

California MLPA Master Plan Science Advisory Team
Revised Round 1 Outputs from Bioeconomic Model Evaluations:
Biomass and Fishery Yield
June 14, 2010 DRAFT

Table 1a: Total Biomass and Total Fishery Yield. Total biomass and fishery yield predicted for each of seven species for revised Round 1 evaluations of external marine protected area (MPA) arrays were estimated using the University of California, Santa Barbara (UCSB) and University of California, Davis (UCD) bioeconomic models. The total biomass of each species is estimated at equilibrium for each square kilometer of the study region. Values are scaled relative to total unfished biomass such that values of 0 indicate no biomass and values of 1 indicate maximum unfished biomass. Total fishery yield is the total harvest of each species relative to maximum sustainable yield (MSY) of the species with the existing MPAs (proposal 0). For revised round 1 evaluations, seven species were modeled: Black rockfish, brown rockfish, cabezon, redbtail surfperch, Dungeness crab, red abalone and red sea urchin. Model results were calculated for 3 different fishery management scenarios; the results in this table are from the MSY-type management scenario. Total biomass and yield are the average across six of these modeled species. Due to the unique characteristics of the Dungeness crab fishery, this species is presented separately in Table 1b. Due to limitations of the SAT's current evaluation methods, for round 1, proposed MPAs in external MPA array A were considered static rather than mobile. Traditional tribal uses were not integrated into revised round 1 evaluations of external MPA arrays due to the limited information about tribal uses.

External Proposed MPA Array	Species	Total Biomass (UCSB)	Total Biomass (UCD)	Total Fishery Yield (UCSB)	Total Fishery Yield (UCD)
ExA	Black Rockfish	0.43513	0.32623	0.97864	0.9691
ExA	Brown Rockfish	0.43883	0.28767	0.92329	0.92552
ExA	Cabezon	0.40622	0.43844	0.95526	0.95959
ExA	Red Abalone	0.40021	0.43197	0.99422	0.99127
ExA	Red Sea Urchin	0.41989	0.59315	0.98728	0.97912
ExA	Redtail Surfperch	0.45699	0.41328	0.86854	0.89127
ExB	Black Rockfish	0.42586	0.31446	0.99876	1.0029
ExB	Brown Rockfish	0.41588	0.25565	0.99014	0.98781
ExB	Cabezon	0.39296	0.42621	0.98517	0.98824
ExB	Red Abalone	0.39693	0.4277	0.99647	0.99578
ExB	Red Sea Urchin	0.41498	0.58965	0.99536	0.99074
ExB	Redtail Surfperch	0.44183	0.3994	0.90172	0.91508
ExC	Black Rockfish	0.43138	0.32442	0.98985	0.98852
ExC	Brown Rockfish	0.43183	0.27502	0.95603	0.9624
ExC	Cabezon	0.40779	0.43975	0.95145	0.95396
ExC	Red Abalone	0.42058	0.45241	0.99063	0.98498
ExC	Red Sea Urchin	0.43711	0.5995	0.95763	0.95637
ExC	Redtail Surfperch	0.43224	0.38816	0.91853	0.92758
ExD	Black Rockfish	0.43021	0.30399	0.99166	0.99746

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External Proposed MPA Array	Species	Total Biomass (UCSB)	Total Biomass (UCD)	Total Fishery Yield (UCSB)	Total Fishery Yield (UCD)
ExD	Brown Rockfish	0.42918	0.2677	0.96514	0.95813
ExD	Cabazon	0.41125	0.4424	0.94574	0.94478
ExD	Red Abalone	0.42411	0.45664	0.9795	0.9718
ExD	Red Sea Urchin	0.44379	0.6024	0.94607	0.94357
ExD	Redtail Surfperch	0.46652	0.42247	0.83643	0.85138
ExE	Black Rockfish	0.43314	0.31226	0.98693	0.9857
ExE	Brown Rockfish	0.43977	0.28674	0.93508	0.93664
ExE	Cabazon	0.41862	0.44988	0.92516	0.92489
ExE	Red Abalone	0.43748	0.46908	0.97226	0.96361
ExE	Red Sea Urchin	0.4549	0.60695	0.9262	0.92757
ExE	Redtail Surfperch	0.45338	0.40949	0.8666	0.8778
ExF	Black Rockfish	0.42653	0.31271	0.99764	1.0037
ExF	Brown Rockfish	0.41777	0.2557	0.98825	0.98834
ExF	Cabazon	0.39297	0.42617	0.98515	0.98861
ExF	Red Abalone	0.39689	0.42762	0.9966	0.99614
ExF	Red Sea Urchin	0.41478	0.58965	0.99577	0.99096
ExF	Redtail Surfperch	0.44185	0.39956	0.90176	0.91527
ExG	Black Rockfish	0.42653	0.31271	0.99764	1.0037
ExG	Brown Rockfish	0.41777	0.2557	0.98825	0.98834
ExG	Cabazon	0.39297	0.42617	0.98515	0.98861
ExG	Red Abalone	0.39689	0.42762	0.9966	0.99614
ExG	Red Sea Urchin	0.41478	0.58965	0.99577	0.99096
ExG	Redtail Surfperch	0.44185	0.39956	0.90176	0.91527
ExH	Black Rockfish	0.42654	0.31443	0.99764	1.0022
ExH	Brown Rockfish	0.41775	0.25686	0.9883	0.98838
ExH	Cabazon	0.39296	0.42638	0.98517	0.98829
ExH	Red Abalone	0.39697	0.42953	0.99649	0.99517
ExH	Red Sea Urchin	0.41472	0.59048	0.9954	0.9883
ExH	Redtail Surfperch	0.44185	0.40109	0.90171	0.91571

Table 1b: Total Biomass and Total Fishery Yield for Dungeness Crab. Total biomass and fishery yield predicted for Dungeness crab for revised Round 1 evaluations of external marine protected area (MPA) arrays were estimated using an integrated biomodel based on the University of California, Santa Barbara (UCSB) and University of California, Davis (UCD) bioeconomic models. The total biomass of Dungeness crab is estimated at equilibrium for each square kilometer of the study region. Values are scaled relative to total unfished biomass such that values of 0 indicate no biomass and values of 1 indicate maximum unfished biomass. Total fishery yield is the total harvest of Dungeness crab relative to maximum sustainable yield (MSY) with the existing MPAs (proposal 0). Model results were calculated for 3 different fishery management scenarios; the results in this table are from the MSY-type management scenario. Due to limitations of the SAT's current evaluation methods, for round 1, proposed MPAs in external MPA array A were considered static rather than mobile. Traditional tribal uses were not integrated into revised round 1 evaluations of external MPA arrays due to the limited information about tribal uses.

External Proposed MPA Array	Species	Total Biomass (UCSB)	Total Biomass (UCD)	Total Fishery Yield (UCSB)	Total Fishery Yield (UCD)
ExA	Dungeness Crab	0.28343	0.36487	0.9894	1.0021
ExB	Dungeness Crab	0.29825	0.36804	0.97	1.001
ExC	Dungeness Crab	0.31686	0.37651	0.94596	0.9995
ExD	Dungeness Crab	0.3234	0.38388	0.93495	0.98664
ExE	Dungeness Crab	0.3182	0.37788	0.94321	0.99918
ExF	Dungeness Crab	0.29924	0.36871	0.96873	1.0002
ExG	Dungeness Crab	0.29924	0.36871	0.96873	1.0002
ExH	Dungeness Crab	0.29931	0.36875	0.96872	1.0005