Supporting Information

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SI Materials and Methods

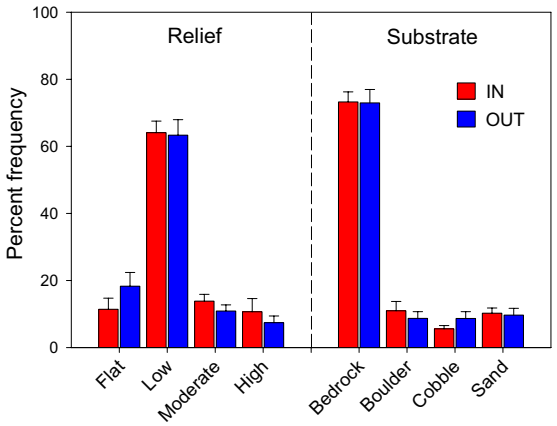

Fig. S1. Percent frequency of different categories of physical relief and substrate types at sites inside and outside of reserves in the Channel Islands. There were no significant differences in relief or substrate type between reserves and nonreserve sites, with the exception of higher frequency of flat relief outside reserves.

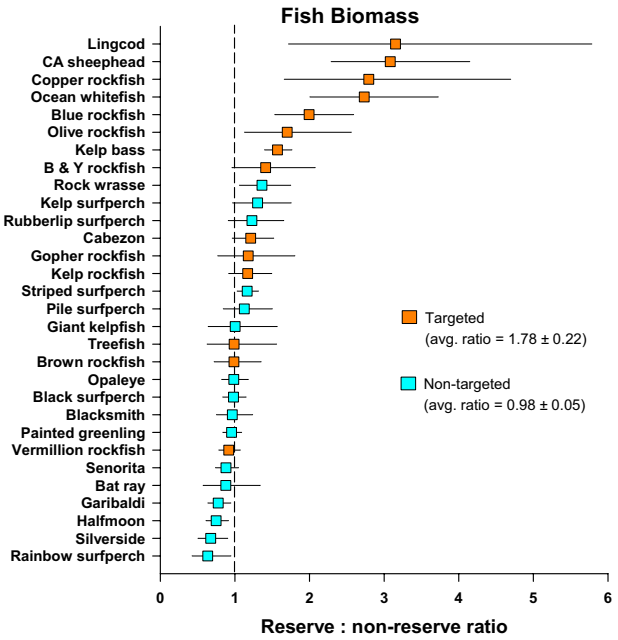

Fig. S2. Average Response Ratios (biomass inside/biomass outside) for individual targeted and nontargeted species of fish in the Channel Islands reserve network. Values represent the back-transformed average of the log response ratios for each island. Values greater than 1 indicate species with higher biomass inside reserves, whereas values less than 1 indicate species with higher biomass outside reserves. Overall, targeted fish species had higher biomass inside reserves relative to outside, whereas nontargeted species showed no differences in biomass inside or outside of reserves. Error bars are ± SE.

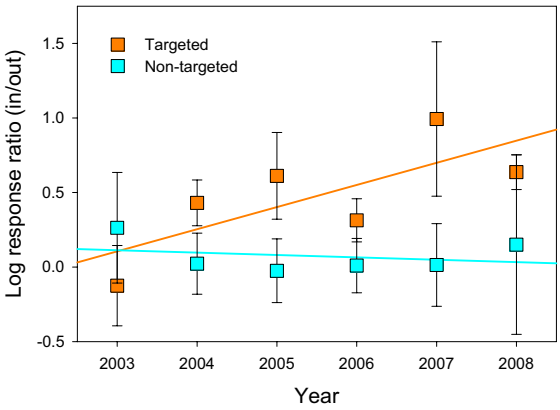

Fig. S3. Time series of log response ratios (biomass inside/biomass outside) for targeted and nontargeted fish species in the Channel Islands reserve network. Values represent the ARR using islands as replicates across the different years surveyed since the marine reserves were enacted in 2003. Positive values indicate greater biomass inside reserves and negative values indicate greater biomass outside reserves. The biomass of targeted species increased inside reserves relative to outside, whereas the biomass of nontargeted species showed no change inside or outside of reserves (by ANCOVA, target status $F_{1,8} = 10.52$, $P = 0.012$; year $F_{1,8} = 3.30$, $P = 0.11$; target status × year, $F_{1,8} = 5.07$, $P = 0.054$). Error bars represent ± SE.

Table S1. Results of analysis of similarity on fish community structure among the island groups

Group comparison	R statistic	*P* value
Anacapa vs. Santa Barbara	0.546	**0.002**
Anacapa vs. Santa Cruz	0.078	0.22
Anacapa vs. Santa Rosa	0.835	**0.002**
Anacapa vs. San Miguel	1	**0.005**
Santa Barbara vs. Santa Cruz	0.826	**0.001**
Santa Barbara vs. Santa Rosa	0.944	**0.001**
Santa Barbara vs. San Miguel	1	**0.005**
Santa Cruz vs. Santa Rosa	0.698	**0.001**
Santa Cruz vs. San Miguel	0.956	**0.001**
Santa Rosa vs. San Miguel	0.072	0.26

Shown are pairwise tests of significant differences in community structure. Statistically significant values are in bold text. All analyses were conducted in PRIMER 6.0 and used a resemblance matrix of the fourth root transformed abundance data of the 30 most common species surveyed.

Table S2. Results of canonical analysis of principal coordinates reclassification

	Classification						
Original group	Anacapa I.	Santa Barbara I.	Santa Cruz I.	San Miguel I.	Santa Rosa I.	Total	Correct, %
Anacapa	6	0	0	0	0	6	100
Santa Barbara	0	6	0	0	0	6	100
Santa Cruz	1	0	13	0	0	14	92.8
San Miguel	0	0	0	4	0	4	100
Santa Rosa	0	0	0	2	10	12	83.3

Shown are cross-validated reclassification probabilities of sites back to their island of origin based on community structure analyses using leave-one-out criteria. All analyses were conducted in PRIMER 6.0 and used a resemblance matrix of the fourth root transformed abundance data of the 30 most common species surveyed.

Table S3. Densities of common targeted and nontargeted species surveyed in the Channel Islands

Species	Santa Barbara I.	Anacapa I.	Santa Cruz I.	Santa Rosa I.	San Miguel I.	Magnitude difference (Max/Min)*
Targeted species						
Blue rockfish	0	0.02	0.32	1.99	4.34	235×
Kelp bass	0.24	2.34	3.91	0.25	0.03	84×
Olive rockfish	0	0.02	0.23	0.73	0.93	59×
Kelp rockfish	0.04	0.10	0.69	1.10	2.06	52×
Copper rockfish	0	0.01	0.01	0.09	0.19	32×
Vermilion rockfish	0	0	0.002	0.015	0.047	17×
Ocean whitefish	0.09	0.09	0.10	0.01	0.01	15×
Cabezon	0.02	0	0.01	0.03	0.02	13×
Lingcod	0.01	0	0.01	0.06	0.08	12×
Black and yellow rockfish	0.01	0.03	0.06	0.09	0.06	9×
Gopher rockfish	0.02	0.02	0.03	0.08	0.14	9×
California sheephead	0.66	0.79	0.93	0.97	0.26	4×
Brown rockfish	0.005	0	0.011	0.018	0.007	4×
Treefish	0.02	0.06	0.05	0.02	0.03	3×
Nontargeted species						
Striped surfperch	0.01	0.03	0.29	1.22	3.35	260×
Garibaldi	0.90	1.07	1.20	0.01	0	92×
Silverside	0.44	4.69	1.96	0.74	0.09	51×
Blacksmith	23.77	18.79	17.06	1.38	0.93	25×
Rainbow surfperch	0	0.08	0.28	1.12	0.51	14×
Rubberlip surfperch	0.01	0.04	0.30	0.17	0.03	12×
Halfmoon	1.64	0.93	0.72	0.14	0	12×
Kelp surfperch	0.25	1.66	2.78	2.63	1.26	11×
Opaleye	1.95	2.43	1.88	0.24	0	10×
Giant kelpfish	0.04	0.40	0.15	0.13	0.06	10×
Rock wrasse	0.23	1.32	0.54	0	0	6×
Black surfperch	0.51	2.24	2.13	0.93	0.75	4×
Bat ray	0.04	0.02	0.01	0.01	0.02	4×
Senorita	12.19	11.05	9.62	10.12	3.54	3×
Pile surfperch	0.18	0.38	1.10	0.59	0.33	3×
Painted greenling	0.33	0.38	0.66	0.74	0.95	3×

Shown are average densities (number of fish per transect) and the magnitude of difference in average density among islands (comparison of highest to lowest).
*Excluding islands where a species did not occur.

Table S4. Statistical analysis (ANOVA) of the differences in habitats across reserve and nonreserve sites in the Channel Islands

Habitat class/factor	*F*	*P* value
Relief		
Flat (0–10 cm)		
Reserve	4.59	**0.035**
Island	8.73	**<0.001**
Reserve × Island	0.21	0.93
Low (10 cm to 1 m)		
Reserve	0.03	0.86
Island	0.44	0.77
Reserve × Island	2.47	0.052
Moderate (1–2 m)		
Reserve	1.99	0.16
Island	4.55	**0.002**
Reserve × Island	0.88	0.48
High (>2 m)		
Reserve	1.17	0.28
Island	4.34	**0.003**
Reserve × Island	2.27	0.07
Substrate		
Bedrock		
Reserve	0.005	0.94
Island	3.65	**0.009**
Reserve × Island	1.21	0.31
Boulder		
Reserve	1.23	0.27
Island	5.60	**0.005**
Reserve × Island	2.14	0.084
Cobble		
Reserve	2.77	0.10
Island	1.29	0.27
Reserve × Island	1.99	0.11
Sand		
Reserve	0.07	0.79
Island	2.85	**0.029**
Reserve × Island	0.91	0.47

df = 9, 79 for the full model. The analysis includes the fixed factors of reserve, island (i.e., bioregion), and their interaction.

Table S5. Statistical analysis of the density responses of individual fish species to MPAs in the Channel Islands

Species/factor	*F*	*P* value
Targeted fish species		
Lingcod		
Reserve	9.6	0.0043
Island	13.1	<0.0001
Reserve × Island	2.3	0.08
California sheephead		
Reserve	27.7	<0.0001
Island	14.2	<0.0001
Reserve × Island	1.6	0.19
Copper rockfish		
Reserve	2.1	0.15
Island	12.0	<0.0001
Reserve × Island	3.1	0.03
Ocean whitefish		
Reserve	4.6	0.04
Island	3.4	0.02
Reserve × Island	2.6	0.06
Blue rockfish		
Reserve	1.2	0.29
Island	15.9	<0.0001
Reserve × Island	0.3	0.88
Olive rockfish		
Reserve	3.2	0.08
Island	8.5	0.0001
Reserve × Island	1.1	0.39
Kelp bass		
Reserve	0.4	0.55
Island	61.0	<0.0001
Reserve × Island	4.2	0.008
Black and Yellow rockfish		
Reserve	0.3	0.62
Island	8.1	0.0001
Reserve × Island	1.8	0.16
Cabezon		
Reserve	6.2	0.019
Island	3.5	0.019
Reserve × Island	4.0	0.011
Gopher rockfish		
Reserve	2.6	0.11
Island	4.3	0.0073
Reserve × Island	1.0	0.41
Kelp rockfish		
Reserve	0.06	0.81
Island	9.0	<0.0001
Reserve × Island	1.8	0.15
Treefish		
Reserve	0.3	0.62
Island	2.6	0.053
Reserve × Island	1.8	0.15
Brown rockfish		
Reserve	2.2	0.15
Island	1.9	0.14
Reserve × Island	0.9	0.49
Vermilion rockfish		
Reserve	0.7	0.41
Island	2.8	0.042
Reserve × Island	0.8	0.53
Nontargeted fish species		
Rock wrasse		
Reserve	3.0	0.10
Island	7.6	0.0002
Reserve × Island	2.3	0.09

Table S5. Cont.

Species/factor	*F*	*P* value
Kelp surfperch		
Reserve	0.01	0.92
Island	2.4	0.07
Reserve × Island	0.3	0.88
Rubberlip surfperch		
Reserve	0.01	0.93
Island	6.3	0.0009
Reserve × Island	0.2	0.93
Striped surfperch		
Reserve	0.3	0.61
Island	27.7	<0.0001
Reserve × Island	1.7	0.17
Pile surfperch		
Reserve	2.1	0.16
Island	12.9	<0.0001
Reserve × Island	1.3	0.3
Giant kelpfish		
Reserve	0.7	0.42
Island	4.0	0.01
Reserve × Island	0.3	0.88
Opaleye		
Reserve	1.8	0.19
Island	27.9	<0.0001
Reserve × Island	1.1	0.37
Black surfperch		
Reserve	0.01	0.94
Island	15.3	<0.0001
Reserve × Island	0.59	0.68
Blacksmith		
Reserve	0.6	0.46
Island	11.7	<0.0001
Reserve × Island	4.4	0.007
Painted greenling		
Reserve	2.0	0.17
Island	13.5	<0.0001
Reserve × Island	3.2	0.025
Senorita		
Reserve	0.1	0.75
Island	3.7	0.014
Reserve × Island	1.3	0.29
Bat ray		
Reserve	0.01	0.98
Island	1.1	0.37
Reserve × Island	1.5	0.22
Garibaldi		
Reserve	1.7	0.20
Island	56.7	<0.0001
Reserve × Island	8.7	<0.0001
Halfmoon		
Reserve	0.8	0.39
Island	5.7	0.0015
Reserve × Island	0.6	0.67
Silverside		
Reserve	2.2	0.15
Island	3.3	0.023
Reserve × Island	0.6	0.67
Rainbow surfperch		
Reserve	0.8	0.37
Island	2.8	0.045
Reserve × Island	0.7	0.61

Analysis includes the factors of reserve and island (i.e., bioregion) and their interaction.

Table S6. Statistical analysis of the biomass response of individual fish species to MPAs in the Channel Islands

Species/factor	F	*P* value
Targeted fish species		
Lingcod		
Reserve	4.2	**0.05**
Island	5.3	**0.0025**
Reserve × Island	1.6	0.19
California sheephead		
Reserve	21.9	**<0.0001**
Island	17.4	**<0.0001**
Reserve × Island	3.1	**0.03**
Copper rockfish		
Reserve	2.9	0.10
Island	12.0	**<0.0001**
Reserve × Island	2.4	0.07
Ocean whitefish		
Reserve	1.0	0.33
Island	0.8	0.54
Reserve × Island	3.3	**0.023**
Blue rockfish		
Reserve	1.7	0.19
Island	15.2	**<0.0001**
Reserve × Island	0.9	0.45
Olive rockfish		
Reserve	8.5	**0.0066**
Island	18.8	**<0.0001**
Reserve × Island	2.7	0.051
Kelp bass		
Reserve	7.1	**0.012**
Island	21.8	**<0.0001**
Reserve × Island	1.4	0.27
Black and Yellow rockfish		
Reserve	1.0	0.32
Island	13.1	**<0.0001**
Reserve × Island	2.9	**0.04**
Cabezon		
Reserve	2.9	0.09
Island	2.8	**0.043**
Reserve × Island	2.7	**0.048**
Gopher rockfish		
Reserve	2.9	0.097
Island	4.8	**0.004**
Reserve × Island	0.7	0.58
Kelp rockfish		
Reserve	0.4	0.55
Island	7.9	**0.0002**
Reserve × Island	0.8	0.52
Treefish		
Reserve	0.3	0.62
Island	1.8	0.15
Reserve × Island	1.4	0.25
Brown rockfish		
Reserve	2.0	0.17
Island	0.6	0.64
Reserve × Island	1.0	0.43
Vermilion rockfish		
Reserve	0.7	0.40
Island	1.6	0.20
Reserve × Island	1.2	0.35
Nontargeted fish species		
Rock wrasse		
Reserve	2.7	0.11
Island	22.4	**<0.0001**
Reserve × Island	3.2	**0.026**

Table S6. Cont.

Species/factor	F	*P* value
Kelp surfperch		
Reserve	0.02	0.90
Island	2.5	0.07
Reserve × Island	0.2	0.95
Rubberlip surfperch		
Reserve	0.03	0.85
Island	8.4	**0.0001**
Reserve × Island	0.4	0.81
Striped surfperch		
Reserve	0.5	0.49
Island	23.2	**<0.0001**
Reserve × Island	1.0	0.40
Pile surfperch		
Reserve	2.4	0.13
Island	11.3	**<0.0001**
Reserve × Island	1.8	0.15
Giant kelpfish		
Reserve	0.6	0.43
Island	3.0	**0.035**
Reserve × Island	4.0	**0.01**
Opaleye		
Reserve	0.3	0.57
Island	26.7	**<0.0001**
Reserve × Island	1.0	0.43
Black surfperch		
Reserve	0.1	0.71
Island	11.2	**<0.0001**
Reserve × Island	0.9	0.49
Blacksmith		
Reserve	0.1	0.77
Island	5.8	**0.0014**
Reserve × Island	1.5	0.23
Painted greenling		
Reserve	2.2	0.15
Island	15.7	**<0.0001**
Reserve × Island	3.1	**0.03**
Senorita		
Reserve	0.8	0.39
Island	5.1	**0.003**
Reserve × Island	0.9	0.50
Bat ray		
Reserve	0.5	0.50
Island	1.0	0.45
Reserve × Island	1.9	0.14
Garibaldi		
Reserve	2.9	0.09
Island	43.5	**<0.0001**
Reserve × Island	6.1	**0.0011**
Halfmoon		
Reserve	1.3	0.26
Island	10.7	**<0.0001**
Reserve × Island	1.4	0.26
Silverside		
Reserve	6.9	**0.013**
Island	1.8	0.15
Reserve × Island	1.3	0.28
Rainbow surfperch		
Reserve	0.4	0.53
Island	1.7	0.17
Reserve × Island	0.9	0.45

Analysis includes the factors of reserve and island (i.e., bioregion) and their interaction.

Table S7. Table of the physical attributes of the individual Channel Island MPAs, noting which ones are included in the study

Name	Island	Size, nm^2	Length of coastline, nm	Surveyed by PISCO
Santa Barbara SMR	Santa Barbara	13.2	1	Yes
Anacapa SMR	Anacapa	11.7	3.3	Yes
Anacapa SMCA	Anacapa	8.1	2.2	Yes
Scorpion SMR	Santa Cruz	10.3	3.3	Yes
Gull Island SMR	Santa Cruz	16.1	2.9	Yes
Painted Cave SMCA	Santa Cruz	2.1	2	Yes
Skunk Point SMR	Santa Rosa	1.4	2.7	No
Carrington SMR	Santa Rosa	13.3	5.3	Yes
South Point SMR	Santa Rosa	10.8	3.8	Yes
Harris Point SMR	San Miguel	18.2	6.3	Yes
Judith Rock SMR	San Miguel	5.1	1.4	No
Richardson Rock SMR	San Miguel	32.2	NA	No

Areas and length of coastline refer to the MPAs in state waters and are reported in nautical miles. NA, not applicable. Source: McArdle D, Hastings S, Ugoretz J (2003) California Marine Protected Areas Update. California Seagrant Publication No T-051.