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

March 13, 2010 Draft

The tables in this document provide supporting information for the 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 a no-take areas. In External Proposed MPA Array C, areas that allowed tribal uses only were assigned as 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 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.

Note use of the following marine protected area and marine managed areas 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

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

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 |

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

Table 2. Comparison between external proposed MPA arrays of numbers and percentages of marine birds at breeding colonies within proposed marine protected areas (MPAs) in the north coast study region. Only no-take MPAs counted towards the summary in Table 3. Proposed MPAs not shown do not contain breeding marine birds.

| MPA Name | No. of Species | Total Birds (No.) | Total Birds (%) | BLOY | BRCO | COMU | DCCO | FTSP | LESP | PECO | PIGU | RHAU | TUPU | WEGU |
|---------------------------------|-------------------|-------------------------|-----------------------|--------------|---------------|-----------------|------------------|----------------|-----------------|---------------|----------------|-------------|---------------|----------------|
| | | | | | | | P0 | | | | | | | |
| (None in P0) | | | | | | | | | | | | | | |
| | | | | | | | 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%) |

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| 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%) |

| MPA Name | No. of Species | Total Birds (No.) | Total Birds (%) | BLOY | BRCO | COMU | DCCO | FTSP | LESP | PECO | PIGU | RHAU | TUPU | WEGU |
|---------------------------|-------------------|-------------------------|-----------------------|--------------|---------------|-------------|------------------|-------------|-------------|---------------|----------------|-------------|---------------|----------------|
| 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%) |
| 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%) |
| 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%) |

| MPA Name | No. of Species | Total Birds (No.) | Total Birds (%) | BLOY | BRCO | COMU | DCCO | FTSP | LESP | PECO | PIGU | RHAU | TUPU | WEGU |
|--------------------|-------------------|-------------------------|-----------------------|-------------|---------------|-------------|-------------|-------------|-------------|---------------|--------------|-------------|-------------|--------------|
| 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%) |

Table 3. Comparison between external proposed MPA arrays of numbers and percentages of marine birds breeding within proposed state marine reserves (SMRs) 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%) |

Table 4. Comparison between external proposed MPA arrays of inclusion of top eight marine bird breeding hot spots in proposed marine protected areas 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 Cap SMCA | е | | |
| 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 marine protected areas. Proposed marine protected areas not shown do not contain Brown Pelican roosts.

| MPA Name | Roost Category | Number of Roosts | MPA Name | Roost Category | Number of Roosts |
|-------------------------|-------------------|------------------|---------------------|-------------------|------------------|
| P(|) | | | 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 |
| Eureka Mobile SMCA | Low | 1 | False Cape SMCA | Low | 1 |
| Punta Gorda (FS) SMCA | Low | 1 | Punta Gorda SMR | Low | 1 |
| Ten Mile (FS) SMR | Low | 2 | Vizcaino SMCA | Low | 4 |
| Ext | 3 | | S.E.A. Ten Mile SMR | Low | 2 |
| Pyramid Point SMR | Low | 2 | MacKerricher SMCA | Low | 1 |
| 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 |
| Ex | 2 | | Punta Gorda SMR | Low | 1 |
| Pyramid Point SMCA | Low | 2 | Ten Mile SMR | Low | 2 |
| Pyramid Point SMCA | Medium | 1 | MacKerricher SMCA | Low | 1 |
| False Klamath Cove SMCA | Medium | 1 | | ExG | |

| MPA Name | Roost Category | Number of Roosts | MPA Name | Roost Category | Number of Roosts |
|----------------------|-------------------|------------------|--------------------|-------------------|------------------|
| Punta Gorda SMCA | Low | 1 | Pyramid Point SMCA | Low | 2 |
| Vizcaino SMCA | Low | 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 |
| E | XD | | | ExH | |
| False Klamath SMCA | Medium | 1 | Punta Gorda SMR | Low | 1 |
| Patrick's Point SMCA | Low | 2 | Ten Mile SMR | Low | 2 |
| Gorda SMR | Low | 1 | | | |
| Usal SMR | Low | 4 | | | |
| MacKerricher SMCA | Low | 1 | | | |

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

| External MPA Array | High (>1,000 birds) | Medium (500- 1,000 birds) | Low (100-500 birds) |
|-----------------------|------------------------|------------------------------|------------------------|
| P0 | 0 | 0 | 0 |
| ExA | 0 | 0 | 2 |
| ExB | 0 | 1 | 5 |
| ExC | 0 | 1 | 8 |
| ExD | 0 | 0 | 5 |
| 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 marine protected areas 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 | >.01 | >.01 | >.01 | >.01 | Point Cabrillo SMR | 0.31 | 0.28 | >.01 | 0.33 |

| MPA Name | BRCO | PECO | COMU | PIGU | MPA Name | BRCO | PECO | COMU | PIGU |
|-----------------------------|------|------|------|------|-------------------------------------|------|------|------|------|
| ExA | _ | | | | Punta Gorda SMR | 0.06 | 0.08 | 0.00 | 0.00 |
| Albion Mobile SMCA | 0.22 | 1.20 | 0.00 | 1.38 | Pyramid Point SMCA | 0.01 | 0.02 | 0.00 | 0.02 |
| Crescent City Mobile SMCA | 3.91 | 2.21 | 7.57 | 3.55 | Pyramid Point SMR | 0.91 | 1.18 | 0.00 | 1.82 |
| Navarro River Estuary SMR | >.01 | >.01 | 0.00 | >.01 | Reading Rock SMCA | >.01 | >.01 | >.01 | >.01 |
| Noyo Mobile SMCA | 0.00 | 0.69 | 0.00 | 0.92 | Reading Rock SMR | 0.24 | 0.01 | 0.13 | 0.01 |
| Point Arena Mobile SMCA | 0.64 | 0.38 | 0.00 | 0.07 | Russian Gulch SMCA | 0.27 | 0.24 | >.01 | 0.31 |
| Point Cabrillo (FS) SMR | 0.03 | 0.03 | >.01 | 0.03 | S.E.A. Ten Mile Estuary SMR | >.01 | >.01 | 0.00 | >.01 |
| 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 |
| Pyramid Point (FS) SMCA | 0.93 | 1.20 | 0.00 | 1.86 | Van Damme SMCA | >.01 | >.01 | >.01 | >.01 |
| Reading Rock (FS) SMCA | 0.13 | >.01 | 0.08 | >.01 | Vizcaino SMCA | 3.66 | 0.76 | 0.62 | 0.81 |
| Shelter Cove Mobile SMCA | 0.00 | 0.06 | 0.00 | 0.00 | | ExF | | | |
| Ten Mile (FS) SMR | 0.22 | 0.62 | 0.00 | 0.57 | MacKerricher SMCA | 0.00 | >.01 | 0.00 | 0.02 |
| Ten Mile Estuary SMR | >.01 | >.01 | 0.00 | >.01 | Navarro River Estuary SMR | >.01 | >.01 | 0.00 | >.01 |
| Trinidad Mobile SMCA | 1.40 | 1.10 | 4.38 | 0.77 | Point Cabrillo SMCA | 0.00 | 0.01 | 0.00 | 0.01 |
| | ExB | | | | Point Cabrillo SMR | 0.03 | 0.02 | >.01 | 0.02 |
| Navarro River Estuary SMR | >.01 | >.01 | 0.00 | >.01 | Punta Gorda 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 | >.01 | 0.02 | Pyramid Point SMR | 0.91 | 1.18 | 0.00 | 1.82 |
| 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 | >.01 | >.01 | >.01 | Russian Gulch SMCA >.01 >.0 | | >.01 | >.01 | >.01 |
| 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 Beach SMCA | 0.04 | 0.06 | 0.00 | 0.04 | Ten Mile Estuary SMR >.01 >.01 0.00 | | 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 >.01 >.01 | | >.01 | >.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 | >.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 | |
| 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 | | 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 | 2.18 | 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 |