California MLPA Master Plan Science Advisory Team Marine Birds Evaluation Results for Round 1 External MPA Arrays: Supplemental Information

March 17, 2010

The tables in this document provide supporting information for the Marine Life Protection Act (MLPA) Master plan Science Advisory Team Round 1 marine birds evaluation results. Results are given for individual marine protected areas (MPAs) within external proposed MPA arrays.

Only state marine reserves (SMRs) were considered in Round 1 analyses. In Round 2 analyses, state marine conservation areas (SMCAs) that provide benefits to marine birds (based on allowed uses) will be included. Additionally, data is being incorporated for a neritic foraging analysis in Round 2.

In Round 1 evaluations, effects on benefits to marine birds by allowing tribal uses in an MPA were not considered because there was not enough information on tribal uses to determine what the effects might be; therefore, tribal uses were not considered in proposed state marine reserves (SMRs) and other MPAs that were evaluated as no-take areas. In External Proposed MPA Array C, areas that allowed tribal uses only were assigned as state marine conservation areas (SMCAs) according to the proposed designation, whereas in other external proposed MPA arrays areas that allow tribal uses only were proposed as SMRs. Because tribal uses were not considered in this evaluation, we assigned SMCAs from External Proposed MPA Array C, which propose only tribal uses, to the SMR category for these analyses. In External Proposed MPA Array C, the proposed SMCAs that were reclassified as no-take MPAs equivalent to SMRs are: Pyramid Point SMCA, Reading Rock SMCA, Punta Gorda SMCA, Vizcaino SMCA, Ten Mile SMCA, Ten Mile Estuary SMCA, Point Cabrillo SMCA and Navarro River Estuary SMCA.

External Proposed MPA Array A proposed mobile MPAs that are intended to shift each year within a specified zone. For round 1, these MPAs were considered static for the purpose of evaluation. In External Proposed MPA Array A these proposed mobile MPAs are: Crescent City Mobile SMCA, Trinidad Mobile SMCA, Eureka Mobile SMCA, Shelter Cove Mobile SMCA, Noyo Mobile SMCA, Albion Mobile SMCA and Point Arena Mobile SMCA.

Note use of the following marine protected area and marine managed area acronyms in a number of tables:

SMR = state marine reserve

SMP = state marine park

SMCA = state marine conservation area

SMRMA = state marine recreational management area

In addition, a number of species codes are used in the tables:

BLOY = Black Oystercatcher

BRCO¹ = Brandt's Cormorant

BRPE = Brown Pelican

CAAU = Cassin's Auklet

COMU = Common Murre

DCCO = Double-crested Cormorant

FTSP = Fork-tailed Storm-petrel

LESP² = Leach's Storm-petrel

PECO = Pelagic Cormorant

PIGU = Pigeon Guillemot

RHAU = Rhinoceros Auklet

TUPU = Tufted Puffin

WEGU = Western Gull

Table 1. Numbers of 12 species of marine birds at breeding colonies within the north coast study region

Species	No. Animals
Black Oystercatcher (BLOY)	248
Brandt's Cormorant (BRCO)	13,105
Cassin's Auklet (CAAU)	4,833
Common Murre (COMU)	258,010
Double-crested Cormorant (DCCO)	2,873
Fork-tailed Storm-petrel (FTSP)	419
Leach's Storm-petrel (LESP)	9,414
Pelagic Cormorant (PECO)	5,675
Pigeon Guillemot (PIGU)	3,148
Rhinoceros Auklet (RHAU)	1,063
Tufted Puffin (TUPU)	181
Western Gull (WEGU)	4,046
Study Region Total	303,014

¹ American Ornithologists' Union (AOU) code for Brandt's Cormorant has been updated to BRAC since this data was collected.

² American Ornithologists' Union (AOU) code for Leach's Storm-petrel has been updated to LHSP since this data was collected.

Table 2. Comparison among external proposed MPA arrays of numbers and percentages of marine birds at breeding colonies within proposed MPAs ^{a,b} in the north coast study region.

MPA Name	No. of Species	Total Birds (No.)	Total Birds (%)	BLOY	BRCO	COMU	DCCO	FTSP	LESP	PECO	PIGU	RHAU	TUPU	WEGU
		(10.)	(10)				P0							
(None in P0)							10							
(140110 1111 0)							ExA							
Pyramid Point (FS) SMCA	9	3,374	1.1%	15 (6.0%)	774 (5.9%)	0 (0.0%)	1,102 (38.4%)	0 (0.0%)	1 (0.0%)	433 (7.6%)	371 (11.8%)	1 (0.1%)	27 (14.9%)	650 (16.1%)
Crescent City Mobile SMCA	5	192	0.1%	5 (2.0%)	0 (0.0%)	0 (0.0%)	2 (0.1%)	0 (0.0%)	0 (0.0%)	96 (1.7%)	59 (1.9%)	0 (0.0%)	0 (0.0%)	30 (0.7%)
Trinidad Mobile SMCA	9	1,1741	3.9%	7 (2.8%)	0 (0.0%)	2,281 (0.9%)	552 (19.2%)	208 (49.6%)	8373 (88.9%)	92 (1.6%)	64 (2.0%)	2 (0.2%)	0 (0.0%)	162 (4.0%)
Punta Gorda (FS) SMCA	3	80	0.0%	0 (0.0%)	57 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	19 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (0.1%)
Shelter Cove Mobile SMCA	2	64	0.0%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	62 (1.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (0.0%)
Ten Mile (FS) SMR	5	525	0.2%	3 (1.2%)	257 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	169 (3.0%)	58 (1.8%)	0 (0.0%)	0 (0.0%)	38 (0.9%)
Noyo Mobile SMCA	4	115	0.0%	2 (0.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	57 (1.0%)	48 (1.5%)	0 (0.0%)	0 (0.0%)	8 (0.2%)
Albion Mobile SMCA	4	164	0.1%	1 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	121 (2.1%)	28 (0.9%)	0 (0.0%)	0 (0.0%)	14 (0.3%)

MPA Name	No. of Species	Total Birds (No.)	Total Birds (%)	BLOY	BRCO	COMU	DCCO	FTSP	LESP	PECO	PIGU	RHAU	TUPU	WEGU
Point Arena Mobile SMCA	4	32	0.0%	2 (0.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	24 (0.4%)	2 (0.1%)	0 (0.0%)	0 (0.0%)	4 (0.1%)
							ExB							
Pyramid Point SMR	9	3,374	1.1%	15 (6.0%)	774 (5.9%)	0 (0.0%)	1,102 (38.4%)	0 (0.0%)	1 (0.0%)	433 (7.6%)	371 (11.8%)	1 (0.1%)	27 (14.9%)	650 (16.1%)
Punta Gorda SMR	3	80	0.0%	0 (0.0%)	57 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	19 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (0.1%)
Ten Mile SMR	5	461	0.2%	2 (0.8%)	257 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	114 (2.0%)	50 (1.6%)	0 (0.0%)	0 (0.0%)	38 (0.9%)
Point Cabrillo SMCA	4	50	0.0%	4 (1.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	13 (0.2%)	15 (0.5%)	0 (0.0%)	0 (0.0%)	18 (0.4%)
							ExC							
Pyramid Point SMCA	9	3,374	1.1%	15 (6.0%)	774 (5.9%)	0 (0.0%)	1,102 (38.4%)	0 (0.0%)	1 (0.0%)	433 (7.6%)	371 (11.8%)	1 (0.1%)	27 (14.9%)	650 (16.1%)
False Klamath Cove SMCA	8	4,4998	14.9%	2 (0.8%)	713 (5.4%)	43,898 (17.0%)	84 (2.9%)	0 (0.0%)	0 (0.0%)	115 (2.0%)	88 (2.8%)	0 (0.0%)	4 (2.2%)	94 (2.3%)
Punta Gorda SMCA	2	19	0.0%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	17 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (0.0%)
Vizcaino SMCA	7	1,1354	3.7%	6 (2.4%)	2,545 (19.4%)	8,474 (3.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	170 (3.0%)	70 (2.2%)	3 (0.3%)	0 (0.0%)	86 (2.1%)
Ten Mile SMCA	5	525	0.2%	3 (1.2%)	257 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	169 (3.0%)	58 (1.8%)	0 (0.0%)	0 (0.0%)	38 (0.9%)
Russian Gulch SMCA	4	267	0.1%	7 (2.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	185 (3.3%)	63 (2.0%)	0 (0.0%)	0 (0.0%)	12 (0.3%)

MPA Name	No. of Species	Total Birds (No.)	Total Birds (%)	BLOY	BRCO	COMU	DCCO ExD	FTSP	LESP	PECO	PIGU	RHAU	TUPU	WEGU
Pyramid Point SMR	9	3,374	1.1%	15 (6.0%)	774 (5.9%)	0 (0.0%)	1,102 (38.4%)	0 (0.0%)	1 (0.0%)	433 (7.6%)	371 (11.8%)	1 (0.1%)	27 (14.9%)	650 (16.1%)
False Klamath SMCA	8	4,5188	14.9%	4 (1.6%)	713 (5.4%)	43,898 (17.0%)	228 (7.9%)	0 (0.0%)	0 (0.0%)	144 (2.5%)	101 (3.2%)	0 (0.0%)	4 (2.2%)	96 (2.4%)
Patrick's Point SMCA	5	151	0.0%	5 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	39 (0.7%)	83 (2.6%)	20 (1.9%)	0 (0.0%)	4 (0.1%)
Gorda SMR	3	80	0.0%	0 (0.0%)	57 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	19 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (0.1%)
Usal SMR	7	1,1385	3.8%	6 (2.4%)	2545 (19.4%)	8,474 (3.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	181 (3.2%)	88 (2.8%)	3 (0.3%)	0 (0.0%)	88 (2.2%)
Point Cabrillo SMR	4	317	0.1%	11 (4.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	198 (3.5%)	78 (2.5%)	0 (0.0%)	0 (0.0%)	30 (0.7%)
							ExE							
Pyramid Point SMR	9	3,374	1.1%	15 (6.0%)	774 (5.9%)	0 (0.0%)	1102 (38.4%)	0 (0.0%)	1 (0.0%)	433 (7.6%)	371 (11.8%)	1 (0.1%)	27 (14.9%)	650 (16.1%)
False Klamath SMCA	8	4,5425	15.0%	12 (4.8%)	713 (5.4%)	43,898 (17.0%)	228 (7.9%)	0 (0.0%)	0 (0.0%)	300 (5.3%)	162 (5.1%)	0 (0.0%)	4 (2.2%)	108 (2.7%)
False Cape SMCA	7	1,2244	4.0%	2 (0.8%)	792 (6.0%)	11051 (4.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	240 (4.2%)	55 (1.7%)	0 (0.0%)	8 (4.4%)	96 (2.4%)
Punta Gorda SMR	3	99	0.0%	0 (0.0%)	57 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	36 (0.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	6 (0.1%)
Vizcaino SMCA	7	1,1354	3.7%	6 (2.4%)	2,545 (19.4%)	8,474 (3.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	170 (3.0%)	70 (2.2%)	3 (0.3%)	0 (0.0%)	86 (2.1%)
S.E.A. Ten Mile SMR	5	525	0.2%	3 (1.2%)	257 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	169 (3.0%)	58 (1.8%)	0 (0.0%)	0 (0.0%)	38 (0.9%)

MPA Name	No. of Species	Total Birds (No.)	Total Birds (%)	BLOY	BRCO	COMU	DCCO	FTSP	LESP	PECO	PIGU	RHAU	TUPU	WEGU
Russian Gulch SMCA	4	267	0.1%	7 (2.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%) ExF	0 (0.0%)	0 (0.0%)	185 (3.3%)	63 (2.0%)	0 (0.0%)	0 (0.0%)	12 (0.3%)
Pyramid Point SMR	9	3,374	1.1%	15 (6.0%)	774 (5.9%)	0 (0.0%)	1,102 (38.4%)	0 (0.0%)	1 (0.0%)	433 (7.6%)	371 (11.8%)	1 (0.1%)	27 (14.9%)	650 (16.1%)
Punta Gorda SMR	3	80	0.0%	0 (0.0%)	57 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	19 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (0.1%)
Ten Mile SMR	5	461	0.2%	2 (0.8%)	257 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	114 (2.0%)	50 (1.6%)	0 (0.0%)	0 (0.0%)	38 (0.9%)
Point Cabrillo SMCA	4	50	0.0%	4 (1.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	13 (0.2%)	15 (0.5%)	0 (0.0%)	0 (0.0%)	18 (0.4%)
							ExG							
Pyramid Point SMR	9	3,374	1.1%	15 (6.0%)	774 (5.9%)	0 (0.0%)	1,102 (38.4%)	0 (0.0%)	1 (0.0%)	433 (7.6%)	371 (11.8%)	1 (0.1%)	27 (14.9%)	650 (16.1%)
Punta Gorda SMR	3	80	0.0%	0 (0.0%)	57 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	19 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (0.1%)
Ten Mile SMR	5	461	0.2%	2 (0.8%)	257 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	114 (2.0%)	50 (1.6%)	0 (0.0%)	0 (0.0%)	38 (0.9%)
Point Cabrillo SMCA	4	50	0.0%	4 (1.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	13 (0.2%)	15 (0.5%)	0 (0.0%)	0 (0.0%)	18 (0.4%)
							ExH							
Pyramid Point SMR	4	52	0.0%	3 (1.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	31 (0.5%)	12 (0.4%)	0 (0.0%)	0 (0.0%)	6 (0.1%)
Punta Gorda SMR	3	80	0.0%	0 (0.0%)	57 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	19 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (0.1%)

MPA Name	No. of Species	Total Birds (No.)	Total Birds (%)	BLOY	BRCO	COMU	DCCO	FTSP	LESP	PECO	PIGU	RHAU	TUPU	WEGU
Ten Mile SMR	5	461	0.2%	2 (0.8%)	257 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	114 (2.0%)	50 (1.6%)	0 (0.0%)	0 (0.0%)	38 (0.9%)

a Only no-take MPAs count toward the summary in Table 3

Table 3. Comparison among external proposed MPA arrays of numbers and percentages of marine birds breeding within proposed state marine reserves in the north coast study region.

External MPA Array	No. of Species	Total Birds	Total Birds Pct.	BLOY	BRCO	COMU	DCCO	FTSP	LESP	PECO	PIGU	RHAU	TUPU	WEGU
P0	0	0	0.0%	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
ExA	5	525	0.2%	3 (1.2%)	257 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	169 (3.0%)	58 (1.8%)	0 (0.0%)	0 (0.0%)	38 (0.9%)
ExB	9	3,915	1.3%	17 (6.9%)	1,088 (8.3%)	0 (0.0%)	1,102 (38.4%)	0 (0.0%)	1 (0.0%)	566 (10.0%)	421 (13.4%)	1 (0.1%)	27 (14.9%)	692 (17.1%)
ExC	9	15,272	5.0%	24 (9.7%)	3,576 (27.3%)	8474 (3.3%)	1,102 (38.4%)	0 (0.0%)	1 (0.0%)	789 (13.9%)	499 (15.9%)	4 (0.4%)	27 (14.9%)	776 (19.2%)
ExD	10	15,156	5.0%	32 (12.9%)	3,376 (25.8%)	8474 (3.3%)	1,102 (38.4%)	0 (0.0%)	1 (0.0%)	831 (14.6%)	537 (17.1%)	4 (0.4%)	27 (14.9%)	772 (19.1%)
ExE	9	3,998	1.3%	18 (7.3%)	1,088 (8.3%)	0 (0.0%)	1,102 (38.4%)	0 (0.0%)	1 (0.0%)	638 (11.2%)	429 (13.6%)	1 (0.1%)	27 (14.9%)	694 (17.2%)
ExF	9	3,915	1.3%	17 (6.9%)	1,088 (8.3%)	0 (0.0%)	1,102 (38.4%)	0 (0.0%)	1 (0.0%)	566 (10.0%)	421 (13.4%)	1 (0.1%)	27 (14.9%)	692 (17.1%)
ExG	9	3,915	1.3%	17 (6.9%)	1,088 (8.3%)	0 (0.0%)	1,102 (38.4%)	0 (0.0%)	1 (0.0%)	566 (10.0%)	421 (13.4%)	1 (0.1%)	27 (14.9%)	692 (17.1%)
ExH	5	593	0.2%	5 (2.0%)	314 (2.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	164 (2.9%)	62 (2.0%)	0 (0.0%)	0 (0.0%)	48 (1.2%)

b Proposed MPAs not included in the table do not contain breeding marine birds.

Table 4. Comparison among external proposed MPA arrays of inclusion of top eight marine bird breeding hot spots in proposed MPAs in the north coast study region.

Breeding Hot Spots	P0	ExA	ЕхВ	ExC	ExD	ExE	ExF	ExG	ExH
Castle Rock									
False Klamath Rock				False Klamath Cove SMCA	False Klamath SMCA	False Klamath SMCA			
Green Rock									
Flatiron Rock									
False Cape Rocks						False Cape SMCA	e		
Steamboat Rock									
Rockport Rocks				Vizcaino SMCA	Usal SMR	Vizcaino SMCA			
Cape Viscaino				Vizcaino SMCA	Usal SMR	Vizcaino SMCA			

Table 5. Major Brown Pelican roosts by roost size category within proposed MPAs.^a

MPA Name	Roost Category	Number of Roosts	MPA Name	Roost Category	Number of Roosts
P0				ExE	
MacKerricher SMCA	Low	1	Pyramid Point SMCA	Low	2
ExA			Pyramid Point SMCA	Medium	1
Pyramid Point (FS) SMCA	Low	2	False Klamath SMCA	Low	1
Pyramid Point (FS) SMCA	Medium	1	False Klamath SMCA	Medium	1
Crescent City Mobile SMCA	Low	1	False Cape SMCA	Low	1
Trinidad Mobile SMCA	Low	2	Punta Gorda SMR	Low	1
Eureka Mobile SMCA	Low	1	Vizcaino SMCA	Low	1
Punta Gorda (FS) SMCA	Low	1	Vizcaino SMCA	Medium	3
Ten Mile (FS) SMR	Low	2	S.E.A. Ten Mile SMR	Low	2
ExE	}		MacKerricher SMCA	Low	1
Pyramid Point SMR	Low	2			
Pyramid Point SMR	Medium	1		ExF	_
Punta Gorda SMR	Low	1	Pyramid Point SMCA	Low	2
Ten Mile SMR	Low	2	Pyramid Point SMCA	Medium	1
ExC	,		Punta Gorda SMR	Low	1
Pyramid Point SMCA	Low	2	Ten Mile SMR	Low	2
Pyramid Point SMCA	Medium	1	MacKerricher SMCA	Low	1

MPA Name	Roost Category	Number of Roosts	MPA Name	Roost Category	Number of Roosts
False Klamath Cove SMCA	Medium	1		ExG	
Punta Gorda SMCA	Low	1	Pyramid Point SMCA	Low	2
Vizcaino SMCA	Medium	3	Pyramid Point SMCA	Medium	1
Ten Mile SMCA	Low	2	Punta Gorda SMR	Low	1
MacKerricher SMCA	Low	1	Ten Mile SMR	Low	2
ЕхС)			ExH	
False Klamath SMCA	Medium	1	Punta Gorda SMR	Low	1
Patrick's Point SMCA	Low	1	Ten Mile SMR	Low	2
Patrick's Point SMCA	Medium	1			
Gorda SMR	Low	1			
Usal SMR	Low	1			
Usal SMR	Medium	3			
MacKerricher SMCA	Low	1			

a Proposed MPAs not included in the table do not contain Brown Pelican roosts

Table 6. Comparison among external proposed MPA arrays of size and number of Brown Pelican roosts within proposed state marine reserves.

External MPA Array	High (>500 birds)	Medium (100-500 birds)	Low (never more than 100 birds)
P0	0	0	0
ExA	0	0	2
ExB	0	1	5
ExC	0	4	5
ExD	0	3	2
ExE	0	0	3
ExF	0	0	3
ExG	0	0	3
ExH	0	0	3

Table 7. Comparison of external proposed MPA arrays to total contributions of weighted foraging index for four species of breeding seabirds in MPAs in the north coast study region.

MPA Name	BRCO	PECO	COMU	PIGU	MPA Name	BRCO	PECO	COMU	PIGU
	P0					ExE			
MacKerricher SMCA	0.00	>.01	0.00	0.02	Big River Estuary SMP	0.02	0.02	>.01	0.02
Point Cabrillo SMCA	0.02	0.02	>.01	0.02	False Cape SMCA	0.75	0.52	0.53	0.22
Punta Gorda SMR	0.00	>.01	0.00	0.00	False Klamath SMCA	1.44	1.10	2.62	1.27
Russian Gulch SMCA	>.01	>.01	>.01	>.01	MacKerricher SMCA	0.00	>.01	0.00	0.02

Van Damme SMCA	MPA Name	BRCO	PECO	COMU	PIGU	MPA Name	BRCO	PECO	COMU	PIGU
Albion Mobile SMCA 0.22 1.20 0.00 1.38	Van Damme SMCA	>.01	>.01	>.01	>.01	Point Cabrillo SMR 0.31 0.28 >.01		>.01	0.33	
Crescent City Mobile SMCA 3.91 2.21 7.57 3.55 Navarro River Estuary SMR 0.01 0.00		ExA				Punta Gorda SMR 0.06		0.08	0.00	0.00
Navarro River Estuary SMR	Albion Mobile SMCA	0.22	1.20	0.00	1.38	Pyramid Point SMCA	0.01	0.02	0.00	0.02
Noyo Mobile SMCA	Crescent City Mobile SMCA	3.91	2.21	7.57	3.55	Pyramid Point SMR	0.91	1.18	0.00	1.82
Point Arena Mobile SMCA 0.64 0.38 0.00 0.07 Nussian Gulch SMCA 0.27 0.24 >.01 0.31	Navarro River Estuary SMR	>.01	>.01	0.00	>.01	Reading Rock SMCA	>.01	>.01	>.01	>.01
Point Cabrillo (FS) SMR	Noyo Mobile SMCA	0.00	0.69	0.00	0.92	Reading Rock SMR	0.24	0.01	0.13	0.01
Punta Gorda (FS) SMCA	Point Arena Mobile SMCA	0.64	0.38	0.00	0.07	Russian Gulch SMCA	0.27	0.24	>.01	0.31
Pyramid Point (FS) SMCA	Point Cabrillo (FS) SMR	0.03	0.03	>.01	0.03	S.E.A. Ten Mile Estuary SMR	>.01	>.01	0.00	>.01
Reading Rock (FS) SMCA	Punta Gorda (FS) SMCA	0.05	0.07	0.00	0.00	S.E.A. Ten Mile SMR	0.24	0.68	0.00	0.62
Shelter Cove Mobile SMCA 0.00 0.06 0.00 0.00 0.00 0.00	Pyramid Point (FS) SMCA	0.93	1.20	0.00	1.86	Van Damme SMCA	>.01	>.01	>.01	>.01
Ten Mile (FS) SMR	Reading Rock (FS) SMCA	0.13	>.01	0.08	>.01	Vizcaino SMCA	3.66	0.76	0.62	0.81
Ten Mile Estuary SMR SO1	Shelter Cove Mobile SMCA	0.00	0.06	0.00	0.00		ExF			
Trinidad Mobile SMCA 1.40 1.10 4.38 0.77 Point Cabrillo SMCA 0.00 0.01 0.00 0.01 Navarro River Estuary SMR >.01 >.01 0.00 >.01 Point Cabrillo SMR 0.04 0.07 0.00 0.00 Point Cabrillo SMCA 0.00 0.01 0.00 0.01 Pyramid Point SMCA 0.01 0.02 0.00 0.02 Point Cabrillo SMR 0.02 0.02 0.02 >.01 0.02 Pyramid Point SMCA 0.01 0.02 0.00 0.02 Point Cabrillo SMR 0.05 0.07 0.00 0.00 Pyramid Point SMR 0.01 1.82 0.00 1.82 Punta Gorda SMR 0.05 0.07 0.00 1.86 Reading Rock SMCA >.01	Ten Mile (FS) SMR	0.22	0.62	0.00	0.57	MacKerricher SMCA	0.00	>.01	0.00	0.02
Navarro River Estuary SMR 0.01 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.00	Ten Mile Estuary SMR	>.01	>.01	0.00	>.01	Navarro River Estuary SMR	>.01	>.01	0.00	>.01
Navarro River Estuary SMR	Trinidad Mobile SMCA	1.40	1.10	4.38	0.77	Point Cabrillo SMCA	0.00	0.01	0.00	0.01
Point Cabrillo SMCA 0.00 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.02 0.00 0.02 0.00 0.02 0.00 0.02 0.00 0.02 0.00 0.02 0.00		ExB				Point Cabrillo SMR	0.03	0.02	>.01	0.02
Point Cabrillo SMR	Navarro River Estuary SMR	>.01	>.01	0.00	>.01	Punta Gorda SMR	0.04	0.07	0.00	0.00
Punta Gorda SMR 0.05 0.07 0.00 0.00 Reading Rock SMCA >.01 >.01 >.01 >.01 Pyramid Point SMR 0.93 1.20 0.00 1.86 Reading Rock SMR 0.15 >.01 0.09 >.01 Reading Rock SMCA >.01 Ten Mile Beach SMCA 0.04 0.06 0.00 0.04 Ten Mile Beach SMCA 0.01 0.00 >.01 Ten Mile Estuary SMR >.01 >.01 0.00 >.01 Ten Mile Estuary SMR >.01 >.01 >.00 0.15 Ten Mile Estuary SMR >.01 >.01 >.00 0.15 Ten Mile Estuary SMR >.01 >.01 >.01 >.01 >.01 >.01 >.0	Point Cabrillo SMCA	0.00	0.01	0.00	0.01	Pyramid Point SMCA	0.01	0.02	0.00	0.02
Pyramid Point SMR 0.93 1.20 0.00 1.86 Reading Rock SMR 0.15 >.01 0.09 >.01 Reading Rock SMCA >.01 >.01 >.01 >.01 >.01 Reading Rock SMCA >.01 >.01 >.01 >.01 >.01 Reading Rock SMR 0.14 >.01 0.08 >.01 Ten Mile Beach SMCA 0.04 0.06 0.00 0.04 Ten Mile Beach SMCA 0.04 0.06 0.00 0.04 Ten Mile Beach SMCA 0.04 0.06 0.00 0.01 Ten Mile Estuary SMR >.01 >.01 0.00 >.01 Ten Mile Estuary SMR 0.14 0.22 0.00 0.15 Ten Mile SMR 0.01 >.	Point Cabrillo SMR	0.02	0.02	>.01	0.02	Pyramid Point SMR	0.91	1.18	0.00	1.82
Reading Rock SMCA >.01 >.01 >.01 >.01 >.01 Russian Gulch SMCA >.01 >.01 >.01 >.01 >.01 >.01 Reading Rock SMR 0.14 >.01 0.08 >.01 Ten Mile Beach SMCA 0.04 0.06 0.00 0.04 Ten Mile Beach SMCA 0.04 0.06 0.00 0.04 Ten Mile Estuary SMR >.01 >.01 0.00 >.01 Ten Mile Estuary SMR >.01 >.01 0.00 >.01 Ten Mile Estuary SMR >.01 >.01 0.00 >.01 Ten Mile Estuary SMR >.01 >.01 >.01 >.01 >.01 >.01 Ten Mile Estuary SMR >.01 >.01 >.01 >.01 >.01 >.01 Ten Mile Estuary SMR >.01 >.01 >.01 >.01 >.01 >.01 >.01 Ten Mile Estuary SMR >.01 >.01 >.01 >.01 >.01 >.01 >.01 Ten Mile Estuary SMR >.01	Punta Gorda SMR	0.05	0.07	0.00	0.00	Reading Rock SMCA >.01 >.01		>.01	>.01	
Reading Rock SMR	Pyramid Point SMR	0.93	1.20	0.00	1.86	Reading Rock SMR 0.15 >.01 0.0		0.09	>.01	
Ten Mile Beach SMCA 0.04 0.06 0.00 0.04 Ten Mile Estuary SMR >.01 >.01 0.00 >.01 Ten Mile Estuary SMR >.01 >.01 0.00 >.01 Ten Mile SMR 0.14 0.22 0.00 0.15 Ten Mile SMR 0.14 0.22 0.00 0.15 Van Damme SMCA >.01 0.00 >.01 0.00 >.01 0.02 Point Cabrillo SMCA 0.00 0.01 0.02 Point Cabrillo SMR 0.04 0.07 0.00 0.00 Navarro River Estuary SMCA 0.01 0.00 0.01	Reading Rock SMCA	>.01	>.01	>.01	>.01	Russian Gulch SMCA >.01 >.01 >.01		>.01	>.01	
Ten Mile Estuary SMR	Reading Rock SMR	0.14	>.01	0.08	>.01	Ten Mile Beach SMCA 0.04 0.06 0.00		0.00	0.04	
Ten Mile SMR 0.14 bxc 0.22 bxc 0.00 bxc 0.15 bxc Van Damme SMCA bxc ≥.01 bxc >.01 bxc ≥.01 bxc >.01 b	Ten Mile Beach SMCA	0.04	0.06	0.00	0.04	Ten Mile Estuary SMR >.01 >.01 0.00		0.00	>.01	
EXC EXG Albion River Estuary SMP 0.00 >.01 0.00 >.01 Navarro River Estuary SMR >.01 >.01 0.00 >.01 Big River Estuary SMP 0.02 0.02 >.01 0.02 Point Cabrillo SMCA 0.00 0.01 0.00 0.01 False Klamath Cove SMCA 0.36 0.39 1.12 0.35 Point Cabrillo SMR 0.03 0.02 >.01 0.02 MacKerricher SMCA 0.00 >.01 0.00 0.02 Punta Gorda SMR 0.04 0.07 0.00 0.00 Navarro River Estuary SMCA 0.01 0.00 0.02 Punta Gorda SMR 0.04 0.07 0.00 0.00 Navarro River Estuary SMCA 0.01 0.00 0.02 Punta Gorda SMR 0.04 0.07 0.00 0.00 Point Cabrillo SMCA 0.02 0.01 0.02 Pyramid Point SMCA 0.01 0.02 0.00 0.02 Punta Gorda SMCA 0.04 0.06 0.00 0.00 Reading	Ten Mile Estuary SMR	>.01	>.01	0.00	>.01	Ten Mile SMR 0.14 0.22 0.00		0.00	0.15	
Albion River Estuary SMP 0.00 >.01 0.00 >.01 Navarro River Estuary SMR >.01 >.01 0.00 >.01 Big River Estuary SMP 0.02 0.02 >.01 0.02 Point Cabrillo SMCA 0.00 0.01 0.00 0.01 False Klamath Cove SMCA 0.36 0.39 1.12 0.35 Point Cabrillo SMR 0.03 0.02 >.01 0.02 MacKerricher SMCA 0.00 >.01 0.00 0.02 Punta Gorda SMR 0.04 0.07 0.00 0.00 Navarro River Estuary SMCA 0.01 0.00 0.02 Punta Gorda SMR 0.04 0.07 0.00 0.00 Navarro River Estuary SMCA 0.01 0.00 0.02 Punta Gorda SMR 0.04 0.07 0.00 0.00 Navarro River Estuary SMCA 0.01 0.00 0.01 Pyramid Point SMCA 0.01 0.00 0.00 Pyramid Point SMCA 0.02 0.04 0.06 0.00 0.00 Reading Rock SMCA 0.01 0.0	Ten Mile SMR	0.14	0.22	0.00	0.15	Van Damme SMCA >.01 >.01 >.01		>.01		
Big River Estuary SMP 0.02 0.02 >.01 0.02 Point Cabrillo SMCA 0.00 0.01 0.00 0.01 False Klamath Cove SMCA 0.36 0.39 1.12 0.35 Point Cabrillo SMR 0.03 0.02 >.01 0.02 MacKerricher SMCA 0.00 >.01 0.00 0.02 Punta Gorda SMR 0.04 0.07 0.00 0.00 Navarro River Estuary SMCA >.01 >.01 0.00 >.01 Pyramid Point SMCA 0.01 0.02 0.00 0.02 Point Cabrillo SMR 0.04 0.05 0.00 >.01 Pyramid Point SMCA 0.01 0.02 0.00 0.02 Point Cabrillo SMR 0.01 0.02 >.01 0.02 Pyramid Point SMCA 0.01 0.02 0.00 0.02 Point Cabrillo SMR 0.04 0.06 0.00 0.09 Pyramid Point SMCA 0.01 0.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 </td <td></td> <td>ExC</td> <td></td> <td></td> <td></td> <td></td> <td>ExG</td> <td></td> <td></td> <td></td>		ExC					ExG			
False Klamath Cove SMCA 0.36 0.39 1.12 0.35 Point Cabrillo SMR 0.03 0.02 >.01 0.02 MacKerricher SMCA 0.00 >.01 0.00 0.02 Punta Gorda SMR 0.04 0.07 0.00 0.00 Navarro River Estuary SMCA >.01 >.01 0.00 >.01 Pyramid Point SMCA 0.01 0.02 0.00 0.02 Point Cabrillo SMR 0.01 0.02 0.00 0.02 Pyramid Point SMCA 0.01 0.02 0.00 0.02 Point Cabrillo SMR 0.01 0.02 0.00 0.00 Pyramid Point SMCA 0.01 0.02 0.00 0.02 Punta Gorda SMCA 0.04 0.06 0.00 0.00 Reading Rock SMCA >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 0.04 0.06 0.00 0.04 Reading Rock Coastline SMCA 0.26 0.01 0.15 0.01 Ten Mile Estuary SMR >.	Albion River Estuary SMP	0.00	>.01	0.00	>.01	Navarro River Estuary SMR	>.01	>.01	0.00	>.01
MacKerricher SMCA 0.00 >.01 0.00 0.02 Punta Gorda SMR 0.04 0.07 0.00 0.00 Navarro River Estuary SMCA >.01 >.01 0.00 >.01 Pyramid Point SMCA 0.01 0.02 0.00 0.02 Point Cabrillo SMCA 0.28 0.26 >.01 0.29 Pyramid Point SMR 0.91 1.18 0.00 1.82 Punta Gorda SMCA 0.04 0.06 0.00 0.00 Reading Rock SMCA >.01<	Big River Estuary SMP	0.02	0.02	>.01	0.02	Point Cabrillo SMCA	0.00	0.01	0.00	0.01
Navarro River Estuary SMCA >.01 >.01 0.00 >.01 Pyramid Point SMCA 0.01 0.02 0.00 0.02 Point Cabrillo SMCA 0.28 0.26 >.01 0.29 Pyramid Point SMR 0.91 1.18 0.00 1.82 Punta Gorda SMCA 0.04 0.06 0.00 0.00 Reading Rock SMCA >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 0.09 >.01 Reading Rock Coastline SMCA 0.02 >.01 0.01 >.01 Ten Mile Beach SMCA 0.04 0.00 0.00 >.01 Reading Rock SMCA 0.26 0.01 0.15 0.01 Ten Mile Estuary SMR >.01 >.01 0.00 >.01 Russian Gulch SMCA 0.30 0.27 >.01 0.35 Ten Mile SMR 0.14 0.22 0.00 0.15	False Klamath Cove SMCA	0.36	0.39	1.12	0.35	Point Cabrillo SMR	0.03	0.02	>.01	0.02
Point Cabrillo SMCA 0.28 0.26 >.01 0.29 Pyramid Point SMR 0.91 1.18 0.00 1.82 Punta Gorda SMCA 0.04 0.06 0.00 0.00 Reading Rock SMCA >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 >.01 0.09 >.01 0.09 >.01 0.09 >.01 0.09 >.01 0.09 >.01 0.09 >.01 0.09 >.01 0.09 >.01 0.09 0.04 0.06 0.00 0.04 0.06 0.00 0.04 0.06 0.00 0.04 0.06 0.00 0.04 0.06 0.00 0.04 0.06 0.00 0.04 0.06 0.00 0.04 0.06 0.00 0.01 0.01 Ten Mile Estuary SMR 0.01 0.00 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 <td< td=""><td>MacKerricher SMCA</td><td>0.00</td><td>>.01</td><td>0.00</td><td>0.02</td><td>Punta Gorda SMR</td><td>0.04</td><td>0.07</td><td>0.00</td><td>0.00</td></td<>	MacKerricher SMCA	0.00	>.01	0.00	0.02	Punta Gorda SMR	0.04	0.07	0.00	0.00
Punta Gorda SMCA 0.04 0.06 0.00 0.00 Reading Rock SMCA >.01 >.01 >.01 >.01 Pyramid Point SMCA 0.93 1.20 0.00 1.85 Reading Rock SMR 0.15 >.01 0.09 >.01 Reading Rock Coastline SMCA 0.02 >.01 0.01 >.01 Ten Mile Beach SMCA 0.04 0.06 0.00 0.04 Reading Rock SMCA 0.26 0.01 0.15 0.01 Ten Mile Estuary SMR >.01 >.01 0.00 >.01 Russian Gulch SMCA 0.30 0.27 >.01 0.35 Ten Mile SMR 0.14 0.22 0.00 0.15	Navarro River Estuary SMCA	>.01	>.01	0.00	>.01	Pyramid Point SMCA 0.01 0.02		0.00	0.02	
Pyramid Point SMCA 0.93 1.20 0.00 1.85 Reading Rock SMR 0.15 >.01 0.09 >.01 Reading Rock Coastline SMCA 0.02 >.01 0.01 >.01 Ten Mile Beach SMCA 0.04 0.06 0.00 0.04 Reading Rock SMCA 0.26 0.01 0.15 0.01 Ten Mile Estuary SMR >.01 >.01 0.00 >.01 Russian Gulch SMCA 0.30 0.27 >.01 0.35 Ten Mile SMR 0.14 0.22 0.00 0.15	Point Cabrillo SMCA	0.28	0.26	>.01	0.29	Pyramid Point SMR 0.91 1.18 0.00		0.00	1.82	
Reading Rock Coastline SMCA 0.02 >.01 0.01 >.01 Ten Mile Beach SMCA 0.04 0.06 0.00 0.04 Reading Rock SMCA 0.26 0.01 0.15 0.01 Ten Mile Estuary SMR >.01 >.01 >.01 >.01 Russian Gulch SMCA 0.30 0.27 >.01 0.35 Ten Mile SMR 0.14 0.22 0.00 0.15	Punta Gorda SMCA	0.04	0.06	0.00	0.00	Reading Rock SMCA >.01 >.01 >.01		>.01		
Reading Rock SMCA 0.26 0.01 0.15 0.01 Ten Mile Estuary SMR >.01 >.01 0.00 >.01 Russian Gulch SMCA 0.30 0.27 >.01 0.35 Ten Mile SMR 0.14 0.22 0.00 0.15	Pyramid Point SMCA	0.93	1.20	0.00	1.85	Reading Rock SMR		>.01		
Russian Gulch SMCA 0.30 0.27 >.01 0.35 Ten Mile SMR 0.14 0.22 0.00 0.15	Reading Rock Coastline SMCA	0.02	>.01	0.01	>.01	Ten Mile Beach SMCA 0.04 0.06 0.00		0.04		
	Reading Rock SMCA	0.26	0.01	0.15	0.01	Ten Mile Estuary SMR >.01 >.01 0.00		>.01		
Ten Mile Estuary SMCA >.01 >.01 0.00 >.01 ExH	Russian Gulch SMCA	0.30	0.27	>.01	0.35	Ten Mile SMR 0.14 0.22 0.00 0		0.15		
	Ten Mile Estuary SMCA	>.01	>.01	0.00	>.01		ExH			

MPA Name	BRCO	PECO	COMU	PIGU	MPA Name	BRCO	PECO	COMU	PIGU
Ten Mile SMCA	0.22	0.63	0.00	0.58	Point Cabrillo SMR	0.03	0.02	>.01	0.02
Van Damme SMCA	>.01	>.01	>.01	>.01	Punta Gorda SMR	0.04	0.07	0.00	0.00
Vizcaino Outside SMCA	0.92	0.17	0.16	0.17	Pyramid Point SMR	0.79	1.02	0.00	1.57
Vizcaino SMCA	1.16	0.24	0.20	0.26	Reading Rock SMCA	>.01	>.01	>.01	>.01
	ExD				Reading Rock SMR	0.15	>.01	0.09	>.01
Albion River Estuary SMP	0.00	>.01	0.00	>.01	Ten Mile Beach SMCA	0.04	0.06	0.00	0.04
Big River Estuary SMP	0.02	0.02	>.01	0.02	Ten Mile Estuary SMR	>.01	>.01	0.00	>.01
False Klamath SMCA	0.79	0.56	1.58	0.54	Ten Mile SMR	0.14	0.22	0.00	0.15
Gorda SMR	0.05	0.07	0.00	0.00					
MacKerricher SMCA	0.00	>.01	0.00	0.02					
Navarro River Estuary SMR	>.01	>.01	0.00	>.01					
Patrick's Point SMCA	0.00	0.77	0.00	0.59					
Point Cabrillo Offshore SMCA	0.29	0.25	>.01	0.24					
Point Cabrillo SMR	0.35	0.36	>.01	0.47					
Pyramid Point SMR	0.91	1.18	0.00	1.82					
Reading Rock SMCA	>.01	>.01	>.01	>.01					
Reading Rock SMR	0.24	0.01	0.13	0.01					
Ten Mile River Estuary SMR	>.01	>.01	0.00	>.01					
Usal SMR	4.03	1.03	0.68	1.15					
Van Damme SMCA	>.01	>.01	>.01	>.01					

Table 8. Comparison of external proposed MPA arrays to total contributions of weighted foraging areas for four species of breeding seabirds in state marine reserves in the north coast study region.

External MPA Array	Brandt's Cormorant	Pelagic Cormorant	Common Murre	Pigeon Guillemot
P0	0.00	0.00	0.00	0.00
ExA	0.26	0.66	>.01	0.60
ExB	1.29	1.53	0.08	2.04
ExC	2.89	2.41	0.34	3.00
ExD	5.58	2.66	0.82	3.46
ExE	1.76	2.24	0.13	2.78
ExF	1.29	1.51	0.09	2.01
ExG	1.29	1.51	0.09	2.01
ExH	1.16	1.34	0.09	1.76

Table 9. Comparison of external proposed MPA arrays to total contributions of coastal habitats used by shorebirds and waterfowl in state marine reserves in the north coast study region.

External MPA Array	Coastal Beach (miles)	Coastal Marsh (miles)	Coastal Marsh (sq. miles)	Tidal Flats (miles)	Humboldt Bay Eelgrass (sq. miles)	Estuary (sq. miles)
P0	0.00	0.00	0.00	0.00	0.00	0.00
ExA	1.93	2.94	0.06	0.33	0.00	0.28
ExB	9.30	2.94	0.06	0.36	0.00	0.33
ExC	10.43	2.94	0.06	0.33	0.00	0.28
ExD	8.28	2.94	0.06	0.33	0.00	0.28
ExE	5.43	2.30	0.05	0.00	0.00	0.19
ExF	5.24	2.94	0.06	0.36	0.00	0.33
ExG	5.24	2.94	0.06	0.36	0.00	0.33
ExH	4.92	2.30	0.05	0.00	0.00	0.19