
<i>Engraulis mordax</i>	northern anchovy	334	16	0	0	0	4417	0	0	0	0	0	0	0	0	0	4767	46.6	20
<i>Halichoeres semicinctus</i>	rock wrasse	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4	0.0	7
<i>Heterodontus francisci</i>	horn shark	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.0	7
<i>Heterostichus rostratus</i>	giant kelpfish	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.0	7
<i>Hippocampus ingens</i>	Pacific seahorse	0	0	1	0	1	0	0	0	0	0	0	2	0	0	0	4	0.0	20
<i>Hypsopsetta guttulata</i>	diamond turbot	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0	7
<i>Myliobatis californica</i>	bat ray	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	6	0.1	7
<i>Paralabrax clathratus</i>	kelp bass	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	15	0.1	7
<i>Paralabrax maculatofasciatus</i>	spotted sand bass	4	0	8	0	13	6	37	22	0	16	2	4	7	3	12	134	1.3	80
<i>Paralabrax nebulifer</i>	barred sand bass	3	0	0	0	4	0	0	1	5	4	7	1	0	2	0	27	0.3	53
<i>Paralichthys californicus</i>	California halibut	0	2	8	0	0	9	6	1	0	9	0	1	1	1	0	38	0.4	60
<i>Phanerodon furcatus</i>	white surfperch	1	9	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0.1	13
<i>Pleuronichthys ritteri</i>	spotted turbot	0	0	0	0	1	0	1	0	1	1	0	0	0	0	0	4	0.0	27
<i>Parichthys myriaster</i>	specklefin midshipman	0	0	0	0	0	1	0	2	0	2	1	0	0	0	0	6	0.1	27
<i>Roncador stearnsii</i>	spotfin croaker	1	59	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0.6	13
<i>Scorpaena guttata</i>	spotted scorpionfish	0	0	0	0	0	0	1	0	5	0	0	0	0	0	0	6	0.1	13
<i>Sebastes carnatus</i>	gopher rockfish	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0	7
<i>Seriphus politus</i>	queenfish	1	4	0	0	0	62	0	0	0	0	0	0	0	0	0	67	0.7	20
<i>Symphurus atricauda</i>	California tonguefish	1	1	0	0	0	0	2	1	0	0	0	0	0	0	0	5	0.0	27
<i>Syngnathus californiensis</i>	kelp pipefish	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.0	7
<i>Synodus lucioceps</i>	California lizardfish	0	0	0	0	0	1	17	3	18	0	0	0	0	0	0	39	0.4	27
<i>Umbrina roncadore</i>	yellowfin croaker	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	4	0.0	27
<i>Urolophus halleri</i>	round ray	0	0	4	0	1	29	3	4	0	32	4	1	0	7	9	94	0.9	67
<i>Xenistius californiensis</i>	salema	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0.0	7
Total Abundance per Station		409	153	92	206	26	4563	67	35	30	319	255	3149	296	610	21	10231	100.0	--
Means		409	153	108			935												

Table I-2. 2018 RHMP Demersal Fish Biomass (kg)

Scientific Name	Common Name	Dana Point Harbor	Oceanside Harbor	Mission Bay			San Diego Bay										Total Biomass per Taxa	% of Total Biomass
							North				Central			South				
				B18-10068	B18-10071	B18-10016	B18-10017	B18-10019	B18-10022	B18-10023	B18-10024	B18-10030	B18-10034	B18-10036	B18-10037	B18-10038		
<i>Anchoa compressa</i>	deepbody anchovy	0	0.69	0	0	0	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0	0.72	0.8
<i>Anchoa delicatissima</i>	slough anchovy	0	0.02	0.051	0.291	0	0.108	0	0.003	0	0.266	0.039	3.14	0.053	0.213	0	4.18	4.5
<i>Anisotremus davidsonii</i>	sargo	0	0	0.084	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.08	0.1
<i>Atherinops affinis</i>	topsmelt	0	0	0.004	0.008	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.01	0.0
<i>Cheilotrema saturnum</i>	black croaker	0	0	0	0	0	0	0.00	0.00	0.184	0.175	0.108	0	0.338	0.172	0	0.98	1.0
<i>Citharichthys sordidus</i>	Pacific sanddab	0.014	0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.01	0.0
<i>Cymatogaster aggregata</i>	shiner surfperch	0.382	0.04	0.2	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.63	0.7
<i>Embiotoca jacksoni</i>	black surfperch	0	0.022	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0.0
<i>Engraulis mordax</i>	northern anchovy	0.349	0.016	0	0	0	7.142	0	0	0	0	0	0	0	0	0	7.51	8.0
<i>Halichoeres semicinctus</i>	rock wrasse	0.0	0.0	0.00	0.00	0.58	0.00	0.00	0.00	0.0	0.0	0	0	0	0	0	0.58	0.6
<i>Heterodontus francisci</i>	horn shark	0	0	0	0	0.081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.08	0.1
<i>Heterostichus rostratus</i>	giant kelpfish	0	0.047	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.05	0.1
<i>Hippocampus ingens</i>	Pacific seahorse	0	0	0.06	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0	0.14	0.2
<i>Hypsopsetta guttulata</i>	diamond turbot	0.00	0.22	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.22	0.2
<i>Myliobatis californica</i>	bat ray	0	0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	11.19	0.00	0.00	0.00	0.00	0	11.19	12.0
<i>Paralabrax clathratus</i>	kelp bass	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.41	0.4
<i>Paralabrax maculatofasciatus</i>	spotted sand bass	0.705	0	2.1	0.0	3.06	1.26	4.80	4.08	0.00	1.82	0.18	0.30	1.09	0.05	1.76	21.21	22.7
<i>Paralabrax nebulifer</i>	barred sand bass	0.40	0.00	0	0	0.246	0.00	0.00	0.12	1.02	0.17	0.21	0.042	0.00	0.066	0	2.28	2.4
<i>Paralichthys californicus</i>	California halibut	0	0.17	0.366	0	0.00	1.479	1.6	0.0	0	0.22	0	0.021	0.08	0.025	0	4.02	4.3
<i>Phanerodon furcatus</i>	white surfperch	0.15	0.5	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.63	0.7
<i>Pleuronichthys ritteri</i>	spotted turbot	0.00	0.00	0.00	0.00	0.03	0.00	0.04	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0	0.19	0.2
<i>Porichthys myriaster</i>	specklefin midshipman	0	0	0	0	0	0.032	0	0.67	0	0.085	0.099	0	0	0	0	0.88	0.9
<i>Roncador stearnsii</i>	spotfin croaker	0.31	5.66	0	0	0	0	0	0	0	0	0	0	0	0	0	5.97	6.4
<i>Scorpaena guttata</i>	spotted scorpionfish	0	0	0	0	0	0	0.127	0.00	1.6	0	0	0	0	0	0	1.73	1.8
<i>Sebastes carnatus</i>	gopher rockfish	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.13	0.1
<i>Seriphus politus</i>	queenfish	0.05	0.00	0.00	0.00	0.00	4.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	4.68	5.0
<i>Symphurus atricauda</i>	California tonguefish	0.012	0.009	0.0	0.0	0.0	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0	0.05	0.1
<i>Syngnathus californiensis</i>	kelp pipefish	0	0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.04	0.0
<i>Synodus lucioceps</i>	California lizardfish	0	0	0	0	0	0.093	0.18	0.13	0.147	0	0	0	0	0	0	0.54	0.6
<i>Umbrina roncadior</i>	yellowfin croaker	0	0.05	0.504	0.00	0	0.00	0.00	0.00	0.00	0.05	0.27	0	0	0	0	0.87	0.9
<i>Urolophus halleri</i>	round ray	0	0	1.022	0	0.404	6.408	1.05	0.8	0	10.196	0.75	0.071	0	1.04	1.5	23.28	24.9
<i>Xenistius californiensis</i>	salema	0	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.05	0.1
Total Biomass per Station		2.38	7.55	4.83	0.35	4.48	21.15	7.8	5.9	2.96	24.3	1.66	3.6	1.56	1.57	3.26	93.39	100
Means		2.38	7.55	3.22			7.4											

Table I-3. 2018 RHMP Demersal Fish Biodiversity Metrics

Biological Metric	Dana Point Harbor	Oceanside Harbor	Mission Bay			San Diego Bay									
	B18-10068	B18-10071	B18-10016	B18-10017	B18-10019	North				Central			South		
						B18-10022	B18-10023	B18-10024	B18-10030	B18-10034	B18-10036	B18-10037	B18-10038	B18-10039	B18-10042
Taxa Richness	9	14	10	3	8	8	7	8	5	11	7	6	4	6	2
Abundance	409	153	92	206	26	4563	67	35	30	319	255	3149	296	610	21
Shannon-Wiener Diversity Index	0.61	1.76	1.77	0.09	1.55	0.19	1.26	1.32	1.13	0.93	0.33	0.02	0.17	0.14	0.68
Pielou's Evenness Index	0.28	0.67	0.77	0.08	0.74	0.09	0.65	0.63	0.70	0.39	0.17	0.01	0.13	0.08	0.99
% Dominance Top Taxa	81.7	38.6	31.5	98.5	50.0	96.8	55.2	62.9	60.0	76.8	93.7	99.7	96.6	97.7	57.1
% Dominance Top 3 Taxa	98.0	77.1	73.9	100.0	80.8	99.0	89.6	82.9	93.3	91.8	98.0	99.9	99.7	99.3	100.0
% Biomass Top Taxa	29.7	75.0	43.8	83.4	68.3	33.8	61.3	69.2	54.1	46.0	45.2	86.9	69.8	66.3	54.0
% Biomass Top 3 Taxa	62.8	90.5	75.4	100.0	90.3	86.0	95.4	94.7	94.9	95.4	74.5	97.1	96.6	90.9	100.0
% Top Predator Taxa	22.2	14.3	30.0	0.0	37.5	25.0	42.9	37.5	40.0	36.4	28.6	50.0	50.0	50.0	50.0
% Top Predator Individuals	1.7	2.0	33.7	0.0	69.2	0.3	65.7	68.6	33.3	9.1	3.5	0.2	2.7	1.0	57.1

**Table I-4. 2018 RHMP Demersal Fish Ecological Indices,
All Harbors Combined**

Common Name	% of Total Abundance	Frequency of Trawl Capture (%)	% of Total Biomass	Ecological Index
Slough Anchovy	46.7	67	4.48	3411
Spotted Sand Bass	1.31	80	22.7	1922
Round Stingray	0.92	67	24.9	1723
Northern Anchovy	46.6	20	8.04	1093
California Halibut	0.37	60	4.31	281
Barred Sand Bass	0.26	53	2.45	145
Queenfish	0.65	20	5.01	113
Spotfin Croaker	0.59	13	6.39	93
Bat Ray	0.06	7	12.0	80
Black Croaker	0.06	33	1.05	37
Shiner Surfperch	0.99	20	0.68	33
Specklefin Midshipman	0.06	27	0.94	27
Yellowfin Croaker	0.04	27	0.93	26
California Lizardfish	0.38	27	0.58	26
Spotted Scorpionfish	0.06	13	1.85	25
Deepbody Anchovy	0.44	13	0.77	16
White Surfperch	0.10	13	0.68	10
Spotted Turbot	0.04	27	0.20	6.4
Rock Wrasse	0.04	7	0.62	4.4
Kelp Bass	0.15	7	0.44	3.9
Pacific Seahorse	0.04	20	0.15	3.8
California Tonguefish	0.05	27	0.05	2.8
Diamond Turbot	0.01	7	0.24	1.6
Gopher Rockfish	0.01	7	0.14	1.0
Sargo	0.01	7	0.09	0.7
Horn Shark	0.01	7	0.09	0.6
Salema	0.02	7	0.05	0.5
Giant Kelpfish	0.02	7	0.05	0.5
Topsmelt	0.02	13	0.01	0.4
Kelp Pipefish	0.01	7	0.04	0.3
Black Surfperch	0.01	7	0.02	0.2
Pacific Sanddab	0.01	7	0.01	0.2

Table I-5. 2018 RHMP Demersal Fish Ecological Indices by Harbor

Harbor	Scientific Name	Common Name	% of Total Abundance	Frequency of Trawl Capture (%)	% of Total Biomass	Ecological Index
Dana Point Harbor	<i>Citharichthys sordidus</i>	Pacific sanddab	0.2	100	0.6	83
	<i>Cymatogaster aggregata</i>	shiner surfperch	15.4	100	16.1	3149
	<i>Engraulis mordax</i>	northern anchovy	81.7	100	14.7	9636
	<i>Paralabrax maculatofasciatus</i>	spotted sand bass	1.0	100	29.7	3066
	<i>Paralabrax nebulifer</i>	barred sand bass	0.7	100	17.0	1774
	<i>Phanerodon furcatus</i>	white surfperch	0.2	100	6.4	660
	<i>Roncador stearnsii</i>	spotfin croaker	0.2	100	13.1	1330
	<i>Seriphus politus</i>	queenfish	0.2	100	2.0	227
	<i>Symphurus atricauda</i>	California tonguefish	0.2	100	0.5	75
Oceanside Harbor	<i>Anchoa compressa</i>	deepbody anchovy	28.1	100	9.1	3724
	<i>Anchoa delicatissima</i>	slough anchovy	2.6	100	0.3	288
	<i>Cymatogaster aggregata</i>	shiner surfperch	5.9	100	0.5	641
	<i>Embiotoca jacksoni</i>	black surfperch	0.7	100	0.3	95
	<i>Engraulis mordax</i>	northern anchovy	10.5	100	0.2	1067
	<i>Heterostichus rostratus</i>	giant kelpfish	1.3	100	0.6	193
	<i>Hypsopsetta guttulata</i>	diamond turbot	0.7	100	2.9	357
	<i>Paralichthys californicus</i>	California halibut	1.3	100	2.2	349
	<i>Phanerodon furcatus</i>	white surfperch	5.9	100	6.4	1228
	<i>Roncador stearnsii</i>	spotfin croaker	38.6	100	75.0	11354
	<i>Sebastes carnatus</i>	gopher rockfish	0.7	100	1.7	235
	<i>Seriphus politus</i>	queenfish	2.6	100	0.0	264
	<i>Symphurus atricauda</i>	California tonguefish	0.7	100	0.1	77
	<i>Umbrina roncadior</i>	yellowfin croaker	0.7	100	0.6	128
	Mission Bay	<i>Anchoa delicatissima</i>	slough anchovy	70.1	67	3.5
<i>Anisotremus davidsonii</i>		sargo	0.3	33	0.9	39
<i>Atherinops affinis</i>		topsmelt	0.6	67	0.1	49
<i>Cymatogaster aggregata</i>		shiner surfperch	9.0	33	2.2	371
<i>Halichoeres semicinctus</i>		rock wrasse	1.2	33	6.0	241
<i>Heterodontus francisci</i>		horn shark	0.3	33	0.8	38
<i>Hippocampus ingens</i>		Pacific seahorse	0.6	67	1.1	112
<i>Paralabrax clathratus</i>		kelp bass	4.6	33	4.3	297
<i>Paralabrax maculatofasciatus</i>		spotted sand bass	6.5	67	53.6	4004
<i>Paralabrax nebulifer</i>		barred sand bass	1.2	33	2.5	126
<i>Paralichthys californicus</i>		California halibut	2.5	33	3.8	209
<i>Pleuronichthys ritteri</i>		spotted turbot	0.3	33	0.3	21
<i>Syngnathus californiensis</i>		kelp pipefish	0.3	33	0.4	23
<i>Umbrina roncadior</i>		yellowfin croaker	0.3	33	5.2	184
<i>Urolophus halleri</i>		round ray	1.5	67	14.8	1087
<i>Xenistius californiensis</i>		salema	0.6	33	0.5	38
San Diego Bay - North		<i>Anchoa delicatissima</i>	slough anchovy	0.8	50	0.3
	<i>Cheilotrema saturnum</i>	black croaker	0.0	25	0.5	13
	<i>Engraulis mordax</i>	northern anchovy	94.1	25	18.9	2824
	<i>Paralabrax maculatofasciatus</i>	spotted sand bass	1.4	75	26.8	2113
	<i>Paralabrax nebulifer</i>	barred sand bass	0.1	50	3.0	158
	<i>Paralichthys californicus</i>	California halibut	0.3	75	8.3	649
	<i>Pleuronichthys ritteri</i>	spotted turbot	0.0	50	0.1	8
	<i>Porichthys myriaster</i>	specklefin midshipman	0.1	50	1.8	95
	<i>Scorpaena guttata</i>	spotted scorpionfish	0.1	50	4.6	235
	<i>Seriphus politus</i>	queenfish	1.3	25	12.2	339
	<i>Symphurus atricauda</i>	California tonguefish	0.1	50	0.1	7
	<i>Synodus lucioceps</i>	California lizardfish	0.8	100	1.4	227
	<i>Urolophus halleri</i>	round ray	0.8	75	21.9	1703
	San Diego Bay - Central	<i>Anchoa compressa</i>	deepbody anchovy	0.3	50	0.1
<i>Anchoa delicatissima</i>		slough anchovy	84.3	100	1.2	8549
<i>Cheilotrema saturnum</i>		black croaker	0.3	100	1.1	144
<i>Myliobatis californica</i>		bat ray	1.0	50	43.1	2206
<i>Paralabrax maculatofasciatus</i>		spotted sand bass	3.1	100	7.7	1083
<i>Paralabrax nebulifer</i>		barred sand bass	1.9	100	1.5	338
<i>Paralichthys californicus</i>		California halibut	1.6	50	0.8	121
<i>Pleuronichthys ritteri</i>		spotted turbot	0.2	50	0.4	30
<i>Porichthys myriaster</i>		specklefin midshipman	0.5	100	0.7	123
<i>Umbrina roncadior</i>		yellowfin croaker	0.3	100	1.2	159
<i>Urolophus halleri</i>		round ray	6.3	100	42.1	4841
San Diego Bay - South	<i>Anchoa delicatissima</i>	slough anchovy	98.7	75	34.1	9955
	<i>Cheilotrema saturnum</i>	black croaker	0.1	50	5.1	259
	<i>Hippocampus ingens</i>	Pacific seahorse	0.0	25	0.4	11
	<i>Paralabrax maculatofasciatus</i>	spotted sand bass	0.6	100	32.0	3263
	<i>Paralabrax nebulifer</i>	barred sand bass	0.1	50	1.1	58
	<i>Paralichthys californicus</i>	California halibut	0.1	75	1.3	100
	<i>Urolophus halleri</i>	round ray	0.4	75	26.1	1989

Invertebrate Catch Summary Tables and Metrics

Table I-6. 2018 RHMP Epibenthic Macroinvertebrate Abundances

Scientific Name	Dana Point Harbor	Oceanside Harbor	Mission Bay			San Diego Bay										Total Abundance per Taxa	% of Total Abundance	Frequency of Trawl Capture (%)
						North				Central		South						
						B18-10068	B18-10071	B18-10016	B18-10017	B18-10019	B18-10022	B18-10023	B18-10024	B18-10030	B18-10034			
Acanthoptilum sp	0	0	0	0	18	2	8	3	11	2	0	0	0	0	0	44	4.9	40
Amathia verticillata	0	0	0	P	P	0	0	0	0	0	0	0	0	0	P	P	NA	20
Apostichopus californicus	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.1	7
Apostichopus parvimensis	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	7
Bulla gouldiana	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	4	0.4	20
Cancer productus	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.4	7
Chalinidae	0	0	P	0	0	0	0	0	0	0	0	0	0	0	0	P	NA	7
Ciona robusta	0	0	0	0	2	0	0	0	3	0	0	0	0	0	0	5	0.6	13
Crassostrea gigas	0	0	5	0	0	0	0	0	0	0	0	1	0	0	0	6	0.7	13
Crepidula fornicata	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.1	7
Cymothoidae	0	P	0	0	0	0	0	0	0	P	0	0	0	0	0	P	NA	13
Dendraster excentricus	0	0	0	0	618	0	0	0	0	0	0	0	0	0	0	618	68.9	7
Doryteuthis opalescens	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	3	0.3	20
Epiactis prolifera	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.1	7
Farfantepenaeus californiensis	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	0.2	7
Halichondridae	0	0	P	0	0	0	0	0	0	0	0	P	P	0	P	P	NA	27
Heptacarpus brevisrostris	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.2	7
Kelletia kelletii	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	7
Lamellaria diegoensis	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.1	7
Leptopecten latiauratus	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	4	0.4	13
Lophopanopeus bellus	0	0	0	0	0	0	0	0	0	3	4	0	2	9	0	18	2.0	27
Lottia depicta	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0.2	7
Loxorhynchus crispatus	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.1	7
Modiolus capax	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	7
Molgula manhattensis	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	7
Muricea fruticosa	0	0	0	0	0	0	0	0	P	0	0	0	0	0	0	P	NA	7
Musculista senhousia	0	0	1	2	0	0	0	0	0	2	0	11	0	8	4	28	3.1	40
Nassarius tiarula	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	3	0.3	20
Navanax inermis	0	0	0	0	0	0	0	0	0	1	1	1	1	1	25	30	3.3	40
Octopus bimaculoides	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	7
Ophiothrix spiculata	0	4	0	0	1	0	0	0	0	0	0	0	0	0	0	5	0.6	13
Pagurus armatus	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	0.3	7
Palaemon macrodactylus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	7	0.8	7
Panulirus interruptus	0	2	0	0	1	0	0	0	2	0	0	0	0	0	0	5	0.6	20
Patiria miniata	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5	0.6	7
Portunus xantusii	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	7
Pugettia producta	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	7
Pusula solandri	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	7
Pyromaia tuberculata	0	0	0	0	0	4	1	0	3	0	0	0	0	0	0	8	0.9	20
Pyuridae	0	0	0	0	0	0	0	0	0	0	0	68	0	0	0	68	7.6	7
Romaleon antennarium	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0.3	13
Sicyonia penicillata	0	2	0	0	0	1	2	0	0	0	0	0	0	0	0	5	0.6	20
Styela clava	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.1	7
Styela plicata	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.1	7
Suberites sp	0	0	0	0	0	P	0	P	0	0	0	0	0	0	0	P	NA	13
Tetilla sp	0	0	0	0	0	0	0	0	0	P	P	P	P	P	0	P	NA	33
Thalamoporella californica	0	0	0	P	0	0	0	0	P	0	0	0	P	0	0	P	NA	20
Total Abundance per Station	2	18	18	3	642	9	12	3	31	8	5	84	5	19	38	897	100.0	--
Means	2	18	221			21												

Table I-7. 2018 RHMP Epibenthic Macroinvertebrate Biomass (kg)

Scientific Name	Dana Point Harbor	Oceanside Harbor	Mission Bay			San Diego Bay										Total Biomass per Taxa	% of Total Biomass
						North				Central		South					
						B18-10068	B18-10071	B18-10016	B18-10017	B18-10019	B18-10022	B18-10023	B18-10024	B18-10030	B18-10034		
Acanthoptilum sp	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0	0	0.60	1.8
Amathia verticillata	0	0	0	1.3	0.4	0	0	0	0	0	0	0	0	0	0.1	1.80	5.4
Apostichopus californicus	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.10	0.3
Apostichopus parvimensis	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.10	0.3
Bulla gouldiana	0.1	0	0.2	0	0.1	0	0	0	0	0	0	0	0	0	0	0.40	1.2
Cancer productus	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.10	0.3
Chalinidae	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.10	0.3
Ciona robusta	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0.20	0.6
Crassostrea gigas	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0	0.20	0.6
Crepidula fornicata	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.10	0.3
Cymothoidae	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.20	0.6
Dendraster excentricus	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	7.00	21.1
Doryteuthis opalescens	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0.1	0	0	0.30	0.9
Epiactis prolifera	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.10	0.3
Farfantepenaeus californiensis	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.10	0.3
Halichondridae	0	0	0.1	0	0	0	0	0	0	0	0	0.4	0.1	0	0.2	0.80	2.4
Heptacarpus brevisrostris	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.10	0.3
Kelletia kelletii	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.10	0.3
Lamellaria diegoensis	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0.10	0.3
Leptopecten latiauratus	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0.1	0.30	0.9
Lophopanopeus bellus	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0.1	0.1	0	0.40	1.2
Lottia depicta	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.10	0.3
Loxorhynchus crispatus	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.10	0.3
Modiolus capax	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0.20	0.6
Molgula manhattensis	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.10	0.3
Muricea fruticosa	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.10	0.3
Musculista senhousia	0	0	0.1	0.1	0	0	0	0	0	0.1	0	0.1	0	0.1	0.1	0.60	1.8
Nassarius tiarula	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0.30	0.9
Navanax inermis	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.60	1.8
Octopus bimaculoides	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0.30	0.9
Ophiothrix spiculata	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0.20	0.6
Pagurus armatus	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.10	0.3
Palaemon macrodactylus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.10	0.3
Panulirus interruptus	0	0.1	0	0	0.5	0	0	0	1.5	0	0	0	0	0	0	2.10	6.3
Patiria miniata	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.10	0.3
Portunus xantusii	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.10	0.3
Pugettia producta	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.10	0.3
Pusula solandri	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.10	0.3
Pyromaia tuberculata	0	0	0	0	0	0.1	0.1	0	0.1	0	0	0	0	0	0	0.30	0.9
Pyuridae	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0	0.30	0.9
Romaleon antennarium	0	0.1	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.20	0.6
Sicyonia penicillata	0	0.1	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0.30	0.9
Styela clava	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.10	0.3
Styela plicata	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.10	0.3
Suberites sp	0	0	0	0	0	0.5	0	2.3	0	0	0	0	0	0	0	2.80	8.5
Tetilla sp	0	0	0	0	0	0	0	0	0	2.2	1.2	0.1	0.1	6.6	0	10.20	30.8
Thalamoporella californica	0	0	0	0.1	0	0	0	0	0.1	0	0	0	0.1	0	0	0.30	0.9
Total Biomass per Station	0.20	0.90	1.80	1.60	8.40	0.90	0.4	2.4	2.60	2.7	1.40	1.4	0.70	7.00	0.70	33.10	100
Means	0.20	0.90	3.93			2.0											

Table I-8. 2018 RHMP Epibenthic Macroinvertebrate Ecological Indices, All Harbors Combined

Scientific Name	% of Total Abundance	Frequency of Trawl Capture (%)	% of Total Biomass	Ecological Index
<i>Dendraster excentricus</i>	68.9	7	41.7	737.09
<i>Acanthoptilum</i> sp	4.9	40	3.6	339.07
<i>Navanax inermis</i>	3.3	40	3.6	276.64
<i>Musculista senhousia</i>	3.1	40	3.6	267.72
<i>Panulirus interruptus</i>	0.6	20	12.5	261.15
<i>Lophopanopeus bellus</i>	2.0	27	2.4	117.00
Pyuridae	7.6	7	1.8	62.44
<i>Bulla gouldiana</i>	0.4	20	2.4	56.54
<i>Pyromaia tuberculata</i>	0.9	20	1.8	53.55
<i>Sicyonia penicillata</i>	0.6	20	1.8	46.86
<i>Doryteuthis opalescens</i>	0.3	20	1.8	42.40
<i>Nassarius tiarula</i>	0.3	20	1.8	42.40
<i>Leptopecten latiauratus</i>	0.4	13	1.8	29.76
<i>Crassostrea gigas</i>	0.7	13	1.2	24.79
<i>Ciona robusta</i>	0.6	13	1.2	23.31
<i>Ophiothrix spiculata</i>	0.6	13	1.2	23.31
<i>Romaleon antennarium</i>	0.3	13	1.2	20.33
<i>Octopus bimaculoides</i>	0.1	7	1.8	12.65
<i>Palaemon macrodactylus</i>	0.8	7	0.6	9.17
<i>Modiolus capax</i>	0.1	7	1.2	8.68
<i>Patiria miniata</i>	0.6	7	0.6	7.68
<i>Cancer productus</i>	0.4	7	0.6	6.94
<i>Pagurus armatus</i>	0.3	7	0.6	6.20
<i>Farfantepenaeus californiensis</i>	0.2	7	0.6	5.45
<i>Heptacarpus brevisrostris</i>	0.2	7	0.6	5.45
<i>Lottia depicta</i>	0.2	7	0.6	5.45
<i>Apostichopus californicus</i>	0.1	7	0.6	4.71
<i>Apostichopus parvimensis</i>	0.1	7	0.6	4.71
<i>Crepidula fornicata</i>	0.1	7	0.6	4.71
<i>Epiactis prolifera</i>	0.1	7	0.6	4.71
<i>Kelletia kelletii</i>	0.1	7	0.6	4.71
<i>Lamellaria diegoensis</i>	0.1	7	0.6	4.71
<i>Loxorhynchus crispatus</i>	0.1	7	0.6	4.71
<i>Molgula manhattensis</i>	0.1	7	0.6	4.71
<i>Portunus xantusii</i>	0.1	7	0.6	4.71
<i>Pugettia producta</i>	0.1	7	0.6	4.71
<i>Pusula solandri</i>	0.1	7	0.6	4.71
<i>Styela clava</i>	0.1	7	0.6	4.71
<i>Styela plicata</i>	0.1	7	0.6	4.71

**Table I-9. 2018 RHMP Epibenthic Macroinvertebrate
Ecological Indices by Harbor**

Harbor	Scientific Name	% of Total Abundance	Frequency of Trawl Capture (%)	% of Total Biomass	Ecological Index
Dana Point Harbor	<i>Apostichopus parvimensis</i>	50	100	50	10000
	<i>Bulla gouldiana</i>	50	100	50	10000
Oceanside Harbor	<i>Cancer productus</i>	22.2	100	12.5	3472
	<i>Heptacarpus brevirostris</i>	11.1	100	12.5	2361
	<i>Ophiothrix spiculata</i>	22.2	100	12.5	3472
	<i>Panulirus interruptus</i>	11.1	100	12.5	2361
	<i>Portunus xantusii</i>	5.6	100	12.5	1806
	<i>Pugettia producta</i>	5.6	100	12.5	1806
	<i>Romaleon antennarium</i>	11.1	100	12.5	2361
	<i>Sicyonia penicillata</i>	11.1	100	12.5	2361
Mission Bay	<i>Acanthoptilum sp</i>	2.7	33.3	1.0	125
	<i>Bulla gouldiana</i>	0.5	66.7	3.1	234
	<i>Ciona robusta</i>	0.3	33.3	1.0	44
	<i>Crassostrea gigas</i>	0.8	33.3	1.0	59
	<i>Dendraster excentricus</i>	93.2	33.3	71.4	5488
	<i>Epiactis prolifera</i>	0.2	33.3	1.0	39
	<i>Kelletia kelletii</i>	0.2	33.3	1.0	39
	<i>Lamellaria diegoensis</i>	0.2	33.3	1.0	39
	<i>Leptopecten latiauratus</i>	0.3	33.3	2.0	78
	<i>Lottia depicta</i>	0.3	33.3	1.0	44
	<i>Modiolus capax</i>	0.2	33.3	2.0	73
	<i>Molgula manhattensis</i>	0.2	33.3	1.0	39
	<i>Musculista senhousia</i>	0.5	66.7	2.0	166
	<i>Nassarius tiarula</i>	0.2	33.3	1.0	39
	<i>Octopus bimaculoides</i>	0.2	33.3	3.1	107
	<i>Ophiothrix spiculata</i>	0.2	33.3	1.0	39
<i>Panulirus interruptus</i>	0.2	33.3	5.1	175	
<i>Pusula solandri</i>	0.2	33.3	1.0	39	
San Diego Bay	<i>Acanthoptilum sp</i>	12.1	50	8.3	1024
	<i>Apostichopus californicus</i>	0.5	10	1.7	21
	<i>Ciona robusta</i>	1.4	10	1.7	31
	<i>Crassostrea gigas</i>	0.5	10	1.7	21
	<i>Crepidula fornicata</i>	0.5	10	1.7	21
	<i>Doryteuthis opalescens</i>	1.4	30	5.0	192
	<i>Farfantepenaeus californiensis</i>	0.9	10	1.7	26
	<i>Leptopecten latiauratus</i>	0.9	10	1.7	26
	<i>Lophopanopeus bellus</i>	8.4	40	6.7	603
	<i>Loxorhynchus crispatus</i>	0.5	10	1.7	21
	<i>Musculista senhousia</i>	11.7	40	6.7	734
	<i>Nassarius tiarula</i>	0.9	20	3.3	85
	<i>Navanax inermis</i>	14.0	60	10.0	1441
	<i>Pagurus armatus</i>	1.4	10	1.7	31
	<i>Palaemon macrodactylus</i>	3.3	10	1.7	49
	<i>Panulirus interruptus</i>	0.9	10	25.0	259
	<i>Patiria miniata</i>	2.3	10	1.7	40
	<i>Pyromaia tuberculata</i>	3.7	30	5.0	262
	<i>Pyuridae</i>	31.8	10	5.0	368
	<i>Romaleon antennarium</i>	0.5	10	1.7	21
<i>Sicyonia penicillata</i>	1.4	20	3.3	95	
<i>Styela clava</i>	0.5	10	1.7	21	
<i>Styela plicata</i>	0.5	10	1.7	21	

Table I-10. 2018 RHMP Epibenthic Macroinvertebrate Biodiversity Metrics

Biological Metric	Dana Point Harbor	Oceanside Harbor	Mission Bay			San Diego Bay									
	B18-10068	B18-10071	B18-10016	B18-10017	B18-10019	North				Central			South		
						B18-10022	B18-10023	B18-10024	B18-10030	B18-10034	B18-10036	B18-10037	B18-10038	B18-10039	B18-10042
Taxa Richness	2	9	13	4	8	5	4	2	12	6	3	9	7	5	6
Abundance	2	18	18	3	642	9	12	3	31	8	5	84	5	19	38
Biomass (kg)	0.2	0.9	1.8	1.6	8.4	0.9	0.4	2.4	2.6	2.7	1.4	1.4	0.7	7.0	0.7
Shannon-Wiener Diversity Index	0.69	1.97	2.21	0.64	0.20	1.27	0.98	--	1.96	1.32	0.50	0.70	1.33	1.03	0.98
Pielou's Evenness Index	1.0	0.9	0.9	0.9	0.1	0.9	0.7	--	0.9	1.0	0.7	0.4	1.0	0.7	0.7

Notes:

-- = Could not be calculated because only one species was observed that could be enumerated.