California MLPA Master Plan Science Advisory Team

Revised Round 1 Outputs from Bioeconomic Model Evaluations: Deletion Analysis

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Revised Table 3a. Deletion Analysis for External Proposed MPA Arrays. This table shows the biomass increase and biomass increase per area for each MPA proposed in Round 1 external MPA arrays for the Marine Life Protection Act (MLPA) Initiative north coast study region (NCSR). Revised results are derived from the UC Santa Barbara (UCSB) and UC Davis (UCD) bioeconomic models. To explore a range of assumptions, the UCSB model runs this analysis assuming maximum-sustainable yield (MSY)-type management outside of the MPAs, while the UCD model assumes unsuccessful management outside of the MPAs. Because of this, deletion values for the UCD model are typically higher than for the UCSB model, reflecting the more important contributions of MPAs when fish populations outside of MPAs are being depleted. The ***biomass increase*** is the contribution of an individual proposed MPA to the overall biomass in the external MPA array, expressed as a percentage of the equilibrium biomass with the full proposed MPA array. A biomass increase of 1 indicates that the MPA is contributing 1% to the overall biomass in the study region (for example, allowing fishing within that MPA would reduce biomass by 1%). ***Biomass increase per area*** is the contribution of an individual proposed MPA to the overall biomass in the external MPA array, accounting for the area of the MPA. This is calculated as the percent increase in biomass per square kilometer of habitat protected. For both metrics, negative numbers indicate that the MPA is reducing equilibrium biomass. Negative numbers are rare but can occur when opening an MPA draws fishing effort away from other, more productive, locations. For deletion analysis for revised round 1 evaluations, the Master Plan Science Advisory Team (SAT) modeled populations of six species: Black rockfish, brown rockfish, cabezon, redtail surfperch, red abalone, and red sea urchin. Biomass increase and biomass increase per area are averaged across these species. Due to limitations of the SAT's current evaluation methods, for revised round 1 evaluations, proposed MPAs in external MPA array A were considered static rather than mobile. Traditional tribal uses were not integrated into revised round 1 modeling evaluations of external MPA arrays due to the limited information about tribal uses.

External Proposed MPA Array	MPA Name	Biomass increase (UCSB)	Biomass increase per area (UCSB)	Biomass increase (UCD)	Biomass increase per area (UCD)
ExA	Albion Mobile SMCA	0.93534	4.9327	0.40083	2.7116
ExA	Crescent City Mobile SMCA	0.81153	4.7481	0.23854	2.1137
ExA	Eureka Mobile SMCA	0.40512	2.2822	0.11269	0.7407
ExA	Noyo Mobile SMCA	1.152	4.7644	0.35144	1.8801
ExA	Point Arena Mobile SMCA	0.2966	0.3902	0.39519	0.6939
ExA	Point Cabrillo (FS) SMR	0.39969	1.2318	0.70693	2.2999
ExA	Punta Gorda (FS) SMCA	1.2831	5.6633	0.42771	2.2024
ExA	Pyramid Point (FS) SMCA	1.4264	5.5074	0.1635	0.819
ExA	Reading Rock (FS) SMCA	0.45869	1.4874	0.11632	0.4401
ExA	Shelter Cove Mobile SMCA	0.18419	0.4157	0.11944	0.3145

External Proposed MPA Array	MPA Name	Biomass increase (UCSB)	Biomass increase per area (UCSB)	Biomass increase (UCD)	Biomass increase per area (UCD)
ExA	Ten Mile (FS) SMR	1.644	5.2831	0.52136	0.7316
ExA	Trinidad Mobile SMCA	0.57995	1.9826	0.11713	0.4672
ExB	Eel River SMCA	0.54524	2.1714	0.11533	0.5359
ExB	Point Cabrillo SMCA	0.20898	0.2837	0.68522	1.6568
ExB	Point Cabrillo SMR	0.38609	0.5997	0.68287	2.2721
ExB	Punta Gorda SMR	1.6698	10.481	0.4291	1.3338
ExB	Pyramid Point SMR	1.4061	6.1393	0.16117	0.4673
ExB	Reading Rock SMCA	0.50301	2.0071	0.11949	0.5563
ExB	Reading Rock SMR	0.008798	0.365	0.05449	0.0853
ExB	Ten Mile SMR	0.7939	2.2541	0.47107	0.5736
ExB	Ten Mile Beach SMCA	0.040693	0.2508	0.094314	1.0676
ExC	False Klamath Cove SMCA	0.86027	3.6056	0.32073	1.5683
ExC	Point Cabrillo SMCA	0.63903	1.6089	0.63259	0.9702
ExC	Punta Gorda SMCA	2.0706	10.837	0.41305	1.1385
ExC	Pyramid Point SMCA	1.4081	6.0296	0.1614	0.459
ExC	Reading Rock SMCA	0.53645	0.8408	0.93907	0.1068
ExC	Reading Rock Coastline SMCA	0.52214	2.0563	0.11715	0.5464
ExC	Russian Gulch SMCA	0.26089	0.8369	0.46253	1.9873
ExC	Ten Mile SMCA	1.6405	5.3937	0.52027	0.7469
ExC	Vizcaino SMCA	1.5491	5.9813	0.55516	1.4459
ExD	Big Flat SMCA	0.2518	3.3163	0.10909	1.6762
ExD	False Klamath SMCA	1.0694	4.9838	0.24469	1.3304
ExD	Gorda SMR	2.135	9.9665	0.42069	1.0401
ExD	Patrick's Point SMCA	1.0634	3.0507	0.2078	0.6955
ExD	Point Cabrillo SMR	1.4187	4.5519	0.56658	1.3758
ExD	Point Cabrillo Offshore SMCA	0.068533	-0.3328	0.56517	-0.3524
ExD	Pyramid Point SMR	1.4051	4.7115	0.16106	0.3587
ExD	Reading Rock SMCA	0.50453	1.5589	0.11986	0.4321
ExD	Reading Rock SMR	0.37436	-0.1639	0.83086	-0.0219
ExD	Usal SMR	1.9904	8.7763	0.42182	0.7259
ExE	False Cape SMCA	0.62081	1.547	0.18227	0.5299
ExE	False Klamath SMCA	1.7302	9.0079	0.28848	1.7522
ExE	Point Cabrillo SMR	0.64236	1.7687	0.63589	1.0666
ExE	Punta Gorda SMR	2.5651	12.441	0.41652	1.0658
ExE	Pyramid Point SMR	1.4016	4.9585	0.16066	0.3775
ExE	Reading Rock SMCA	0.50192	1.74	0.11924	0.4822
ExE	Reading Rock SMR	0.37043	-0.1541	0.82215	-0.0206
ExE	Russian Gulch SMCA	0.34436	1.3439	0.3571	0.8247
ExE	S.E.A. Ten Mile SMR	1.6417	4.6017	0.52064	0.6206

External Proposed MPA Array	MPA Name	Biomass increase (UCSB)	Biomass increase per area (UCSB)	Biomass increase (UCD)	Biomass increase per area (UCD)
ExE	Vizcaino SMCA	2.6196	9.8211	0.47015	2.0564
ExF	Eel River SMCA	0.54597	2.1723	0.11549	0.5361
ExF	Point Cabrillo SMCA	0.21099	0.2837	0.69179	1.6569
ExF	Point Cabrillo SMR	0.3854	0.6007	0.68166	2.276
ExF	Punta Gorda SMR	1.6595	10.166	0.43472	1.3544
ExF	Pyramid Point SMR	1.4036	6.1402	0.16089	0.4674
ExF	Reading Rock SMCA	0.50428	2.008	0.1198	0.5565
ExF	Reading Rock SMR	0.3081	-0.0206	0.78122	-0.0039
ExF	Ten Mile SMR	0.79311	2.2384	0.4706	0.5696
ExF	Ten Mile Beach SMCA	0.040945	0.2508	0.094897	1.0676
ExG	Eel River SMCA	0.54597	2.1723	0.11549	0.5361
ExG	Point Cabrillo SMCA	0.21099	0.2837	0.69179	1.6569
ExG	Point Cabrillo SMR	0.3854	0.6007	0.68166	2.276
ExG	Punta Gorda SMR	1.6595	10.166	0.43472	1.3544
ExG	Pyramid Point SMR	1.4036	6.1402	0.16089	0.4674
ExG	Reading Rock SMCA	0.50428	2.008	0.1198	0.5565
ExG	Reading Rock SMR	0.3081	-0.0206	0.78122	-0.0039
ExG	Ten Mile SMR	0.79311	2.2384	0.4706	0.5696
ExG	Ten Mile Beach SMCA	0.040945	0.2508	0.094897	1.0676
ExH	Eel River SMCA	0.54566	2.2188	0.11542	0.5475
ExH	Point Cabrillo SMR	0.39138	1.2052	0.69223	2.2501
ExH	Punta Gorda SMR	1.6589	10.161	0.43455	1.3538
ExH	Pyramid Point SMR	1.392	5.8542	0.16104	0.4468
ExH	Reading Rock SMCA	0.50251	2.0527	0.11938	0.5689
ExH	Reading Rock SMR	0.30975	-0.0146	0.78539	-0.0028
ExH	Ten Mile SMR	0.79378	2.2511	0.471	0.5729
ExH	Ten Mile Beach SMCA	0.041365	0.2547	0.095871	1.0843