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by

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PACIFIC HARBOR SEAL,

Phoca vitulina richardsi,

CENSUS IN CALIFORNIA DURING MAY-JULY 2004

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ABSTRACT

An aerial photographic census of Pacific harbor seals (*Phoca vitulina richardsi*) was conducted in California 18 May-19 July 2004 to document the number of seals hauled out during the molt period. To compensate for latitudinal differences in the timing of the molt, the state of California was divided into three sections and each section was surveyed on different dates. The three sections were: (1) Channel Islands and mainland coast of southern California from the U.S./Mexico border to Pismo Beach, (2) central California from Pismo Beach to Point Reyes and San Francisco Bay estuary, and (3) northern California from Point Reyes to the California/Oregon border. Aerial photographic surveys at the Channel Islands and the mainland coast of southern California occurred during the afternoon high-low tide cycle on 18-20 May and 1-3 June at tide levels of 0.43 m to 0.88 m and 0.40 m to 0.73 m, respectively. Surveys in central California occurred during the low-low tide cycle at tide levels of -0.03 m to 0.49 m on 22-25 June. Surveys in northern California occurred during the low-low tide cycle at tide levels of -0.34 m to 0.43 m on 5-9 July and 18-19 July (except at South Humboldt Bay, Eel River, and Cape Mendocino where tide levels were 0.49 m to 0.52 m, 0.89 m, and 0.98 m, respectively). Color transparency photographs of harbor seals were taken with a 126-mm-format camera equipped with image motion compensation. The latitude and longitude of each photograph was recorded by linking the camera to a computer and Global Positioning System (GPS). Two to three observers searched for hauled-out seals. Seals were photographed as the aircraft was flown over the coastline at 213 m (700 ft). A total of 563 haulout sites within the state of California were found during complete surveys conducted at a mean tide level of 0.28 m (-0.46 m to 0.98 m). At the Channel Islands there were 4,344 seals counted onshore, along the mainland coast of California and San Francisco Bay estuary there were 21,989, and statewide there were 26,333. The mainland coast of California was stratified into nineteen 0.5-degree latitude segments with counts from the San Francisco Bay estuary making up the twentieth stratum. Stratum 37.50E to 37.99E had the most seals (n = 3,360) and the most seals at a single haulout site (n = 939). Stratum 40.50E to 40.99E had the highest median (104) and mean (178.4) number of seals per haulout. Of the eight Channel Islands in southern California, Santa Cruz Island had the most seals (n =1,102) and Santa Barbara Island the fewest (n = 12). Total 2004 counts were greater than 2002 counts at mainland sites, but counts at the Channel Islands were relatively stable.

INTRODUCTION

Pacific harbor seals (*Phoca vitulina richardsi*) are widely distributed along the mainland coast, islands and bays of California. The California Department of Fish and Game (CDFG) conducted annual aerial photographic surveys of harbor seals in California during the pre-molt and molt period (when the greatest numbers of seals were expected to be hauled out) from early June to early July during 1982-1995 (Hanan 1996, Fluharty 1999). Seals were counted from near-vertical aerial color-transparency photographs taken with a 70-mm-format Hasselblad camera as the aircraft flew over the coastline at an altitude of 183-213 m (600-700 ft). The National Marine Fisheries Service (NMFS), Southwest Fisheries Science Center (SWFSC) conducted a census in 2002 (Lowry and Carretta 2003) from photographs taken vertically with a 126-mm-format military reconnaissance camera equipped with image motion compensation. This report describes methods and results of a similar harbor seal census in California conducted by SWFSC during May-July 2004.

METHODS

Field methods

Aerial surveys were scheduled to photograph seals during the peak of their molt when the greatest fraction of seals would be ashore. The state of California was divided into three sections (Figure 1) to adjust for latitudinal differences in the timing of the molt by harbor seals (inferred from latitudinal timing of the reproductive period [Tempte et al. 1991]): (1) Channel Islands and mainland coast of southern California from the U.S./Mexico border (32.533EN, 117.117EW) to Pismo Beach (35.139EN, 120.645EW), (2) central California from Pismo Beach to Point Reyes

(37.995EN, 123.023EW) and San Francisco Bay, and (3) northern California from Point Reyes to the California/Oregon border (42.000EN, 124.212EW).

Aerial photographic surveys of harbor seals at the Channel Islands and the mainland coast of southern California were scheduled during the lowest tide cycle in the afternoon (high-low tide [0.40 m to 0.88 m]) in late-May through mid-June when previous studies at the Channel Islands determined that the greatest number of harbor seals were hauled out (Stewart and Yochem 1994). Surveys in central California were scheduled during mid-to-late June during low-low tide cycle at tide levels of 0.31 m or less (this level was raised to 0.46 m due to delays caused by low stratus [i.e., fog]) based on recommendations made at the California harbor seal abundance workshop (Barlow 2002). Surveys in northern California were scheduled in early-July through late-July during low-low tide levels of 0.31 m or less (this level was raised to 0.46 m due to delays caused by low stratus clouds, [but was exceeded for south Humboldt Bay, Eel River, and Cape Mendocino where tide levels were 0.49 m to 0.52 m, 0.89 m, and 0.98 m, respectively]) based on recommendations made at the California harbor seal abundance workshop (Barlow 2002). Surveys were scheduled after 0800 hours when light conditions were optimal for locating and photographing seals.

A twin-engine, high-wing Partenavia PN68-observer model aircraft (offering excellent forward and downward visibility) was flown at a ground speed of 185 km/h (100 kts) and an altitude of 213 m (700 ft) above sea level (ASL), except at Humboldt Bay where the altitude was 244 m (800 ft) to limit disturbance to seals. During the survey, the aircraft was flown directly over the coastline or slightly offshore. Seals were photographed as the aircraft traveled over the coastline, or if the seals were out of lateral camera range or sighted too late to be photographed, the aircraft doubled back to photograph them. Multiple photographic passes were

made over large rocks or islands to ensure that the entire rock or island was photographed.

Harbor seals were photographed with a 126-mm-format Chicago Aerial Industries, Inc. KA-76 camera (mounted vertically inside the belly of the aircraft) equipped with image motion compensation (IMC) and operated at a cycle rate that achieved 67% overlap between adjacent frames. A 152 mm focal-length lens was used on the camera. The latitude and longitude of each photograph was recorded by linking the camera to a computer and Global Positioning System (GPS). Kodak Aerochrome HS Film SO-359, a very fine-grained, high-speed, color transparency film, was used. The camera was set at an aperture of f/4 or f/5.6 with a shutter speed between 1/400 and 1/2000 second.

The survey team consisted of two or three observers and the pilot. The observer in the right front seat looked for seals in front and to the right of the aircraft and directed the pilot to maneuver the aircraft over the seals. The right seat observer also operated a computer linked to a Garmin GPSMAP 76 GPS unit for tracking the aircraft on a topographic map displayed on the computer screen overlaid with all known harbor seal haulout sites (National Geographic Topographic Maps of California) and monitored tide levels displayed by the GPS to ensure that the survey was conducted at optimal tide levels. The second observer looked for seals under the aircraft from the belly viewing port located behind the camera, operated the camera when seals were sighted, and recorded notes onto a second computer linked to a Garmin GPS 12XL and the camera. The third observer (when available) was seated behind the pilot on the left side of the aircraft and looked for seals to the left and below the aircraft. To optimize the time available for surveying under proper tidal conditions and to cover as much distance as possible during that day's survey, the pilot flew the aircraft over the coastline so that seals could be photographed as much as possible while the survey was underway.

Aerial surveys were conducted on 18-20 May and 1-3 June in southern California and Channel Islands, on 22-25 June in central California and San Francisco Bay estuary, and, on 5-9 July and 18-19 July in northern California (Table 1). Ground surveys were conducted at Southeast Farallon Islands on 24 June and 6 July (pers. comm. Russ Bradley, Point Reyes Bird Observatory, 6 July 2004), at Tomales Point and Tomales Bay on 25 June, 4 July, and 23 July (pers. comm. Brooke Sommerfeldt, Point Reyes National Seashore, 28 July 2004), and at Bodega Head on 19 July by the aerial survey team (Table 1). Tide height for each haulout photographed during the surveys and the mean lower low water datum reference (MLLW) was determined using the program WTides (freeware obtained at http://www.mdr.co.nz/).

Count methods

Harbor seal images were counted through a 7-70X zoom binocular microscope as the photographs were illuminated on a light table. Images of animals were marked on a clear acetate overlay with a colored pen as each was counted. Marks on the acetate were compared and verified with partially overlapping photographs. If all animals could not be counted in one photograph, the overlapping portion of the overlay was aligned on an adjacent photograph and the count continued. One count was made for each rock, island, or mainland haulout site. Seals in the water were tabulated separately. Haulout sites were defined as groups of seals or single seals found either on a rock, a group of rocks, or in a cove, and a single latitude and longitude was assigned to each haulout site.

Counts were tabulated by 0.5° latitude intervals for mainland sites, San Francisco Bay estuary, and for each of the Channel Islands. Summary statistics were compiled for each group interval.

RESULTS

Two counts were obtained for some segments of the state because of replicate survey coverage at the following areas: (1) northern Channel Islands (Anacapa Island, Santa Cruz Island, Santa Rosa Island, and San Miguel Island), (2) Mugu Lagoon along the southern California mainland coast, (3) the mainland coast at Estero Bay and just north of Point Piedras Blancas in central California, (4) the mainland coast from Manchester Beach State Park to Bridgeport just north of Point Arena in northern California, (5) ground counts at Southeast Farallon Islands on two dates, and (6) ground counts at Tomales Point and Tomales Bay on three dates.

We determined that the best data would include the counts from the lower tide level for the Channel Islands (2-3 June 2004), the flights that included the longest stretch of coastline coverage (18 May 2004 for Mugu Lagoon, 25 June 2004 for central California, 9 July 2004 for the area north of Point Arena), and the nearest date to aerial surveys for ground counts at Southeast Farallon Islands (24 June 2004) and Tomales Point and Tomales Bay (25 June 2004). However, all counts are being provided (Tables 2-5, Appendices 1 and 2) to indicate variance in counts that were obtained, with the caveat that the second count is not a replicate count for the entire state or segment of coastline.

Along the mainland coast of California and San Francisco Bay estuary there were 21,989 seals counted onshore at 430 haulout sites (partial replicate count obtained was 21,838 seals at 433 haulout sites; Tables 2 and 5, Figures 2 and 3). In the Channel Islands there were 4,344 seals counted onshore at 133 haulout sites (partial replicate count obtained was 2,980 seals at 134 haulout sites; Tables 3 and 5, Figures 2 and 3). Statewide, a total of 26,333 seals were counted

hauled out of the water at 563 haulout sites (partial replicate count obtained was 24,818 seals at 567 haulout sites; Tables 4 and 5, Figures 2 and 3). On average there were 51.1 seals per haulout site along the mainland coast of California (partial replicate count averaged 50.4 seals), 32.7 seals per haulout site at the Channel Islands (partial replicate count averaged 22.2 seals), and 46.8 seals per haulout site statewide (partial replicate count averaged 43.8 seals; Tables 2-5, Figure 4).

The counts of harbor seals at the mainland coast of California were stratified into nineteen 0.5 degree latitude-segments, with counts from the San Francisco Bay estuary making up a twentieth stratum (Table 2). Stratum 37.50E to 37.99E had the most seals (n = 3,360) and the most seals at a single haulout site (n = 939). Stratum 40.50E to 40.99E had the highest median and mean number of seals per haulout (104 and 178.4, respectively). Stratum 38.50E to 38.99E had the highest number of haulout sites (n = 59).

The counts of harbor seals at the Channel Islands in southern California were stratified for each island (Table 3). Santa Cruz Island had the most seals (n =1,102) and Santa Barbara Island the fewest (n = 12). Santa Cruz Island had the highest median and mean number of seals per haulout (27.5 and 42.4, respectively). San Miguel Island had the most haulout sites (n = 39).

The median tide height was 0.580 m for the Channel Islands surveys (0.73 m for the replicate survey, Tables 3 and 5), 0.15 m for California mainland total (Table 2), and 0.27 m for the entire state (0.24 m for the replicate survey-count, Tables 4 and 5).

DISCUSSION

The population of harbor seals in the state of California appears to be increasing (contrary to indications from the 2002 survey), but the rate of increase appears to be lower than it was in

the 1980's and 1990's (Figure 2). However, harbor seal counts at the Channel Islands show no noticeable increase from counts obtained during the early-to-mid 1990's (Hanan 1996, Fluharty 1999, Read and Roberts 2001). The number of haulout sites found statewide in 2004 (n = 563) were higher than 2002 (n = 467), but were comparable to the number of sites found during the early-to-mid 1990's (Figure 3). The average number of seals found per haulout site in 2004 increased from the 2002 value and continues to be greater than previous years for mainland haulout sites (Figure 3). However, the average number of seals found per haulout site is less for Channel Islands sites. Possible reasons for these discrepancies could be due to (1) differences in defining haulout sites between researchers, or (2) change in haulout behavior of seals. Although survey date is another possibility because the number of harbor seals on land differs throughout the year, our surveys were conducted during comparable dates to those conducted by CDFG.

Conducting the survey at low-low tide levels of 0.31 m or less was very difficult to accomplish because these tides occurred during morning hours when low stratus clouds were commonly present. In order to complete the survey the maximum acceptable tide level was raised to 0.46 m. This limit was, however, exceeded for South Bay (Humboldt Bay), the mouth of the Eel River, and Cape Mendocino due to a required refueling stop while the tide was rising and a lack of weather opportunities to repeat these areas. The census in South Bay (Humboldt Bay) and at the mouth of the Eel River was not compromised because the tidal flats where seals were hauled out were exposed and many seals were present.

Haulout counts are not a complete census of the population during the peak molt season because some seals are foraging at sea. Radio tag studies have been used to estimate the proportion of animals on land. Unfortunately, the majority of these studies (reviewed in Boveng 1988) documented the proportion of seals on land for extended periods of time during the day,

not at an instantaneous time (as would occur when an aircraft flies over during aerial surveys), and some proportions were estimated during months that seals were not molting. Three studies have been made to estimate the proportion of seals on land during aerial surveys (Hanan 1996, Huber et al. 2001, and Harvey and Goley 2005). The estimated a correction factor (1.53) in Huber et al. (2001) is probably not appropriate for our counts because that study was done in the pupping season and was north of our study area. For the California stock of harbor seals, a correction factor of 1.3, derived from data of radio tagged seals collected by D. Hanan (Barlow et al. 1997, Hanan 1996), has been used for estimating total abundance of harbor seals in California from counts obtained at haulouts (Carretta et al. 2001). Multiplying 26,333 (our best total count of the number of seals counted onshore at haulouts in 2004) by the 1.3 correction factor results in a total harbor seal population estimate of 34,232 in California. Concurrent with the 2004 census was a study for deriving a correction factor from 120 seals that were tagged with radios in central and northern California (Harvey and Goley 2005). This latter study derived a correction factor of 1.65 that is more appropriate for estimating population size than the previous 1.3 correction factor. By multiplying 26,333 with the 1.65 correction factor, we estimate that there were 43,449 harbor seals in California in 2004.

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Table 1. Dates of survey areas and tide height of areas surveyed for Pacific harbor seals (*Phoca vitulina richardsi*) within three sections of California during 18 May through 23 July 2004.

Section	Survey area	Date	Tide height (m)
Southern California (including Channel Islands)	Point Mugu to Pismo Beach	18 May 2004	0.52 to 0.61
	Santa Barbara Island, San Nicolas Island, Santa Catalina Island, and California mainland coast from Point Loma to Point Mugu (except at Camp Pendleton and between Redondo Beach and Pacific Palisades)	19 May 2004	0.79, 0.70 to 0.76, 0.43 to 0.46, and 0.55 to 0.67
	Anacapa Island, Santa Cruz Island, Santa Rosa Island, and San Miguel Island	20 May 2004	0.64 to 0.73, 0.64 to 0.88, 0.73 to 0.85, and 0.73 to 0.79
	San Clemente Island	1 June 2004	0.40
	Santa Rosa Island and San Miguel Island	2 June 2004	0.58 to 0.73 and 0.52 to 0.58
	Anacapa Island and Santa Cruz Island	3 June 2004	0.55 to 0.58
Central California and San Francisco Bay estuary	Pismo Beach to Point San Luis	22 June 2004	0.06
	Pt. Buchon to Cayucos Point, north side of Point Piedras Blancas to Ragged Point, and Point Lopez to Needle Rock Point (NMFS, SWFSC Santa Cruz Lab)	23 June 2004	0.06 to 0.09, 0.09, and 0.12 to 0.34
	Needle Rock Point to Bolinas, and San Francisco Bay estuary	24 June 2004	0.09 to 0.12, and 0.09 to 0.21
	Bolinas to Point Reyes, Yerba Buena Island, Point Lopez to Point San Luis	25 June 2004	-0.03 to 0.34, 0.43, and 0.27 to 0.49
	Obtained ground count for Southeast Farallon Islands from Russ Bradley, Point Reyes Bird Observatory	24 June 2004 and 6 July 2004	0.09 and 0.03
Northern California	Punta Gorda to Cape Mendocino, Mad River to California/Oregon border, Arcata Bay (Humboldt Bay), South Bay (Humboldt Bay), Eel River, and Cape Mendocino	5 July 2004	-0.34 to -0.31, -0.46 to -0.03, -0.06, 0.49 to 0.52, 0.89, and 0.98
	Punta Gorda to north of Shelter Cove and Rockport to Jug Handle State Reserve	7 July 2004	-0.34
	North of Shelter Cove to Rockport, Jug Handle State Reserve to Manchester State Beach (north of Point Arena)	9 July 2004	0.03, and 0.40
	Duncans Point (north of Bodega Head) to Bridgeport Landing, and Bodega Rock	18 July 2004	-0.06 to 0.31, and 0.43
	Bodega Head (ground survey by aerial survey team)	19 July 2004	0.18 to 0.37
	Obtained ground count for Tomales Bay and Tomales Point from Sarah Allen and Brooke Sommerfeldt, Point Reyes National Seashore	25 June 2004, 4 July 2004, and 23 July 2004	0.15 to 0.30, -0.2 to 1.04 and 0.21 to 0.74

Table 2. Summary statistics for the number of Pacific harbor seals (*Phoca vitulina richardsi*) counted onshore and tide height at haulout sites by 0.5 degree latitude increments for mainland coastal sites (see footnotes) and San Francisco Bay estuary from complete surveys conducted during 18 May-19 July 2004.

Latitude range (stratum) or estuary	Total # of haulouts	Minimum # of seals per haulout	Maximum # of seals per haulout	Sum of seals from all haulouts	Median # of seals per haulout	Mean # of seals per haulout	Minimum tide height (m)	Maximum tide height (m)	Median tide height (m)	Mean tide height (m)
41.50° to 42.00° (S)	17	3	513	1,047	27.0	61.6	-0.27	-0.03	-0.15	-0.16
41.00° to 41.49° (R)	13	1	114	416	18.0	32.0	-0.43	-0.37	-0.40	-0.40
40.50° to 40.99° (Q)	12	25	567	2,141	104.0	178.4	-0.46	0.89	0.49	0.31
40.00° to 40.49° (P)	12	5	155	525	31.0	43.8	-0.34	0.98	-0.31	-0.06
39.50° to 39.99° (O)	19	1	214	740	27.0	38.9	0.40	0.40	0.40	0.40
39.00° to 39.49° (N)	28	1	229	1,522	34.5	54.4	0.09	0.46	0.43	0.33
38.50° to 38.99° (M)	59	1	256	1,905	17.0	32.3	-0.03	0.24	0.15	0.12
38.00° to 38.49° (L)	27	1	315	1,295	14.0	48.0	-0.06	0.43	-0.03	0.08
37.50° to 37.99° [a, b] (K)	26	2	939	3,360	40.5	129.2	-0.03	0.34	0.09	0.16
San Francisco Bay estuary [b]	12	1	158	621	17.0	51.8	0.09	0.43	0.15	0.17
37.00° to 37.49° [b] (J)	30	3	254	1,557	18.0	51.9	0.03	0.09	0.06	0.06
36.50° to 36.99° (I)	52	1	239	2,127	24.0	40.9	0.12	0.34	0.15	0.17
36.00° to 36.49° (H)	26	1	135	778	20.0	29.9	0.12	0.27	0.14	0.15
35.50° to 35.99° (G)	36	1	288	1,292	20.5	35.9	0.31	0.37	0.31	0.32
35.00° to 35.49° (F)	41	2	104	1,219	21.0	29.7	0.06	0.49	0.37	0.33
34.50° to 34.99° (E)	4	1	26	50	11.5	12.5	0.52	0.52	0.52	0.52
34.00° to 34.49° (D)	14	4	407	1,273	49.0	90.9	0.55	0.67	0.58	0.59
33.50° to 33.99° (C)	0	0	0	0	0	0				
33.00° to 33.49° (B)	0	0	0	0	0	0				
32.50° to 32.99° (A)	2	35	86	121	60.5	60.5	0.55	0.55	.055	0.55
California mainland total	430	1	939	21,989	24.5	51.1	-0.46	0.98	0.15	0.18

[a]SE Farallon Islands and Drake's Estero are included in latitude segments 37.50° to 37.99°.
[b]San Francisco Bay estuary is excluded in latitude segments 37.50° to 37.99° and 37.00° to 37.49°.

Table 3. Summary statistics for the number of Pacific harbor seals (*Phoca vitulina richardsi*) counted onshore and tide height at haulout sites of the Channel Islands in southern California from complete surveys conducted during 19-20 May and 1-3 June 2004.

Island	Total # of haulouts	Minimum # of seals per haulout	Maximum # of seals per haulout	Sum of seals from all haulouts	Median # of seals per haulout	Mean # of seals per haulout	Minimum tide height (m)	Maximum tide height (m)	Median tide height (m)	Mean tide height (m)
Anacapa Island	6	10	81	173	17.5	28.8	0.55	0.58	0.56	0.56
Santa Cruz Island	26	3	150	1,102	27.5	42.4	0.55	0.58	0.55	0.56
Santa Rosa Island	26	1	160	972	21.5	37.4	0.58	0.73	0.67	0.67
San Miguel Island	39	1	182	1,004	13.0	25.7	0.52	0.58	0.55	0.55
San Nicolas Island	23	1	105	784	24.0	34.1	0.70	0.76	0.70	0.72
Santa Barbara Island	1	12	12	12	12.0	12.0	0.79	0.79	0.79	0.79
Santa Catalina Island	5	2	129	193	23.0	38.6	0.43	0.46	0.43	0.43
San Clemente Island	7	1	45	104	7.0	14.9	0.40	0.40	0.40	0.40
Channel Islands total	133	1	182	4,344	19.0	32.7	0.40	0.79	0.58	0.59

Table 4. Summary statistics for the number of Pacific harbor seals (*Phoca vitulina richardsi*) counted onshore and tide height at haulout sites for sections of California, and California statewide from complete surveys conducted during 18 May-19 July 2004.

Section	Total # of haulouts	Minimum # of seals per haulout	Maximum # of seals per haulout	Sum of seals from all haulouts	Median # of seals per haulout	Mean # of seals per haulout	Minimum tide height (m)	Maximum tide height (m)	Median tide height (m)	Mean tide height (m)
Northern CA total	187	1	567	9,591	25.0	51.3	-0.46	0.98	0.12	0.11
Central CA total	223	1	939	10,954	23.0	49.1	-0.03	0.49	0.15	0.21
Southern CA total	153	1	407	5,788	20.0	37.8	0.40	0.79	0.58	0.59
Southern CA mainland total	20	1	407	1,444	35.5	72.0	0.52	0.67	0.55	0.57
California total	563	1	939	26,333	23.0	46.8	-0.46	0.98	0.27	0.28

Table 5. Summary statistics for the number of Pacific harbor seals (*Phoca vitulina richardsi*) counted onshore and tide height at haulout sites by 0.5 degree latitude increments for mainland coastal sites (see footnotes), San Francisco Bay estuary, each of the Channel Islands in southern California, sections of California, and California statewide from partial replicate surveys or complete replicate surveys conducted during 18 May-19 July 2004.

Latitude range (stratum), estuary, island, or section	Total # of haulouts	Minimum # of seals per haulout	Maximum # of seals per haulout	Sum of seals from all haulouts	Median # of seals per haulout	Mean # of seals per haulout	Minimum tide height (m)	Maximum tide height (m)	Median tide height (m)	Mean tide height (m)
39.00° to 39.49° (N)	30	1	229	1,443	29.5	48.1	0.09	0.46	0.37	0.31
37.50° to 37.99° [a, b] (K)	26	2	939	3,387	40.5	130.3	-0.03	0.34	0.09	0.16
35.50° to 35.99° (G)	37	1	203	1,195	18.0	32.3	0.09	0.37	0.31	0.29
35.00° to 35.49° (F)	41	1	104	1,248	25.0	30.4	0.06	0.49	0.37	0.29
34.50° to 34.99° (E)	4	1	26	50	11.5	12.5	0.52	0.52	0.52	0.52
34.00° to 34.49° (D)	14	4	396	1,262	49.0	90.1	0.55	0.70	0.58	0.59
Anacapa Island	9	1	81	162	10.0	18.0	0.64	0.73	0.64	0.65
Santa Cruz Island	29	1	67	599	14.0	20.7	0.64	0.89	0.64	0.73
Santa Rosa Island	28	1	97	605	16.0	21.6	0.73	0.85	0.76	0.77
San Miguel Island	32	1	65	521	10.0	16.3	0.73	0.79	0.76	0.76
Channel Islands total	134	1	129	2,980	14.0	22.2	0.40	0.89	0.73	0.71
Northern CA Total	189	1	567	9,512	25.0	50.3	-0.46	0.98	0.12	0.11
Central CA Total	224	1	939	10,893	22.5	48.6	-0.03	0.49	0.15	0.20
Southern CA Total	154	1	396	4,413	15.0	28.7	0.40	0.89	0.73	0.69
Southern CA mainland total	20	1	396	1,433	35.5	71.7	0.52	0.70	0.55	0.57
California mainland total	433	1	939	21,838	24.0	50.4	-0.46	0.98	0.15	0.17
California Total	567	1	939	24,818	20.0	43.8	-0.46	0.98	0.24	0.30

[a]SE Farallon Islands and Drake's Estero are included in latitude segments 37.50° to 37.99°.
[b]San Francisco Bay estuary is excluded in latitude segments 37.50° to 37.99° and 37.00° to 37.49°.

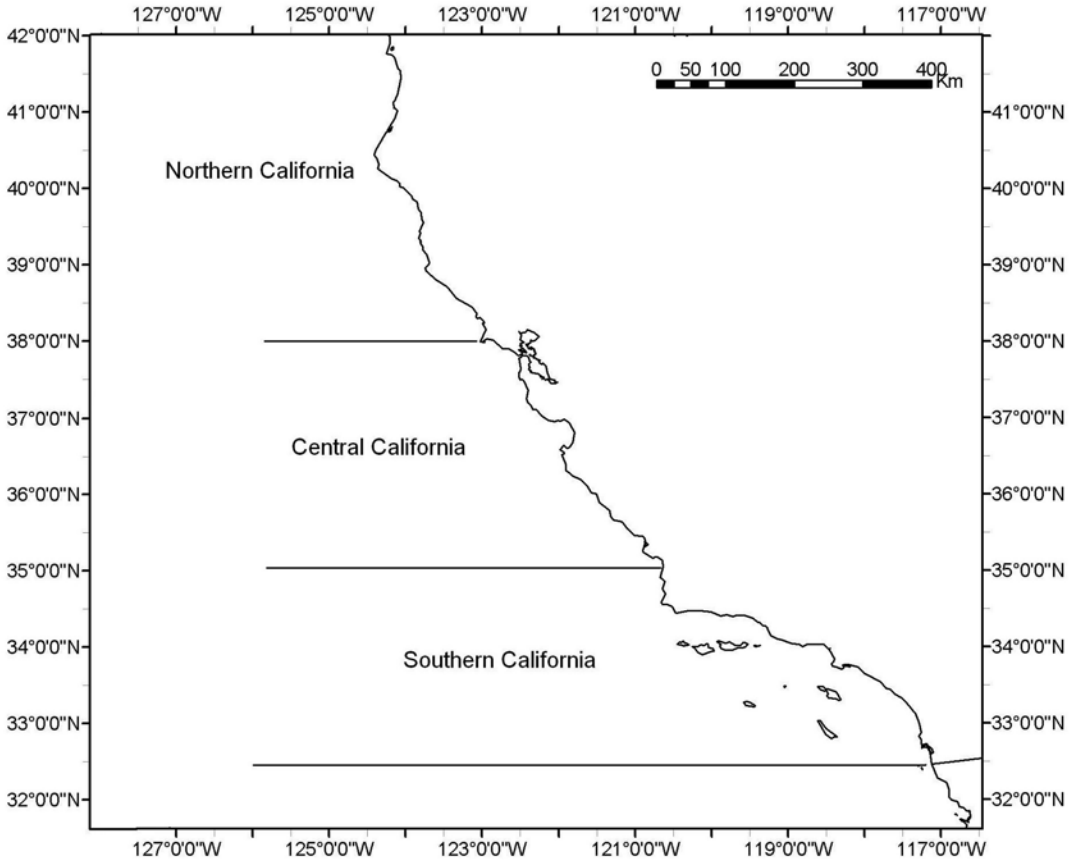

Figure 1. Three sections of California (southern, central, and northern) used to divide the state for offsetting surveys of Pacific harbor seals (*Phoca vitulina richardsi*) within the state.

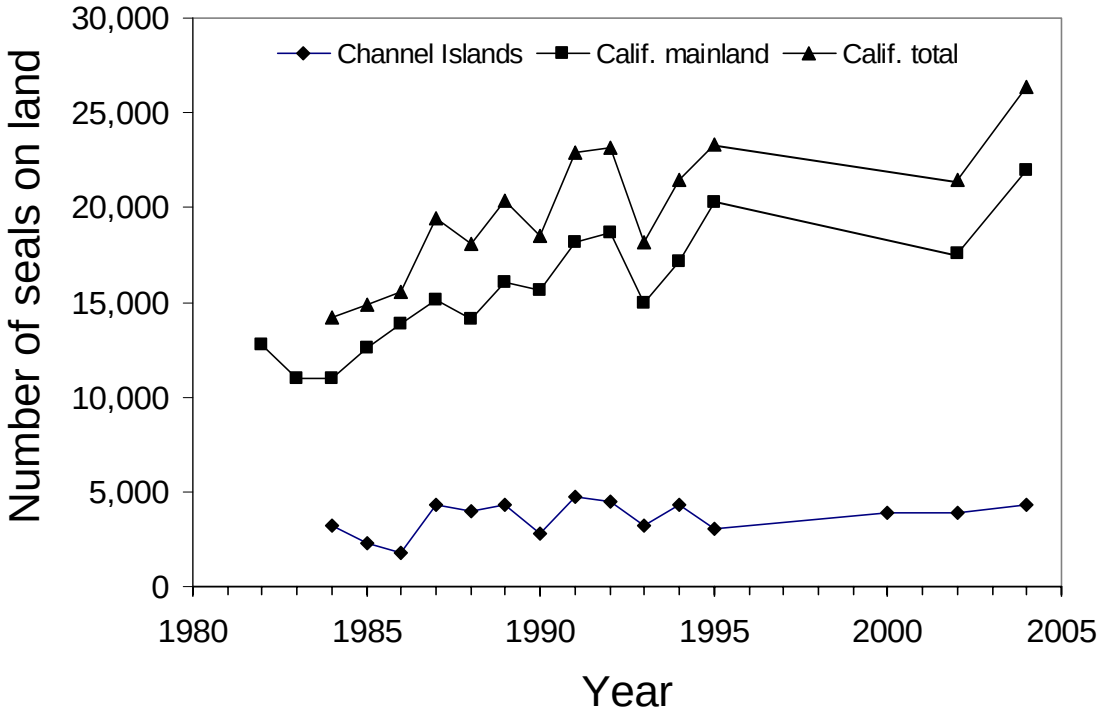

Figure 2. Counts of Pacific harbor seals (*Phoca vitulina richardsi*) during late-molt period in California for 1982-2004 (Hanan 1996, Fluharty 1999, Read and Roberts 2001, Lowry and Carretta 2003, and this study).

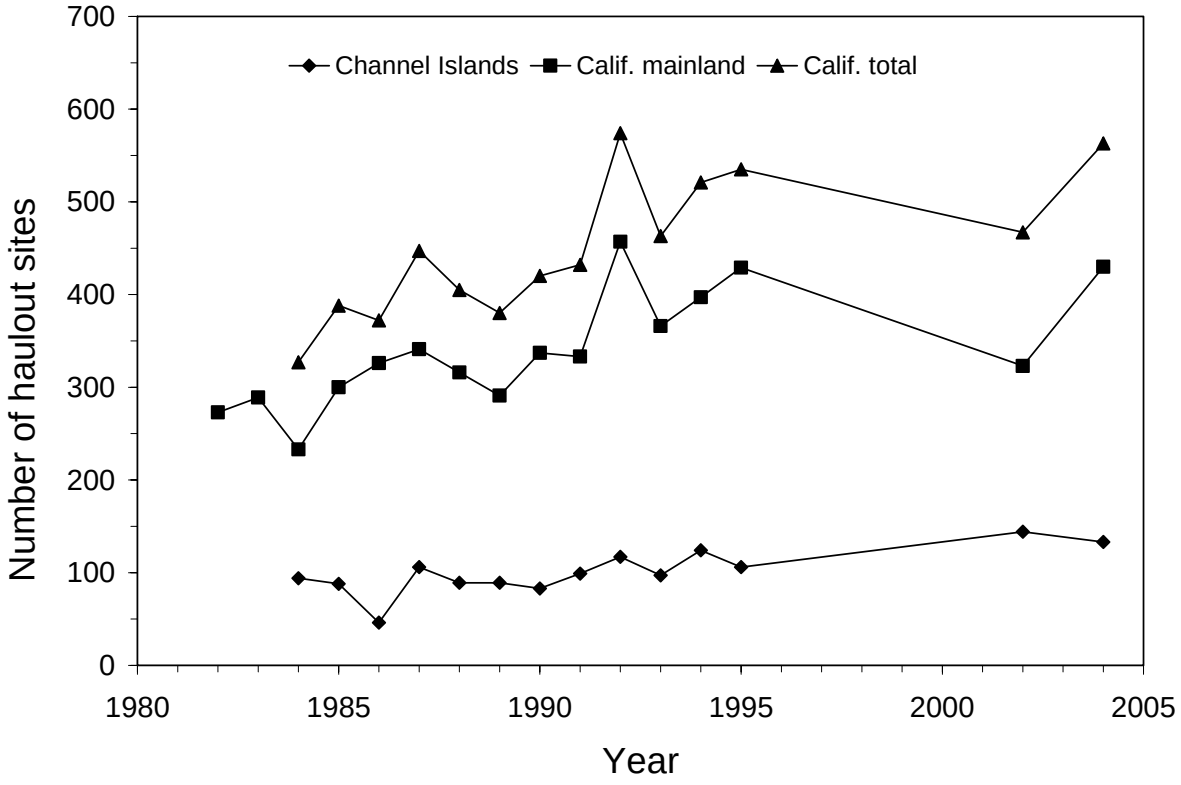

Figure 3. Number of Pacific harbor seal (*Phoca vitulina richardsi*) haulout sites found in California during annual aerial photographic surveys conducted during late-molt period (Hanan 1996, Fluharty 1999, Lowry and Carretta 2003, and this study).

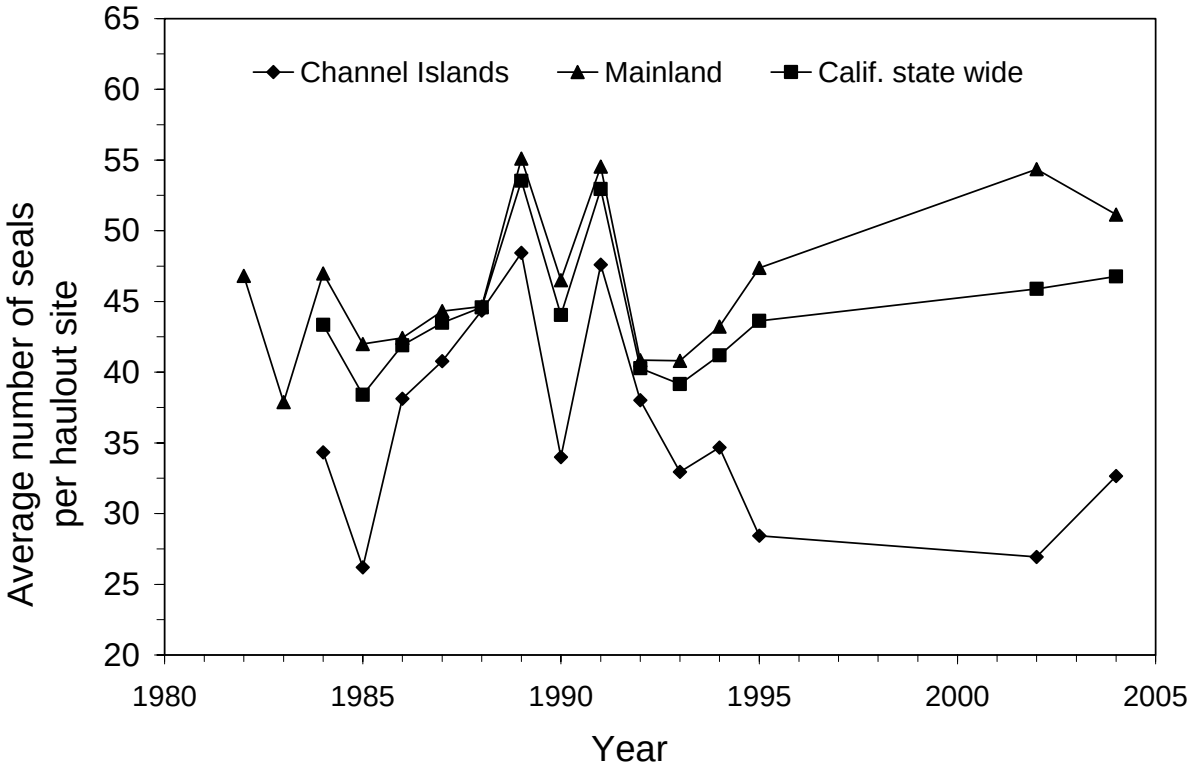

Figure 4. Average number of Pacific harbor seals (*Phoca vitulina richardsi*) per haulout site found in California during annual surveys conducted during late-molt period (Hanan 1996, Fluharty 1999, Lowry and Carretta 2003, and this study).

Appendix 1. Counts of harbor seals (*Phoca vitulina*) by biologists on the ground at Southeast Farallon Islands, Tomales Point, Tomales Bay, and Bodega Head, and obtained from 126-mm-format aerial color photographs taken at haulout sites in California during 18 May to 19 July 2004. GPS Data Format Deg NAD83. SE Farallon Islands and Drake's Estero are included in stratum K (latitude segments 37.50° to 37.99°). San Francisco Bay estuary is excluded from Stratum J and K (latitude segments 37.00° to 37.49° and 37.50° to 37.99°).

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
41.765	124.244	Northern CA	S	Vicinity of Castle Rock, Crescent City	5-Jul-04	10:49	-0.03	61	1
41.763	124.244	Northern CA	S	Vicinity of Castle Rock, Crescent City	5-Jul-04	10:39	-0.03	109	4
41.746	124.205	Northern CA	S	Crescent City	5-Jul-04	10:38	-0.09	13	
41.749	124.219	Northern CA	S	Vicinity of Castle Rock, Crescent City	5-Jul-04	10:46	-0.03	513	3
41.744	124.184	Northern CA	S	Floating marina, Crescent City	5-Jul-04	10:36	-0.12	57	
41.691	124.144	Northern CA	S	0.7 Km S of Enderts Beach	5-Jul-04	10:33	-0.12	46	1
41.673	124.142	Northern CA	S	2.7 Km S of Enderts Beach	5-Jul-04	10:32	-0.15	49	3
41.633[a]	124.117[a]	Northern CA	S	?km NW of Klamath River[a]	5-Jul-04	10:28	-0.15	3	
41.617[a]	124.114[a]	Northern CA	S	?km NW of Klamath River[a]	5-Jul-04	10:26	-0.15	3	
41.600[a]	124.101[a]	Northern CA	S	?km NW of Klamath River[a]	5-Jul-04	10:23	-0.18	27	
41.583[a]	124.099[a]	Northern CA	S	?km NW of Klamath River[a]	5-Jul-04	10:22	-0.21	8	1
41.573	124.100	Northern CA	S	3.4 km NW of Klamath River	5-Jul-04	10:21	-0.21	39	1
41.571	124.102	Northern CA	S	3.2 km NW of Klamath River	5-Jul-04	10:18	-0.24	14	
41.568	124.101	Northern CA	S	2.7 km NW of Klamath River	5-Jul-04	10:17	-0.24	25	
41.566	124.100	Northern CA	S	2.6 km NW of Klamath River	5-Jul-04	10:20	-0.21	12	
41.555	124.094	Northern CA	S	1.4 km NW of Klamath River	5-Jul-04	10:17	-0.24	58	2
41.502	124.078	Northern CA	S	1.1 km NNE of Split Rock	5-Jul-04	10:12	-0.27	10	
41.135	124.163	Northern CA	R	0.3 km S of rocky Point	5-Jul-04	9:51	-0.37	103	2
41.128	124.164	Northern CA	R	Palmers Point	5-Jul-04	9:51	-0.37	114	
41.126	124.163	Northern CA	R	0.6 km SSE of Palmers Point	5-Jul-04	9:51	-0.37	18	
41.126	124.166	Northern CA	R	Palmers Point	5-Jul-04	9:48	-0.40	1	
41.124	124.161	Northern CA	R	0.7 km SSE of Palmers Point	5-Jul-04	9:51	-0.37	10	
41.070	124.160	Northern CA	R	0.4 km N of Elk Head	5-Jul-04	9:43	-0.40	38	
41.057	124.158	Northern CA	R	0.8 km NE of Trinidad Head	5-Jul-04	9:43	-0.40	25	
41.057	124.144	Northern CA	R	0.8 km E of Trinidad Head	5-Jul-04	9:38	-0.43	6	
41.056	124.144	Northern CA	R	0.8 km E of Trinidad Head	5-Jul-04	9:38	-0.43	6	
41.056	124.141	Northern CA	R	0.8 km E of Trinidad Head	5-Jul-04	9:38	-0.43	3	
41.054	124.137	Northern CA	R	1.2 km E of Trinidad Head	5-Jul-04	9:38	-0.43	25	
41.051	124.130	Northern CA	R	1.8 km ESE of Trinidad Head	5-Jul-04	9:38	-0.43	49	
41.043	124.124	Northern CA	R	2.1 km ESE of Trindidad Head	5-Jul-04	9:38	-0.43	18	
40.949	124.132	Northern CA	Q	0.8 km S of Mad River mouth	5-Jul-04	9:32	-0.46	98	
40.839	124.160	Northern CA	Q	Arcata Bay, Humboldt Bay	5-Jul-04	11:43	-0.06	325	

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
40.838	124.112	Northern CA	Q	Arcata Bay, Humboldt Bay	5-Jul-04	11:46	-0.06	113	4
40.813	124.146	Northern CA	Q	Arcata Bay, Humboldt Bay	5-Jul-04	11:44	-0.06	25	
40.703	124.227	Northern CA	Q	South Bay, Humboldt Bay	5-Jul-04	12:26	0.52	110	
40.702	124.255	Northern CA	Q	South Bay, Humboldt Bay	5-Jul-04	12:25	0.49	48	
40.701	124.237	Northern CA	Q	South Bay, Humboldt Bay	5-Jul-04	12:29	0.49	179	1
40.700	124.236	Northern CA	Q	South Bay, Humboldt Bay	5-Jul-04	12:28	0.52	90	
40.699	124.229	Northern CA	Q	South Bay, Humboldt Bay	5-Jul-04	12:27	0.52	55	
40.698	124.240	Northern CA	Q	South Bay, Humboldt Bay	5-Jul-04	12:26	0.52	567	
40.647	124.308	Northern CA	Q	Mouth of Eel River	5-Jul-04	12:32	0.49	487	9
40.447	124.408	Northern CA	P	0.9 km N of Cape Mendocino	5-Jul-04	12:39	0.88	36	
40.330	124.355	Northern CA	P	Hair Seal Rock	5-Jul-04	9:06	-0.31	20	
40.328	124.356	Northern CA	P	Hair Seal Rock	5-Jul-04	9:04	-0.31	26	
40.326	124.354	Northern CA	P	Hair Seal Rock	5-Jul-04	9:04	-0.31	13	
40.320	124.353	Northern CA	P	0.6 km S of Hair Seal rock	5-Jul-04	9:04	-0.31	38	
40.271	124.365	Northern CA	P	1.1 km N of Punta Gorda	5-Jul-04	9:02	-0.31	55	
40.249	124.353	Northern CA	P	Vicinity of Punta Gorda Lighthouse	5-Jul-04	9:00	-0.31	155	4
40.247	124.349	Northern CA	P	Vicinity of Punta Gorda Lighthouse	5-Jul-04	8:59	-0.34	5	
40.175	124.238	Northern CA	P	12.7 km SE of Punta Gorda Lighthouse	5-Jul-04	8:51	-0.34	6	
40.159	124.216	Northern CA	P	0.4 km NW of Big Creek	7-Jul-04	10:39	-0.34	22	
40.029	124.079	Northern CA	P	1.2 km NW of Point Delgada	9-Jul-04	10:53	0.03	80	7
40.006	124.030	Northern CA	P	0.33 km NW of Chamise Creek	9-Jul-04	11:39	0.43	69	
39.993	124.017	Northern CA	O	1.5 km SE of Chamise Creek	9-Jul-04	11:40	0.40	1	
39.912	123.941	Northern CA	O	Bear Harbor	9-Jul-04	11:43	0.40	64	
39.865	123.909	Northern CA	O	0.8 km NNW of Mistake Point	9-Jul-04	11:45	0.40	30	4
39.856	123.900	Northern CA	O	0.8 km SE of Mistake Point	9-Jul-04	11:49	0.40	11	
39.853	123.892	Northern CA	O	1.4 km SE of Mistake Point	9-Jul-04	11:49	0.40	43	
39.837	123.861	Northern CA	O	4.6 km SE of Mistake Point	9-Jul-04	11:51	0.40	1	
39.763	123.839	Northern CA	O	0.6 km N of Soldier Frank Point	9-Jul-04	11:55	0.40	2	
39.756	123.838	Northern CA	O	0.3 km N of Soldier Frank Point	9-Jul-04	11:56	0.40	13	
39.742	123.837	Northern CA	O	1.0 km N of Rockport Bay	9-Jul-04	11:56	0.40	6	
39.730	123.831	Northern CA	O	Rockport Bay	9-Jul-04	11:58	0.40	25	
39.693	123.798	Northern CA	O	2.7 km N of Abalone Point	9-Jul-04	11:59	0.40	28	
39.632	123.786	Northern CA	O	0.4 km N of Bell Point	9-Jul-04	12:01	0.40	109	1
39.607	123.791	Northern CA	O	0.4 km SSE of Bruhel Point	9-Jul-04	12:04	0.40	27	
39.607	123.787	Northern CA	O	0.4 km SSE of Bruhel Point	9-Jul-04	12:02	0.40	31	
39.605	123.789	Northern CA	O	0.4 km SSE of Bruhel Point	9-Jul-04	12:02	0.40	33	
39.600	123.790	Northern CA	O	0.9 km SSE of Bruhel Point	9-Jul-04	12:02	0.40	214	3

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
39.593	123.786	Northern CA	O	1.6 km S of Bruhel Point	9-Jul-04	12:04	0.40	24	
39.582	123.779	Northern CA	O	Vicinity of Newport	9-Jul-04	12:05	0.40	60	
39.568	123.773	Northern CA	O	0.6 km NW of Ten Mile river Bluff	9-Jul-04	12:05	0.40	18	
39.496	123.795	Northern CA	N	1.1 km NE of Laguna Point	7-Jul-04	11:07	0.09	229	
39.492	123.805	Northern CA	N	Laguna Point	7-Jul-04	11:09	0.12	37	
39.489	123.805	Northern CA	N	Laguna Point	7-Jul-04	11:07	0.09	49	
39.472	123.808	Northern CA	N	2 km S of Laguna Point	7-Jul-04	11:10	0.12	20	
39.454	123.815	Northern CA	N	1 km NNE of Soldier Point, Fort Bragg	7-Jul-04	11:11	0.12	2	
39.453	123.814	Northern CA	N	1.6 km NNE of Soldier Point, Fort Bragg	7-Jul-04	11:13	0.12	1	
39.451	123.815	Northern CA	N	1.3 km NNE of Soldier Point, Fort Bragg	7-Jul-04	11:14	0.12	4	
39.448	123.817	Northern CA	N	0.9 km NNE of Soldier Point, Fort Bragg	7-Jul-04	11:11	0.12	61	
39.437	123.821	Northern CA	N	0.3 km SSW of Soldier Point, Fort Bragg	7-Jul-04	11:14	0.12	124	
39.385	123.822	Northern CA	N	1.7 km NNE of Caspar Point	7-Jul-04	11:18	0.15	47	1
39.346	123.826	Northern CA	N	0.3 km SSE of Point Cabrillo	9-Jul-04	12:12	0.43	36	
39.334	123.817	Northern CA	N	2.0 km SSE of Point Cabrillo	9-Jul-04	12:13	0.43	14	
39.308	123.812	Northern CA	N	Goat Island	9-Jul-04	12:14	0.43	85	
39.290	123.804	Northern CA	N	2.0 km SSE of Goat Island	9-Jul-04	12:16	0.43	160	1
39.275	123.801	Northern CA	N	0.6 km W of Van Damme Beach	9-Jul-04	12:16	0.43	10	
39.272	123.800	Northern CA	N	0.5 km SW of Van Damme Beach	9-Jul-04	12:16	0.43	19	
39.256	123.786	Northern CA	N	Buckhorn Cove	9-Jul-04	12:18	0.43	96	
39.248	123.784	Northern CA	N	Stillwell Point	9-Jul-04	12:20	0.43	12	
39.244	123.780	Northern CA	N	1.3 km N of Albion Head	9-Jul-04	12:21	0.43	14	
39.195	123.771	Northern CA	N	Navarro Point	9-Jul-04	12:26	0.46	33	
39.171	123.749	Northern CA	N	Devils Basin	9-Jul-04	12:27	0.46	81	
39.144	123.740	Northern CA	N	Cuffeys Point	9-Jul-04	12:28	0.46	38	
39.109	123.716	Northern CA	N	4.0 km SSE of Cuffeys Point	9-Jul-04	12:31	0.46	13	
39.099	123.711	Northern CA	N	5.3 km SSE of Cuffeys Point	9-Jul-04	12:31	0.46	26	
39.054	123.695	Northern CA	N	11.3 km NNE of Point Arena	9-Jul-04	12:34	0.46	4	
39.052	123.692	Northern CA	N	10.4 km NNE of Point Arena	9-Jul-04	12:34	0.46	219	
39.042	123.694	Northern CA	N	10.4 km NNE of Point Arena	9-Jul-04	12:34	0.46	55	
39.037	123.694	Northern CA	N	Mouth of Mallo Pass Creek	9-Jul-04	12:35	0.46	33	
38.956	123.743	Northern CA	M	Point Arena	18-Jul-04	9:12	0.24	78	6
38.944	123.735	Northern CA	M	1.5 km SSE of Point Arena	18-Jul-04	9:12	0.24	8	15
38.926	123.728	Northern CA	M	3.5 km SSE of Point Arena	18-Jul-04	9:11	0.24	4	
38.905	123.706	Northern CA	M	1.2 km SSE of Arena Cove	18-Jul-04	9:04	0.21	9	
38.887	123.685	Northern CA	M	5 km NW of Saunders Landing	18-Jul-04	9:01	0.21	13	
38.880	123.681	Northern CA	M	4.1 km NW of Saunders Landing	18-Jul-04	9:01	0.21	74	

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
38.844	123.641	Northern CA	M	0.7 km ESE of Iverson Point	18-Jul-04	8:55	0.18	39	
38.838	123.632	Northern CA	M	1.4 km SE of Iverson Point	18-Jul-04	8:55	0.18	17	1
38.838	123.634	Northern CA	M	1.4 km SE of Iverson Point	18-Jul-04	8:57	0.18	20	
38.825	123.611	Northern CA	M	0.6 km ESE of Steens Landing	18-Jul-04	8:51	0.18	16	
38.821	123.606	Northern CA	M	1.4 km N of Havens Neck	18-Jul-04	8:51	0.18	12	
38.820	123.609	Northern CA	M	1.4 km N of Havens Neck	18-Jul-04	8:54	0.18	25	
38.819	123.606	Northern CA	M	1.4 km NNE of Havens Neck	18-Jul-04	8:51	0.18	16	
38.819	123.605	Northern CA	M	1.4 km NNE of Havens Neck	18-Jul-04	8:51	0.18	26	
38.809	123.599	Northern CA	M	Havens Neck	18-Jul-04	8:50	0.18	22	
38.802	123.588	Northern CA	M	Havens Anchorage	18-Jul-04	8:49	0.18	74	1
38.798	123.591	Northern CA	M	Fish rocks	18-Jul-04	8:50	0.18	7	
38.784	123.569	Northern CA	M	Bourns Landing	18-Jul-04	8:46	0.18	9	
38.768	123.538	Northern CA	M	Robinson Point	18-Jul-04	8:45	0.18	18	
38.750	123.528	Northern CA	M	East of Gualala Point Island	18-Jul-04	8:42	0.15	15	
38.750	123.526	Northern CA	M	0.3 km S of Gualala Point	18-Jul-04	8:44	0.15	17	
38.748	123.522	Northern CA	M	0.5 km SE of Gualala Point	18-Jul-04	8:42	0.15	12	
38.747	123.524	Northern CA	M	0.65 km SE of Gualala Point	18-Jul-04	8:44	0.15	16	
38.727	123.485	Northern CA	M	4.7 km SE of Gualala Point	18-Jul-04	8:39	0.15	256	
38.726	123.483	Northern CA	M	4.7 km SE of Gualala Point	18-Jul-04	8:39	0.15	8	
38.723	123.478	Northern CA	M	5.3 km SE of Gualala Point	18-Jul-04	8:38	0.15	25	
38.722	123.473	Northern CA	M	5.9 km NNE of Black Point	18-Jul-04	8:38	0.15	21	
38.721	123.470	Northern CA	M	5.9 km NNE of Black Point	18-Jul-04	8:38	0.15	6	
38.716	123.462	Northern CA	M	4.8 km NNE of Black Point	18-Jul-04	8:38	0.15	58	
38.709	123.454	Northern CA	M	3.4 km NNE of Black Point	18-Jul-04	8:38	0.15	15	
38.705	123.451	Northern CA	M	3.4 km NNE of Black Point	18-Jul-04	8:36	0.12	11	5
38.677	123.427	Northern CA	M	0.5 km SSE of Black Point	18-Jul-04	8:34	0.12	23	
38.676	123.425	Northern CA	M	0.5 km SSE of Black Point	18-Jul-04	8:34	0.12	5	
38.662	123.414	Northern CA	M	1 km NW of Stewarts Point	18-Jul-04	8:34	0.12	15	
38.654	123.409	Northern CA	M	Stewarts Point	18-Jul-04	8:32	0.12	137	
38.654	123.408	Northern CA	M	Stewarts Point	18-Jul-04	8:33	0.12	139	
38.649	123.403	Northern CA	M	0.7 km SE of Stewarts Point	18-Jul-04	8:33	0.12	33	
38.644	123.401	Northern CA	M	Sandy Point	18-Jul-04	8:31	0.09	55	1
38.635	123.390	Northern CA	M	0.5 km N of rocky Point	18-Jul-04	8:28	0.09	42	1
38.630	123.389	Northern CA	M	0.3 km N of rocky Point	18-Jul-04	8:26	0.06	118	
38.629	123.386	Northern CA	M	0.3 km ESE of rocky Point	18-Jul-04	8:29	0.09	35	
38.612	123.368	Northern CA	M	Horseshoe Cove	18-Jul-04	8:25	0.06	13	2
38.602	123.366	Northern CA	M	0.9 km SE of Horseshoe Point	18-Jul-04	8:23	0.06	12	3

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
38.589	123.344	Northern CA	M	3.2 km SE of Horseshoe Point	18-Jul-04	8:22	0.06	17	6
38.565	123.332	Northern CA	M	Salt Point	18-Jul-04	8:18	0.06	27	
38.560	123.322	Northern CA	M	1.1 km SE of Salt Point	18-Jul-04	8:15	0.03	52	
38.559	123.318	Northern CA	M	1.5 km SE of Salt Point	18-Jul-04	8:15	0.03	2	1
38.546	123.298	Northern CA	M	0.95 km NW Stillwater Cove	18-Jul-04	8:13	0.03	6	
38.540	123.289	Northern CA	M	Stillwater Cove	18-Jul-04	8:12	0.03	10	
38.535	123.282	Northern CA	M	1.7 km NW of Windermere Point	18-Jul-04	8:12	0.03	19	2
38.531	123.278	Northern CA	M	1.0 km NW of Windermere Point	18-Jul-04	8:10	0.03	31	
38.528	123.268	Northern CA	M	0.3 km NE of Windermere Point	18-Jul-04	8:12	0.03	4	
38.517	123.258	Northern CA	M	Vicinity of Northwest Cape	18-Jul-04	8:07	0.00	1	
38.514	123.254	Northern CA	M	Fort Ross Cove	18-Jul-04	8:03	0.00	29	
38.513	123.246	Northern CA	M	Fort Ross Cove	18-Jul-04	8:01	0.00	4	
38.512	123.248	Northern CA	M	Fort Ross Cove	18-Jul-04	8:01	0.00	15	
38.512	123.255	Northern CA	M	Fort Ross Cove	18-Jul-04	8:04	0.00	55	
38.511	123.248	Northern CA	M	Fort Ross Cove	18-Jul-04	8:01	0.00	29	2
38.504	123.233	Northern CA	M	Fort Ross Reef	18-Jul-04	7:59	-0.03	30	
38.496	123.212	Northern CA	L	3.6 km ESE of Northwest Cape	18-Jul-04	7:58	-0.03	7	
38.495	123.209	Northern CA	L	3.6 km ESE of Northwest Cape	18-Jul-04	7:58	-0.03	10	
38.477	123.173	Northern CA	L	4.8 km NW of Russian River	18-Jul-04	7:57	-0.03	6	
38.474	123.170	Northern CA	L	4.4 km NW of Russian River	18-Jul-04	7:57	-0.03	14	
38.462	123.152	Northern CA	L	2.3 km NW of Russian River	18-Jul-04	7:56	-0.03	4	1
38.461	123.150	Northern CA	L	2.2 km NW of Russian River	18-Jul-04	7:56	-0.03	1	
38.456	123.145	Northern CA	L	1.5 km NW of Russian River	18-Jul-04	7:54	-0.03	30	
38.454	123.139	Northern CA	L	1 km WNW of Russian River	18-Jul-04	7:54	-0.03	11	1
38.451	123.129	Northern CA	L	Mouth of Russian river	18-Jul-04	7:53	-0.03	315	2
38.421	123.114	Northern CA	L	0.9 km SE of Gull Rock	18-Jul-04	7:50	-0.06	9	
38.420	123.112	Northern CA	L	1.3 km SE of Gull Rock	18-Jul-04	7:48	-0.06	2	
38.419	123.110	Northern CA	L	1.3 km SE of Gull Rock	18-Jul-04	7:50	-0.06	4	
38.403	123.100	Northern CA	L	rock off Wrights Beach	18-Jul-04	7:47	-0.06	18	
38.393	123.091	Northern CA	L	Gleason Beach	18-Jul-04	7:43	-0.06	17	
38.391	123.088	Northern CA	L	Gleason Beach	18-Jul-04	7:43	-0.06	36	2
38.317	123.073	Northern CA	L	Bodega Head	19-Jul-04	9:22	0.18	9	
38.314	123.070	Northern CA	L	Bodega Head	19-Jul-04	10:03	0.37	8	
38.296	123.048	Northern CA	L	Bodega Rock	18-Jul-04	9:46	0.43	16	2
38.230	122.994	Northern CA	L	Tomales Point (TRB)	25-Jun-04	11:30	0.15	50	
38.230	122.994	Northern CA	L	Tomales Point (RB1)	25-Jun-04	12:20	0.18	42	
38.230	122.994	Northern CA	L	Tomales Point (RB2)	25-Jun-04	12:30	0.21	9	

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
38.230	122.994	Northern CA	L	Tomales Point (RB3)	25-Jun-04	12:40	0.21	70	
38.230	122.994	Northern CA	L	Tomales Point (RB4)	25-Jun-04	12:50	0.24	25	
38.230	122.994	Northern CA	L	Tomales Point (RB5)	25-Jun-04	12:55	0.24	57	
38.230	122.994	Northern CA	L	Tomales Point (BR)	25-Jun-04	13:05	0.27	228	
38.218	122.962	Northern CA	L	Tomales Bay (Seal Island)	25-Jun-04	11:45	0.15	287	
38.218	122.962	Northern CA	L	Tomales Bay (Clam Island)	25-Jun-04	12:05	0.18	10	
38.095	122.040	Central CA	SF Bay	Ryer Island	24-Jun-04	12:19	0.18	55	
37.933	122.419	Central CA	SF Bay	Castro Rocks	24-Jun-04	12:00	0.09	158	1
37.871	122.496	Central CA	SF Bay	Sausalito marina platform	24-Jun-04	10:49	0.09	11	
37.857	122.420	Central CA	SF Bay	Vicinity of Point Blunt, Angel Island	24-Jun-04	10:59	0.09	8	
37.807	122.363	Central CA	SF Bay	Yerba Buena Island	25-Jun-04	10:10	0.43	1	1
37.539	122.218	Central CA	SF Bay	Steinberger Slough	24-Jun-04	13:30	0.21	23	
37.525	122.216	Central CA	SF Bay	Corkscrew Slough	24-Jun-04	13:27	0.21	11	2
37.523	122.219	Central CA	SF Bay	Corkscrew Slough	24-Jun-04	13:29	0.21	8	
37.507	122.086	Central CA	SF Bay	Newark Slough	24-Jun-04	13:20	0.18	7	
37.493	122.048	Central CA	SF Bay	Mowry Slough	24-Jun-04	13:12	0.12	141	
37.486	122.033	Central CA	SF Bay	Mowry Slough	24-Jun-04	13:10	0.12	121	
37.464	122.034	Central CA	SF Bay	Coyote Creek	24-Jun-04	13:05	0.09	77	
38.048	122.939	Central CA	K	Drakes Estero	25-Jun-04	9:52	0.31	161	1
38.038	122.938	Central CA	K	Drakes Estero	25-Jun-04	9:48	0.31	547	28
38.033	122.927	Central CA	K	Drakes Estero	25-Jun-04	9:45	0.31	433	10
38.033	122.930	Central CA	K	Drakes Estero	25-Jun-04	9:45	0.31		3
37.994	122.996	Central CA	K	Point Reyes	25-Jun-04	9:37	0.34	136	
37.994	122.995	Central CA	K	Point Reyes	25-Jun-04	9:37	0.34	85	
37.993	122.994	Central CA	K	Point Reyes	25-Jun-04	9:33	0.34	82	
37.993	122.986	Central CA	K	Point Reyes	25-Jun-04	9:33	0.34	2	
37.993	122.984	Central CA	K	Point Reyes	25-Jun-04	9:33	0.34	7	
37.945	122.776	Central CA	K	Double Point	25-Jun-04	9:17	-0.03	939	46
37.915	122.668	Central CA	K	Bolinas Lagoon	24-Jun-04	10:04	0.09	30	
37.913	122.673	Central CA	K	Bolinas Lagoon	24-Jun-04	10:04	0.09	235	
37.909	122.676	Central CA	K	Bolinas Lagoon	24-Jun-04	10:07	0.09	266	1
37.890	122.700	Central CA	K	Bolinas Point	25-Jun-04	9:13	-0.03	45	1
37.823	122.524	Central CA	K	Point Bonita	24-Jun-04	9:49	0.12	27	
37.821	122.528	Central CA	K	Point Bonita	24-Jun-04	9:53	0.12	53	
37.700	123.006	Central CA	K[b]	Southeast Farallon Islands	24-Jun-04	10:00	0.09	122	
37.524	122.519	Central CA	K	Vicinity of San Vicente Creek	24-Jun-04	9:26	0.09	40	
37.518	122.515	Central CA	K	Reefs W of Half Moon Bay Airport	24-Jun-04	9:26	0.09	11	

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
37.516	122.514	Central CA	K	Reefs W of Half Moon Bay Airport	24-Jun-04	9:26	0.09	6	
37.515	122.513	Central CA	K	Reefs W of Half Moon Bay Airport	24-Jun-04	9:26	0.09	23	
37.512	122.511	Central CA	K	Reefs W of Half Moon Bay Airport	24-Jun-04	9:25	0.09	26	
37.506	122.505	Central CA	K	Reefs W of Half Moon Bay Airport	24-Jun-04	9:25	0.09	41	
37.504	122.503	Central CA	K	Reefs W of Half Moon Bay Airport	24-Jun-04	9:24	0.09	29	
37.503	122.501	Central CA	K	Reefs W of Half Moon Bay Airport	24-Jun-04	9:24	0.09	3	
37.502	122.490	Central CA	K	Half Moon Bay Harbor	24-Jun-04	9:22	0.09	9	
37.493	122.500	Central CA	J	Sail Rock, Pillar Point	24-Jun-04	9:20	0.09	47	1
37.493	122.500	Central CA	J	Sail Rock, Pillar Point	24-Jun-04	9:20	0.09	2	
37.432	122.443	Central CA	J	The Rocks, Miramontes Point	24-Jun-04	9:15	0.06	8	1
37.417	122.435	Central CA	J	1.3 km NNW of Eel Rock	24-Jun-04	9:15	0.06	254	6
37.415	122.434	Central CA	J	1.1 km NNW of Eel Rock	24-Jun-04	9:15	0.06	19	
37.406	122.428	Central CA	J	Eel Rock	24-Jun-04	9:14	0.06	10	
37.401	122.427	Central CA	J	Vicinity of Purisima Creek	24-Jun-04	9:14	0.06	59	
37.376	122.412	Central CA	J	Mathis Beach	24-Jun-04	9:13	0.06	41	
37.266	122.414	Central CA	J	Pescadero Creek	24-Jun-04	9:09	0.03	77	
37.233	122.416	Central CA	J	6.0 km NNW of Pigeon Point	24-Jun-04	9:08	0.03	209	3
37.232	122.415	Central CA	J	5.9 km NNW of Pigeon Point	24-Jun-04	9:08	0.03	111	5
37.212	122.409	Central CA	J	3.7 km NNW of Pigeon Point	24-Jun-04	9:07	0.03	9	
37.210	122.408	Central CA	J	3.4 km NNW of Pigeon Point	24-Jun-04	9:07	0.03	211	1
37.208	122.407	Central CA	J	3.2 km NNW of Pigeon Point	24-Jun-04	9:07	0.03	12	1
37.180	122.379	Central CA	J	1.4 km E of Pigeon Point	24-Jun-04	9:05	0.03	4	
37.150	122.361	Central CA	J	Franklin Point	24-Jun-04	9:04	0.03	5	
37.148	122.356	Central CA	J	Franklin Point	24-Jun-04	9:04	0.03	10	
37.139	122.344	Central CA	J	3.5 km NNW of Año Nuevo Island	24-Jun-04	9:02	0.03	4	
37.120	122.340	Central CA	J	Point Año Nuevo	24-Jun-04	9:01	0.03	32	2
37.117	122.337	Central CA	J	Point Año Nuevo	24-Jun-04	9:00	0.06	4	
37.111	122.328	Central CA	J	Año Nuevo Island	24-Jun-04	8:48	0.09	13	1
37.110	122.339	Central CA	J	Año Nuevo Island	24-Jun-04	8:54	0.09	54	
37.109	122.337	Central CA	J	Año Nuevo Island	24-Jun-04	8:53	0.09	3	
37.108	122.338	Central CA	J	Año Nuevo Island	24-Jun-04	8:49	0.09	11	
37.108	122.337	Central CA	J	Año Nuevo Island	24-Jun-04	8:51	0.09	17	
37.085	122.272	Central CA	J	Point Año Nuevo	24-Jun-04	8:45	0.09	4	
37.068	122.258	Central CA	J	6.3 km ESE of Año Nuevo Island	24-Jun-04	8:45	0.09	24	
37.066	122.257	Central CA	J	5.7 km NW of El Jarro Point	24-Jun-04	8:45	0.09	38	
37.058	122.250	Central CA	J	5.5 km NW of El Jarro Point	24-Jun-04	8:42	0.09	240	
37.056	122.248	Central CA	J	4.4 km NW of El Jarro Point	24-Jun-04	8:42	0.09	21	

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
37.013	122.205	Central CA	J	4.1 km NW of El Jarro Point	24-Jun-04	8:39	0.09	6	
36.968	122.133	Central CA	I	Table Rock	24-Jun-04	8:35	0.12	70	
36.967	122.134	Central CA	I	Vicinity of Davenport	24-Jun-04	8:35	0.12	239	9
36.954	121.976	Central CA	I	Soquel Point, Santa Cruz harbor	23-Jun-04	11:32	0.34	9	
36.816	121.747	Central CA	I	Elkhorn Slough	23-Jun-04	11:18	0.24	24	
36.815	121.767	Central CA	I	Elkhorn Slough	23-Jun-04	11:20	0.24	86	
36.814	121.771	Central CA	I	Elkhorn Slough	23-Jun-04	11:16	0.24	68	
36.814	121.771	Central CA	I	Elkhorn Slough	23-Jun-04	11:16	0.24	28	
36.812	121.789	Central CA	I	Elkhorn Slough	23-Jun-04	11:15	0.24	140	
36.638	121.935	Central CA	I	Point Pinos	23-Jun-04	11:00	0.18	4	
36.636	121.928	Central CA	I	Point Pinos	23-Jun-04	11:02	0.18	6	
36.633	121.923	Central CA	I	Point Pinos	23-Jun-04	11:02	0.18	8	
36.631	121.922	Central CA	I	Point Pinos	23-Jun-04	11:04	0.18	7	
36.629	121.921	Central CA	I	Point Pinos	23-Jun-04	11:04	0.18	2	
36.626	121.941	Central CA	I	Point Pinos	23-Jun-04	10:58	0.18	11	
36.625	121.915	Central CA	I	Vicinity of Lovers Point, Monterey	23-Jun-04	11:04	0.18	23	
36.624	121.914	Central CA	I	Vicinity of Lovers Point, Monterey	23-Jun-04	11:04	0.18	45	
36.624	121.940	Central CA	I	Point Pinos	23-Jun-04	10:58	0.18	4	
36.622	121.908	Central CA	I	Point Cabrillo, Monterey	23-Jun-04	11:04	0.18	14	
36.621	121.907	Central CA	I	Point Cabrillo, Monterey	23-Jun-04	11:04	0.18	52	1
36.621	121.903	Central CA	I	Point Cabrillo, Monterey	23-Jun-04	11:04	0.18	75	1
36.621	121.904	Central CA	I	Point Cabrillo, Monterey	23-Jun-04	11:04	0.18	52	2
36.618	121.901	Central CA	I	Cannery Row, Monterey	23-Jun-04	11:06	0.21	32	
36.617	121.900	Central CA	I	Cannery Row, Monterey	23-Jun-04	11:06	0.21	18	
36.614	121.898	Central CA	I	Cannery Row, Monterey	23-Jun-04	11:06	0.21	24	
36.606	121.894	Central CA	I	Monterey Harbor	23-Jun-04	11:08	0.21	28	1
36.604	121.967	Central CA	I	Vicinity of Point Joe	23-Jun-04	10:56	0.18	116	
36.583	121.974	Central CA	I	Cypress Point	23-Jun-04	10:50	0.15	2	
36.583	121.975	Central CA	I	Cypress Point	23-Jun-04	10:50	0.15	3	
36.583	121.976	Central CA	I	Cypress Point	23-Jun-04	10:51	0.15	30	
36.583	121.975	Central CA	I	Cypress Point	23-Jun-04	10:50	0.15	27	
36.581	121.977	Central CA	I	Cypress Point	23-Jun-04	10:51	0.15	30	
36.581	121.976	Central CA	I	Cypress Point	23-Jun-04	10:50	0.15	19	
36.580	121.978	Central CA	I	Cypress Point	23-Jun-04	10:47	0.15	60	
36.580	121.977	Central CA	I	Cypress Point	23-Jun-04	10:49	0.15	38	
36.580	121.979	Central CA	I	Cypress Point	23-Jun-04	10:47	0.15	14	
36.579	121.978	Central CA	I	Cypress Point	23-Jun-04	10:47	0.15	11	

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
36.579	121.978	Central CA	I	Cypress Point	23-Jun-04	10:47	0.15	21	
36.576	121.974	Central CA	I	Cypress Point	23-Jun-04	10:47	0.15	108	
36.575	121.973	Central CA	I	Cypress Point	23-Jun-04	10:47	0.15	60	
36.565	121.951	Central CA	I	Pescadero Point	23-Jun-04	10:44	0.12	48	
36.563	121.944	Central CA	I	Stillwater Cove, vicinity of Carmel by the Sea	23-Jun-04	10:44	0.12	67	
36.562	121.940	Central CA	I	Arrowhead Point, vicinity of Carmel by the Sea	23-Jun-04	10:40	0.12	18	
36.562	121.939	Central CA	I	Arrowhead Point, vicinity of Carmel by the Sea	23-Jun-04	10:40	0.12	111	
36.561	121.940	Central CA	I	Arrowhead Point, vicinity of Carmel by the Sea	23-Jun-04	10:40	0.12	14	
36.561	121.939	Central CA	I	Arrowhead Point, vicinity of Carmel by the Sea	23-Jun-04	10:40	0.12	110	
36.523	121.935	Central CA	I	Granite Point, vicinity of Point Lobos	23-Jun-04	10:38	0.12	17	
36.523	121.936	Central CA	I	Granite Point, vicinity of Point Lobos	23-Jun-04	10:38	0.12	72	
36.522	121.942	Central CA	I	Bluefish Cove, Point Lobos	23-Jun-04	10:38	0.12	12	
36.519	121.952	Central CA	I	Headland Cove, Point Lobos	23-Jun-04	10:36	0.12	1	
36.518	121.952	Central CA	I	Sea Lion Cove, Point Lobos	23-Jun-04	10:34	0.15	20	
36.517	121.953	Central CA	I	Sea Lion Cove, Point Lobos	23-Jun-04	10:34	0.15	19	1
36.517	121.950	Central CA	I	Sand Hill Cove, Point Lobos	23-Jun-04	10:35	0.15	10	
36.489	121.945	Central CA	H	Yankee Point	23-Jun-04	10:32	0.15	35	
36.478	121.938	Central CA	H	1.7 km SSE of Yankee Point	23-Jun-04	10:30	0.15	22	
36.473	121.937	Central CA	H	2.2 km SSE of Yankee Point	23-Jun-04	10:30	0.15	11	
36.462	121.928	Central CA	H	1.0 km NE of Lobos Rocks	23-Jun-04	10:28	0.15	45	
36.443	121.924	Central CA	H	0.8 km SSE of Soberanes Point	23-Jun-04	10:27	0.15	30	
36.440	121.923	Central CA	H	1.1 km SSE of Soberanes Point	23-Jun-04	10:27	0.15	21	
36.400	121.909	Central CA	H	0.6 km SE Rocky Point	23-Jun-04	10:24	0.15	15	
36.302	121.891	Central CA	H	0.8 km ESE of Point Sur	23-Jun-04	10:19	0.12	14	
36.300	121.885	Central CA	H	1.3 km ESE of Point Sur	23-Jun-04	10:19	0.12	78	1
36.288	121.875	Central CA	H	2.8 km SE of Point Sur	23-Jun-04	10:16	0.12	66	
36.264	121.844	Central CA	H	1.7 km NNW of Cooper Point	23-Jun-04	10:15	0.15	82	
36.224	121.773	Central CA	H	3.8 km WNW of Grimes Point	23-Jun-04	10:10	0.15	35	
36.198	121.723	Central CA	H	1.6 km ESE of Grimes Point	23-Jun-04	10:09	0.15	2	
36.171	121.691	Central CA	H	0.8 km ESE of Partington Point	23-Jun-04	10:06	0.12	27	
36.148	121.662	Central CA	H	Vicinity of Anderson Landing	23-Jun-04	10:03	0.12	3	
36.099	121.623	Central CA	H	1.7 km N Dolan Rock	23-Jun-04	9:59	0.12	3	
36.098	121.622	Central CA	H	1.6 km N Dolan Rock	23-Jun-04	9:59	0.12	45	
36.081	121.615	Central CA	H	0.5 km SSE of Dolan Rock	23-Jun-04	9:56	0.12	135	
36.080	121.614	Central CA	H	0.7 km SSE of Dolan Rock	23-Jun-04	9:56	0.12	20	
36.080	121.614	Central CA	H	0.7 km SSE of Dolan Rock	23-Jun-04	9:56	0.12	15	
36.077	121.612	Central CA	H	1.1 km SSE of Dolan Rock	23-Jun-04	9:59	0.12	20	

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
36.042	121.586	Central CA	H	1.1 SSE of Gamboa Point	23-Jun-04	9:54	0.12	1	
36.020	121.568	Central CA	H	2.9 km NNW of Lopez Point	23-Jun-04	9:53	0.12	19	
36.019	121.553	Central CA	H	1.3 km E of Lopez Point	25-Jun-04	11:04	0.27	7	
36.019	121.551	Central CA	H	1.5 km E of Lopez Point	25-Jun-04	11:05	0.27	11	
36.018	121.549	Central CA	H	1.7 km E of Lopez Point	25-Jun-04	11:05	0.27	16	
35.962	121.485	Central CA	G	8.3 NNW of Cape San Martin	25-Jun-04	11:08	0.31	33	1
35.959	121.485	Central CA	G	8.0 NNW of Cape San Martin	25-Jun-04	11:08	0.31	21	
35.958	121.484	Central CA	G	7.9 NNW of Cape San Martin	25-Jun-04	11:09	0.31	3	
35.957	121.484	Central CA	G	7.8 NNW of Cape San Martin	25-Jun-04	11:10	0.31	6	
35.936	121.478	Central CA	G	5.4 NNW of Cape San Martin	25-Jun-04	11:12	0.31	10	
35.930	121.477	Central CA	G	4.7 NNW of Cape San Martin	25-Jun-04	11:12	0.31	3	
35.911	121.469	Central CA	G	2.4 N of Cape San Martin	25-Jun-04	11:14	0.31	13	
35.880	121.454	Central CA	G	1.4 km SE of Cape San Martin	25-Jun-04	11:15	0.31	15	
35.865	121.435	Central CA	G	3.8 km SE of Cape San Martin	25-Jun-04	11:16	0.31	19	
35.863	121.431	Central CA	G	4.2 km SE of Cape San Martin	25-Jun-04	11:17	0.31	5	
35.862	121.429	Central CA	G	4.4 km SE of Cape San Martin	25-Jun-04	11:17	0.31	3	
35.858	121.421	Central CA	G	5.2 km SE of Cape San Martin	25-Jun-04	11:17	0.31	5	
35.857	121.415	Central CA	G	5.7 km SE of Cape San Martin	25-Jun-04	11:19	0.31	1	
35.821	121.385	Central CA	G	8.5 km NW of Ragged Point	25-Jun-04	11:23	0.31	1	
35.811	121.370	Central CA	G	6.8 km NNW of Ragged Point	25-Jun-04	11:24	0.31	4	
35.804	121.359	Central CA	G	5.6 km NNW of Ragged Point	25-Jun-04	11:24	0.31	9	
35.736	121.319	Central CA	G	2.8 km SSE of Ragged Point	25-Jun-04	11:27	0.31	288	4
35.709	121.313	Central CA	G	Vicinity of La Cruz Rock	25-Jun-04	11:28	0.31	20	
35.708	121.313	Central CA	G	Vicinity of La Cruz Rock	25-Jun-04	11:28	0.31	42	
35.700	121.301	Central CA	G	1.4 km NW of Arroyo del Oso	25-Jun-04	11:29	0.31	44	
35.664	121.287	Central CA	G	Point Piedras Blancas	25-Jun-04	11:32	0.34	72	
35.662	121.260	Central CA	G	2.4 km E of Point Piedras Blancas	25-Jun-04	11:34	0.34	22	
35.660	121.255	Central CA	G	2.9 km ESE of Point Piedras Blancas	25-Jun-04	11:36	0.34	49	
35.655	121.247	Central CA	G	3.7 km ESE of Point Piedras Blancas	25-Jun-04	11:36	0.34	15	
35.651	121.229	Central CA	G	3.6 km WNW of San Simeon Point	25-Jun-04	11:36	0.34	39	
35.641	121.206	Central CA	G	1.2 km WNW of San Simeon Point	25-Jun-04	11:37	0.34	88	
35.640	121.180	Central CA	G	San Simeon Bay	25-Jun-04	11:38	0.34	27	
35.617	121.152	Central CA	G	San Simeon	25-Jun-04	11:41	0.34	35	
35.604	121.142	Central CA	G	The Oaks, San Simeon	25-Jun-04	11:41	0.34	48	
35.603	121.140	Central CA	G	The Oaks, San Simeon	25-Jun-04	11:41	0.34	110	
35.578	121.117	Central CA	G	San Simeon Beach State Park	25-Jun-04	11:45	0.34	67	
35.536	121.087	Central CA	G	Vicinity of White Rock	25-Jun-04	11:47	0.34	37	

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
35.532	121.083	Central CA	G	Vicinity of White Rock	25-Jun-04	11:47	0.34	14	
35.530	121.081	Central CA	G	Vicinity of White Rock	25-Jun-04	11:47	0.34	18	
35.515	121.066	Central CA	G	8.3 km NW of Point Estero	25-Jun-04	11:48	0.37	78	1
35.502	121.048	Central CA	G	6.2 km NW of Point Estero	25-Jun-04	11:48	0.37	28	
35.489	121.034	Central CA	F	4.2 km NW of Point Estero	25-Jun-04	11:49	0.37	40	
35.485	121.029	Central CA	F	3.6 km NW of Point Estero	25-Jun-04	11:50	0.37	14	
35.484	121.027	Central CA	F	3.4 km NW of Point Estero	25-Jun-04	11:50	0.37	10	
35.484	121.025	Central CA	F	3.2 km NW of Point Estero	25-Jun-04	11:50	0.37	11	
35.484	121.024	Central CA	F	3.2 km NW of Point Estero	25-Jun-04	11:50	0.37	28	
35.482	121.025	Central CA	F	3.1 km NW of Point Estero	25-Jun-04	11:49	0.37	21	
35.480	121.023	Central CA	F	2.8 km NW of Point Estero	25-Jun-04	11:52	0.37	59	
35.477	121.019	Central CA	F	2.3 km NW of Point Estero	25-Jun-04	11:52	0.37	37	
35.473	121.015	Central CA	F	1.8 km NW of Point Estero	25-Jun-04	11:52	0.37	33	
35.463	120.992	Central CA	F	China Harbor	25-Jun-04	11:55	0.37	4	
35.462	120.990	Central CA	F	Vicinity of China Harbor	25-Jun-04	11:56	0.37	64	1
35.462	121.005	Central CA	F	Point Estero	25-Jun-04	11:53	0.37	26	
35.461	120.987	Central CA	F	Vicinity of China Harbor	25-Jun-04	11:56	0.37	18	
35.454	120.961	Central CA	F	2.0 km WNW of Cayucos Point	25-Jun-04	11:56	0.37	104	
35.450	120.953	Central CA	F	1.2 km WNW of Cayucos Point	25-Jun-04	12:11	0.40	56	
35.448	120.916	Central CA	F	0.9 km W of Cayucos Pier	25-Jun-04	12:13	0.43	25	
35.447	120.925	Central CA	F	1.5 km W of Cayucos Pier	25-Jun-04	12:13	0.43	11	
35.446	120.939	Central CA	F	Cayucos Point	25-Jun-04	12:13	0.43	14	
35.446	120.949	Central CA	F	0.8 km W of Cayucos Point	25-Jun-04	12:11	0.40	16	
35.446	120.947	Central CA	F	0.6 km W of Cayucos Point	25-Jun-04	12:11	0.40	14	
35.446	120.944	Central CA	F	Cayucos Point	25-Jun-04	12:13	0.43	2	
35.446	120.943	Central CA	F	Cayucos Point	25-Jun-04	12:13	0.43	42	
35.342	120.847	Central CA	F	Morro Bay estuary	25-Jun-04	12:18	0.31	49	
35.238	120.888	Central CA	F	2.3 km SSE of Point Buchon	25-Jun-04	12:25	0.49	15	
35.237	120.887	Central CA	F	2.3 km SSE of Point Buchon	25-Jun-04	12:22	0.46	32	
35.224	120.874	Central CA	F	2.1 km NW of Diablo Canyon Power Plant	25-Jun-04	12:25	0.49	101	
35.204	120.848	Central CA	F	1.1 km SE of Diablo Canyon Power Plant	25-Jun-04	12:26	0.49	8	
35.200	120.840	Central CA	F	1.9 km SE of Diablo Canyon Power Plant	25-Jun-04	12:27	0.49	50	
35.198	120.838	Central CA	F	2.2 km SE of Diablo Canyon Power Plant	25-Jun-04	12:27	0.49	56	
35.198	120.837	Central CA	F	2.2 km SE of Diablo Canyon Power Plant	25-Jun-04	12:27	0.49	12	
35.195	120.828	Central CA	F	3.2 km SE of Diablo Canyon Power Plant	25-Jun-04	12:27	0.49	36	
35.190	120.817	Central CA	F	4.3 km SE of Diablo Canyon Power Plant	25-Jun-04	12:27	0.49	33	

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
35.178	120.741	Central CA	F	1.5 km WNW of Fossil Point, San Luis Obispo Bay	22-Jun-04	9:47	0.06	62	2
35.174	120.718	Central CA	F	Lone Rock, San Luis Obispo Bay	22-Jun-04	9:46	0.06	16	1
35.173	120.704	Central CA	F	1.9 km E of Fossil Point, San Luis Obispo Bay	22-Jun-04	9:46	0.06	12	
35.152	120.672	Central CA	F	Vicinity of South Point, Shell Beach	22-Jun-04	9:42	0.06	33	
35.152	120.669	Central CA	F	Vicinity of South Point, Shell Beach	22-Jun-04	9:41	0.06	12	
35.151	120.670	Central CA	F	Vicinity of South Point, Shell Beach	22-Jun-04	9:41	0.06	14	1
35.151	120.669	Central CA	F	Vicinity of South Point, Shell Beach	22-Jun-04	9:41	0.06	9	1
35.150	120.658	Central CA	F	Pismo Beach	22-Jun-04	9:40	0.06	14	
35.149	120.655	Central CA	F	Pismo Beach	22-Jun-04	9:40	0.06	6	
34.929	120.666	Southern CA	E	Mussel Point	18-May-04	15:26	0.52	26	
34.901	120.668	Southern CA	E	0.4 km SE Point Sal	18-May-04	15:24	0.52	9	
34.901	120.667	Southern CA	E	0.5 km SE Point Sal	18-May-04	15:24	0.52	1	
34.865	120.617	Southern CA	E	6.4 km SE of Point Sal	18-May-04	15:20	0.52	14	
34.756	120.640	Southern CA	D	Purisima Point	18-May-04	15:13	0.55	14	
34.738	120.626	Southern CA	D	2.3 SSE of Purisima Point	18-May-04	15:10	0.55	44	
34.562	120.635	Southern CA	D	0.5 km ESE of Rocky Point	18-May-04	15:03	0.55	4	
34.560	120.631	Southern CA	D	0.9 km ESE of Rocky Point	18-May-04	15:01	0.55	74	
34.560	120.631	Southern CA	D	0.9 km ESE of Rocky Point	18-May-04	15:01	0.55	106	
34.559	120.629	Southern CA	D	1.1 km ESE of Rocky Point	18-May-04	15:03	0.55	4	
34.453	120.475	Southern CA	D	Point Conception	18-May-04	14:53	0.55	54	
34.450	120.468	Southern CA	D	Point Conception	18-May-04	14:49	0.61	289	
34.449	120.466	Southern CA	D	Point Conception	18-May-04	14:49	0.61	19	
34.449	120.466	Southern CA	D	Point Conception	18-May-04	14:49	0.61	12	
34.449	120.470	Southern CA	D	Point Conception	18-May-04	14:49	0.61	85	
34.435	119.943	Southern CA	D	6.6 km WNW of Coal Oil Point	18-May-04	14:28	0.64	36	5
34.385	119.506	Southern CA	D	2.9 km WNW of Rincon Point, Carpinteria	18-May-04	14:12	0.67	125	
34.102	119.097	Southern CA	D	Mugu Lagoon	18-May-04	13:53	0.61	407	1
32.849	117.277	Southern CA	A	La Jolla	19-May-04	15:21	0.55	35	
32.848	117.279	Southern CA	A	La Jolla	19-May-04	15:21	0.55	86	
33.303	118.339	Southern CA	Santa Catalina Island	1.3 km WNW of Church Rock	19-May-04	14:30	0.43	28	
33.308	118.348	Southern CA	Santa Catalina Island	2.3 km WNW of Church Rock	19-May-04	14:31	0.43	2	
33.336	118.472	Southern CA	Santa Catalina Island	Vicinity of China Point	19-May-04	14:35	0.43	129	
33.330	118.467	Southern CA	Santa Catalina Island	China Point	19-May-04	14:35	0.43	23	
33.434	118.555	Southern CA	Santa Catalina Island	Vicinity of Whale Rock	19-May-04	14:42	0.46	11	
33.480	119.049	Southern CA	Santa Barbara Island	Webster Point	19-May-04	12:59	0.79	12	
33.220	119.442	Southern CA	San Nicolas Island	East Daytona Beach	19-May-04	13:17	0.76	13	

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
33.216	119.456	Southern CA	San Nicolas Island	West Daytona Beach	19-May-04	13:19	0.76	12	
33.216	119.457	Southern CA	San Nicolas Island	West Daytona Beach	19-May-04	13:19	0.76	55	
33.216	119.476	Southern CA	San Nicolas Island	Flat Rock	19-May-04	13:28	0.73	24	
33.216	119.466	Southern CA	San Nicolas Island	Flat Rock	19-May-04	13:28	0.73	6	
33.215	119.474	Southern CA	San Nicolas Island	Flat Rock	19-May-04	13:28	0.73	46	
33.216	119.467	Southern CA	San Nicolas Island	Flat Rock	19-May-04	13:28	0.73	2	
33.216	119.475	Southern CA	San Nicolas Island	Flat Rock	19-May-04	13:28	0.73	25	
33.215	119.473	Southern CA	San Nicolas Island	Flat Rock	19-May-04	13:28	0.73	56	
33.223	119.512	Southern CA	San Nicolas Island	1.6 km WNW of South Marker Poles Point	19-May-04	13:33	0.73	54	
33.240	119.554	Southern CA	San Nicolas Island	Beach SSE of Sea Lion Cove	19-May-04	13:36	0.70	1	
33.244	119.559	Southern CA	San Nicolas Island	Sea Lion Cove	19-May-04	13:37	0.70	5	
33.243	119.557	Southern CA	San Nicolas Island	Beach SSE of Sea Lion Cove	19-May-04	13:37	0.70	16	
33.273	119.576	Southern CA	San Nicolas Island	Vizcaino Point	19-May-04	13:38	0.70	18	
33.273	119.566	Southern CA	San Nicolas Island	Vizcaino Point, Rocks NW of Red Eye Beach	19-May-04	13:41	0.70	83	
33.273	119.565	Southern CA	San Nicolas Island	Vizcaino Point, Rocks NW of Red Eye Beach	19-May-04	13:41	0.70	62	
33.279	119.546	Southern CA	San Nicolas Island	West end of Tender Beach	19-May-04	13:43	0.70	5	
33.283	119.525	Southern CA	San Nicolas Island	Pirates Cove	19-May-04	13:45	0.70	31	
33.282	119.523	Southern CA	San Nicolas Island	0.2 km ESE Pirates Cove	19-May-04	13:45	0.70	11	
33.279	119.518	Southern CA	San Nicolas Island	Corral Harbor	19-May-04	13:45	0.70	87	
33.272	119.506	Southern CA	San Nicolas Island	Vicinity of Corral Harbor	19-May-04	13:46	0.70	63	
33.269	119.501	Southern CA	San Nicolas Island	Vicinity of Corral Harbor	19-May-04	13:46	0.70	4	
33.245	119.448	Southern CA	San Nicolas Island	West Coast Guard Beach	19-May-04	13:51	0.70	105	
32.874	118.508	Southern CA	San Clemente Island	1.7 km SSE of Mail Point	1-Jun-04	13:35	0.40	24	
33.038	118.591	Southern CA	San Clemente Island	Northwest Harbor Islet	1-Jun-04	13:57	0.40	5	
32.833	118.465	Southern CA	San Clemente Island	4.0 km SE of Lost Point	1-Jun-04	14:09	0.40	45	
32.833	118.464	Southern CA	San Clemente Island	4.1 km SE of Lost Point	1-Jun-04	14:09	0.40	7	
32.803	118.431	Southern CA	San Clemente Island	China Point	1-Jun-04	14:13	0.40	4	
32.819	118.370	Southern CA	San Clemente Island	Pyramid Cove	1-Jun-04	14:18	0.40	1	
32.817	118.356	Southern CA	San Clemente Island	Pyramid Head	1-Jun-04	14:18	0.40	18	
34.022	120.124	Southern CA	Santa Rosa Island	2.2 km E of Brockway Point	2-Jun-04	15:25	0.58	20	
34.020	120.115	Southern CA	Santa Rosa Island	3.1 km E of Brockway Point	2-Jun-04	15:25	0.58	141	
34.020	120.114	Southern CA	Santa Rosa Island	3.1 km E of Brockway Point	2-Jun-04	15:25	0.58	41	
34.025	120.141	Southern CA	Santa Rosa Island	0.6 km ENE of Brockway Point	2-Jun-04	15:27	0.58	17	
34.023	120.127	Southern CA	Santa Rosa Island	1.9 km E of Brockway Point	2-Jun-04	15:27	0.58	1	
34.008	120.235	Southern CA	Santa Rosa Island	1.6 km NE of Sandy Point	2-Jun-04	15:32	0.58	9	
34.000	120.246	Southern CA	Santa Rosa Island	Sandy Point	2-Jun-04	16:16	0.67	1	
33.999	120.243	Southern CA	Santa Rosa Island	Vicinity of Sandy Point	2-Jun-04	16:17	0.67	11	

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
33.998	120.241	Southern CA	Santa Rosa Island	Vicinity of Sandy Point	2-Jun-04	16:17	0.67	48	
33.997	120.239	Southern CA	Santa Rosa Island	Vicinity of Sandy Point	2-Jun-04	16:17	0.67	144	
33.996	120.239	Southern CA	Santa Rosa Island	Vicinity of Sandy Point	2-Jun-04	16:17	0.67	160	
33.995	120.238	Southern CA	Santa Rosa Island	Vicinity of Sandy Point	2-Jun-04	16:20	0.67	58	
33.983	120.221	Southern CA	Santa Rosa Island	3.4 km ESE of Sandy Point	2-Jun-04	16:22	0.67	10	
33.980	120.219	Southern CA	Santa Rosa Island	3.7 km ESE of Sandy Point	2-Jun-04	16:22	0.67	14	
33.978	120.217	Southern CA	Santa Rosa Island	4.0 km ESE of Sandy Point	2-Jun-04	16:24	0.67	7	
33.976	120.214	Southern CA	Santa Rosa Island	4.4 km ESE of Sandy Point	2-Jun-04	16:24	0.67	71	
33.911	120.150	Southern CA	Santa Rosa Island	3.1 km ESE of Cluster Point	2-Jun-04	16:30	0.70	25	
33.911	120.149	Southern CA	Santa Rosa Island	3.4 km ESE of Cluster Point	2-Jun-04	16:30	0.70	5	
33.910	120.147	Southern CA	Santa Rosa Island	3.4 km ESE of Cluster Point	2-Jun-04	16:30	0.70	42	
33.907	120.143	Southern CA	Santa Rosa Island	3.9 km ESE of Cluster Point	2-Jun-04	16:31	0.70	3	
33.925	120.036	Southern CA	Santa Rosa Island	1.5 km NE of Ford Point	2-Jun-04	16:34	0.70	35	
33.925	120.036	Southern CA	Santa Rosa Island	1.5 km NE of Ford Point	2-Jun-04	16:34	0.70	23	
33.930	120.024	Southern CA	Santa Rosa Island	2.7 km NE of Ford Point	2-Jun-04	16:36	0.73	11	
33.930	120.025	Southern CA	Santa Rosa Island	2.7 km NE of Ford Point	2-Jun-04	16:36	0.73	39	
33.928	120.029	Southern CA	Santa Rosa Island	2.3 km NE of Ford Point	2-Jun-04	16:36	0.73	28	
33.926	120.033	Southern CA	Santa Rosa Island	1.8 km NE of Ford Point	2-Jun-04	16:36	0.73	8	
34.031	120.310	Southern CA	San Miguel Island	Cardwell Point	2-Jun-04	15:35	0.52	48	
34.030	120.308	Southern CA	San Miguel Island	Cardwell Point	2-Jun-04	15:35	0.52	8	
34.028	120.307	Southern CA	San Miguel Island	Cardwell Point	2-Jun-04	15:35	0.52	4	
34.026	120.307	Southern CA	San Miguel Island	Cardwell Point	2-Jun-04	15:38	0.52	1	
34.022	120.308	Southern CA	San Miguel Island	Cardwell Point	2-Jun-04	15:38	0.52	2	
34.045	120.326	Southern CA	San Miguel Island	Hoffman Point	2-Jun-04	15:39	0.52	182	
34.061	120.358	Southern CA	San Miguel Island	0.3 km NW of Bat Rock	2-Jun-04	15:42	0.52	57	
34.070	120.362	Southern CA	San Miguel Island	Harbor Seal Cove	2-Jun-04	15:43	0.52	1	
34.068	120.362	Southern CA	San Miguel Island	Harbor Seal Cove	2-Jun-04	15:43	0.52	6	
34.074	120.362	Southern CA	San Miguel Island	Harris Point	2-Jun-04	15:44	0.52	12	
34.055	120.414	Southern CA	San Miguel Island	Oil Point	2-Jun-04	15:46	0.55	6	
34.055	120.415	Southern CA	San Miguel Island	Oil Point	2-Jun-04	15:46	0.55	4	
34.054	120.412	Southern CA	San Miguel Island	Otter Harbor	2-Jun-04	15:46	0.52	1	
34.052	120.408	Southern CA	San Miguel Island	West end of Simonton Cove	2-Jun-04	15:46	0.52	19	
34.052	120.407	Southern CA	San Miguel Island	West end of Simonton Cove	2-Jun-04	15:46	0.52	29	
34.052	120.406	Southern CA	San Miguel Island	West end of Simonton Cove	2-Jun-04	15:46	0.52	17	
34.051	120.405	Southern CA	San Miguel Island	West end of Simonton Cove	2-Jun-04	15:46	0.52	9	
34.054	120.417	Southern CA	San Miguel Island	Oil Point	2-Jun-04	15:48	0.55	33	
34.052	120.410	Southern CA	San Miguel Island	West end of Simonton Cove	2-Jun-04	15:48	0.55	1	

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
34.056	120.414	Southern CA	San Miguel Island	Oil Point	2-Jun-04	15:50	0.55	7	
34.032	120.454	Southern CA	San Miguel Island	Point Bennett	2-Jun-04	15:54	0.55	13	
34.029	120.419	Southern CA	San Miguel Island	Leuzarder Point, Tyler Bight	2-Jun-04	15:56	0.55	14	
34.026	120.391	Southern CA	San Miguel Island	3.4 km WNW of Crook Point	2-Jun-04	15:58	0.55	18	
34.025	120.389	Southern CA	San Miguel Island	3.2 km WNW of Crook Point	2-Jun-04	15:58	0.55	50	
34.025	120.388	Southern CA	San Miguel Island	3.0 km WNW of Crook Point	2-Jun-04	15:58	0.55	5	
34.021	120.377	Southern CA	San Miguel Island	1.9 km WNW of Crook Point	2-Jun-04	15:58	0.55	3	
34.019	120.374	Southern CA	San Miguel Island	1.5 km WNW of Crook Point	2-Jun-04	16:01	0.55	56	
34.018	120.373	Southern CA	San Miguel Island	1.5 km WNW of Crook Point	2-Jun-04	16:01	0.55	1	
34.014	120.361	Southern CA	San Miguel Island	Crook Point	2-Jun-04	16:03	0.55	46	
34.016	120.358	Southern CA	San Miguel Island	Crook Point	2-Jun-04	16:06	0.55	119	
34.020	120.349	Southern CA	San Miguel Island	South East Beach	2-Jun-04	16:09	0.58	47	
34.019	120.327	Southern CA	San Miguel Island	South East Beach	2-Jun-04	16:09	0.58	29	
34.019	120.324	Southern CA	San Miguel Island	South East Beach	2-Jun-04	16:09	0.58	3	
34.018	120.356	Southern CA	San Miguel Island	Crook Point	2-Jun-04	16:09	0.58	9	
34.019	120.321	Southern CA	San Miguel Island	South East Beach	2-Jun-04	16:10	0.58	57	
34.019	120.321	Southern CA	San Miguel Island	South East Beach	2-Jun-04	16:10	0.58	26	
34.019	120.315	Southern CA	San Miguel Island	Cardwell Point	2-Jun-04	16:10	0.58	22	
34.020	120.310	Southern CA	San Miguel Island	Cardwell Point	2-Jun-04	16:12	0.58	32	
34.019	120.316	Southern CA	San Miguel Island	South East Beach	2-Jun-04	16:12	0.58	7	
34.000	119.884	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	3-Jun-04	15:06	0.55	22	
34.016	119.644	Southern CA	Santa Cruz Island	Between Chinese Harbor and Prisoners Harbor	3-Jun-04	15:15	0.58	33	
34.019	119.653	Southern CA	Santa Cruz Island	Between Chinese Harbor and Prisoners Harbor	3-Jun-04	15:17	0.58	38	
34.048	119.730	Southern CA	Santa Cruz Island	Platts Harbor	3-Jun-04	15:19	0.58	9	
34.056	119.797	Southern CA	Santa Cruz Island	Vicinity of Arch Rock	3-Jun-04	15:24	0.58	51	
34.055	119.798	Southern CA	Santa Cruz Island	Vicinity of Arch Rock	3-Jun-04	15:25	0.58	56	
34.063	119.834	Southern CA	Santa Cruz Island	2.5 km ESE Profile Point	3-Jun-04	15:27	0.58	5	
34.068	119.922	Southern CA	Santa Cruz Island	1.0 km S West Point	3-Jun-04	15:32	0.58	14	
34.067	119.921	Southern CA	Santa Cruz Island	1.1 km S West Point	3-Jun-04	15:32	0.58	21	
34.008	119.887	Southern CA	Santa Cruz Island	Klinton Point	3-Jun-04	15:38	0.55	40	
34.008	119.887	Southern CA	Santa Cruz Island	Klinton Point	3-Jun-04	15:38	0.55	4	
34.007	119.886	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	3-Jun-04	15:38	0.55	14	
34.006	119.885	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	3-Jun-04	15:38	0.55	78	
34.006	119.886	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	3-Jun-04	15:38	0.55	15	
34.004	119.885	Southern CA	Santa Cruz Island	Klinton Point	3-Jun-04	15:38	0.55	43	
34.002	119.884	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	3-Jun-04	15:38	0.55	36	
34.000	119.883	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	3-Jun-04	15:45	0.55	19	

Appendix 1. (Continued)

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
33.998	119.883	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	3-Jun-04	15:45	0.55	120	
33.996	119.881	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	3-Jun-04	15:46	0.55	125	
33.994	119.880	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	3-Jun-04	15:46	0.55	97	
33.991	119.880	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	3-Jun-04	15:46	0.55	78	
33.990	119.879	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	3-Jun-04	15:46	0.55	3	
33.989	119.878	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	3-Jun-04	15:50	0.55	5	
33.977	119.682	Southern CA	Santa Cruz Island	4.1 km NE of Bowen Point	3-Jun-04	16:01	0.55	5	
33.989	119.595	Southern CA	Santa Cruz Island	3.1 km WSW of Sandstone Point	3-Jun-04	16:04	0.55	150	
33.992	119.586	Southern CA	Santa Cruz Island	2.5 km WSW of Sandstone Point	3-Jun-04	16:06	0.55	21	
34.011	119.434	Southern CA	Anacapa Island	South shore of West (Anacapa) Island	3-Jun-04	16:11	0.55	10	
34.010	119.433	Southern CA	Anacapa Island	South shore of West (Anacapa) Island	3-Jun-04	16:11	0.55	12	
34.008	119.426	Southern CA	Anacapa Island	South shore of West (Anacapa) Island	3-Jun-04	16:11	0.55	81	
34.005	119.421	Southern CA	Anacapa Island	E of Cat Rock Point, West (Anacapa) Island	3-Jun-04	16:12	0.58	12	
34.005	119.420	Southern CA	Anacapa Island	E of Cat Rock Point, West (Anacapa) Island	3-Jun-04	16:13	0.58	23	
34.004	119.401	Southern CA	Anacapa Island	SW Middle (Anacapa) Island	3-Jun-04	16:15	0.58	35	

[a]GPS malfunctioned during survey, positions and locations of haulout sites were approximated.

[b]SE Farallon Islands are included in stratum K (latitude segments 37.50° to 37.99°).

Appendix 2. Counts of harbor seals (*Phoca vitulina*) by biologists on the ground at Southeast Farallon Islands or that were obtained from 126-mm-format aerial color photographs taken at haulout sites in California during 20 May to 18 July 2004 at haulout sites found for coastline where replicate survey coverage occurred. GPS Data Format Deg NAD83.

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
4.014	119.419	Southern CA	Anacapa Island	N West (Anacapa) Island	5/20/2004	13:21	0.73	1	
34.010	119.433	Southern CA	Anacapa Island	South shore of West (Anacapa) Island	5/20/2004	16:03	0.64	14	
34.011	119.436	Southern CA	Anacapa Island	South shore of West (Anacapa) Island	5/20/2004	16:05	0.64	23	
34.009	119.429	Southern CA	Anacapa Island	South shore of West (Anacapa) Island	5/20/2004	16:05	0.64	8	
34.008	119.426	Southern CA	Anacapa Island	South shore of West (Anacapa) Island	5/20/2004	16:05	0.64	81	
34.006	119.421	Southern CA	Anacapa Island	E of Cat Rock Point, West (Anacapa) Island	5/20/2004	16:05	0.64	10	
34.006	119.421	Southern CA	Anacapa Island	E of Cat Rock Point, West (Anacapa) Island	5/20/2004	16:05	0.64	16	
34.006	119.419	Southern CA	Anacapa Island	E of Cat Rock Point, West (Anacapa) Island	5/20/2004	16:09	0.64	1	
34.003	119.398	Southern CA	Anacapa Island	S Middle (Anacapa) Island	5/20/2004	16:09	0.64	8	
34.031	120.309	Southern CA	San Miguel Island	Cardwell Point	5/20/2004	14:15	0.79	6	
34.031	120.310	Southern CA	San Miguel Island	Cardwell Point	5/20/2004	14:15	0.79	18	
34.045	120.327	Southern CA	San Miguel Island	Hoffman Point	5/20/2004	14:22	0.79	65	
34.062	120.358	Southern CA	San Miguel Island	0.4 km NW of Bat Rock	5/20/2004	14:25	0.79	48	
34.063	120.358	Southern CA	San Miguel Island	0.5 km NW of Bat Rock	5/20/2004	14:25	0.79	39	
34.067	120.361	Southern CA	San Miguel Island	Harbor Seal Cove	5/20/2004	14:25	0.79	4	
34.068	120.362	Southern CA	San Miguel Island	Harbor Seal Cove	5/20/2004	14:25	0.79	3	
34.067	120.360	Southern CA	San Miguel Island	Harbor Seal Cove	5/20/2004	14:25	0.79	25	
34.075	120.366	Southern CA	San Miguel Island	Harris Point	5/20/2004	14:30	0.79	2	
34.075	120.363	Southern CA	San Miguel Island	Harris Point	5/20/2004	14:31	0.79	1	
34.051	120.404	Southern CA	San Miguel Island	West end of Simonton Cove	5/20/2004	14:32	0.76	1	
34.053	120.411	Southern CA	San Miguel Island	Otter Harbor	5/20/2004	14:33	0.76	2	
34.054	120.416	Southern CA	San Miguel Island	Oil Point	5/20/2004	14:33	0.76	10	
34.052	120.408	Southern CA	San Miguel Island	West end of Simonton Cove	5/20/2004	14:35	0.76	52	
34.052	120.406	Southern CA	San Miguel Island	West end of Simonton Cove	5/20/2004	14:35	0.76	27	
34.056	120.414	Southern CA	San Miguel Island	Oil Point	5/20/2004	14:40	0.76	12	
34.031	120.452	Southern CA	San Miguel Island	Point Bennett	5/20/2004	14:41	0.76	17	
34.028	120.419	Southern CA	San Miguel Island	Leuzarder Point	5/20/2004	14:45	0.76	1	
34.026	120.390	Southern CA	San Miguel Island	3.3 km WNW of Crook Point	5/20/2004	14:46	0.76	14	
34.019	120.373	Southern CA	San Miguel Island	1.5 km WNW of Crook Point	5/20/2004	14:46	0.76	30	
34.018	120.372	Southern CA	San Miguel Island	1.5 km WNW of Crook Point	5/20/2004	14:46	0.76	1	
34.015	120.360	Southern CA	San Miguel Island	Crook Point	5/20/2004	14:47	0.76	23	
34.016	120.358	Southern CA	San Miguel Island	Crook Point	5/20/2004	14:49	0.76	50	
34.017	120.357	Southern CA	San Miguel Island	Crook Point	5/20/2004	14:51	0.73	5	
34.019	120.350	Southern CA	San Miguel Island	0.9 km NE of Crook Point	5/20/2004	14:53	0.73	24	
34.020	120.332	Southern CA	San Miguel Island	South East Beach	5/20/2004	15:01	0.73	1	
34.020	120.327	Southern CA	San Miguel Island	South East Beach	5/20/2004	15:01	0.73	7	
34.019	120.323	Southern CA	San Miguel Island	South East Beach	5/20/2004	15:01	0.73	2	
34.019	120.320	Southern CA	San Miguel Island	South East Beach	5/20/2004	15:01	0.73	10	

Appendix 2. (Continued).

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
34.019	120.317	Southern CA	San Miguel Island	South East Beach	5/20/2004	15:01	0.73	3	
34.020	120.315	Southern CA	San Miguel Island	South East Beach	5/20/2004	15:01	0.73	5	
34.020	120.311	Southern CA	San Miguel Island	Cardwell Point	5/20/2004	15:01	0.73	13	
34.016	119.643	Southern CA	Santa Cruz Island	Between Chinese Harbor and Prisoners Harbor	5/20/2004	13:33	0.88	15	
34.019	119.656	Southern CA	Santa Cruz Island	Between Chinese Harbor and Prisoners Harbor	5/20/2004	13:33	0.88	24	
34.043	119.716	Southern CA	Santa Cruz Island	Twin Harbors	5/20/2004	13:39	0.88	1	
34.049	119.731	Southern CA	Santa Cruz Island	Platts Harbor	5/20/2004	13:41	0.88	15	
34.055	119.765	Southern CA	Santa Cruz Island	Diablo Anchorage	5/20/2004	13:44	0.85	14	
34.056	119.796	Southern CA	Santa Cruz Island	Vicinity of Arch Rock	5/20/2004	13:46	0.85	35	
34.055	119.798	Southern CA	Santa Cruz Island	Vicinity of Arch Rock	5/20/2004	13:46	0.85	20	
34.053	119.804	Southern CA	Santa Cruz Island	Vicinity of Arch Rock	5/20/2004	13:46	0.85	3	
34.058	119.826	Southern CA	Santa Cruz Island	3.4 km ESE Profile Point	5/20/2004	13:47	0.85	6	
34.059	119.829	Southern CA	Santa Cruz Island	3.1 km ESE Profile Point	5/20/2004	13:47	0.85	8	
34.068	119.851	Southern CA	Santa Cruz Island	0.8 km ESE Profile Point	5/20/2004	13:48	0.85	4	
34.077	119.919	Southern CA	Santa Cruz Island	West Point	5/20/2004	13:50	0.85	6	
34.007	119.886	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	5/20/2004	15:39	0.64	56	
33.999	119.883	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	5/20/2004	15:41	0.64	45	
33.998	119.882	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	5/20/2004	15:41	0.64	2	
33.997	119.882	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	5/20/2004	15:41	0.64	33	
33.995	119.881	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	5/20/2004	15:41	0.64	67	
33.994	119.881	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	5/20/2004	15:41	0.64	37	
34.005	119.885	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	5/20/2004	15:41	0.64	11	
34.004	119.884	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	5/20/2004	15:41	0.64	5	
34.001	119.884	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	5/20/2004	15:41	0.64	11	
34.001	119.883	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	5/20/2004	15:41	0.64	3	
34.000	119.883	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	5/20/2004	15:41	0.64	5	
33.992	119.880	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	5/20/2004	15:42	0.64	41	
33.991	119.879	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	5/20/2004	15:42	0.64	6	
33.990	119.878	Southern CA	Santa Cruz Island	Vicinity of Klinton Point	5/20/2004	15:42	0.64	2	
33.989	119.595	Southern CA	Santa Cruz Island	3.1 km WSW of Sandstone Point	5/20/2004	15:58	0.64	16	
33.989	119.594	Southern CA	Santa Cruz Island	3.1 km WSW of Sandstone Point	5/20/2004	15:58	0.64	64	
33.993	119.586	Southern CA	Santa Cruz Island	2.5 km WSW of Sandstone Point	5/20/2004	15:59	0.64	44	
34.037	120.048	Southern CA	Santa Rosa Island	Carrington Point	5/20/2004	14:03	0.85	15	
34.037	120.050	Southern CA	Santa Rosa Island	Carrington Point	5/20/2004	14:03	0.85	4	
34.037	120.056	Southern CA	Santa Rosa Island	Carrington Point	5/20/2004	14:03	0.85	26	
34.020	120.114	Southern CA	Santa Rosa Island	3.1 km E of Brockway Point	5/20/2004	14:05	0.85	35	
34.020	120.117	Southern CA	Santa Rosa Island	3.1 km E of Brockway Point	5/20/2004	14:05	0.85	97	
34.025	120.141	Southern CA	Santa Rosa Island	0.6 km ENE of Brockway Point	5/20/2004	14:07	0.85	28	
33.998	120.242	Southern CA	Santa Rosa Island	Vicinity of Sandy Point	5/20/2004	15:03	0.76	15	
33.996	120.239	Southern CA	Santa Rosa Island	Vicinity of Sandy Point	5/20/2004	15:03	0.76	40	
33.995	120.238	Southern CA	Santa Rosa Island	Vicinity of Sandy Point	5/20/2004	15:03	0.76	75	

Appendix 2. (Continued).

Degrees latitude	Degrees longitude	Section	Stratum	Location of haulout site	Date	Time (hh:mm)	Tide height (m)	Count of seals onshore	Count of seals in water
34.002	120.250	Southern CA	Santa Rosa Island	Sandy Point	5/20/2004	15:03	0.76	4	
34.001	120.249	Southern CA	Santa Rosa Island	Sandy Point	5/20/2004	15:03	0.76	7	
34.000	120.247	Southern CA	Santa Rosa Island	Sandy Point	5/20/2004	15:03	0.76	1	
33.983	120.220	Southern CA	Santa Rosa Island	3.4 km ESE of Sandy Point	5/20/2004	15:07	0.76	6	
33.980	120.219	Southern CA	Santa Rosa Island	3.7 km ESE of Sandy Point	5/20/2004	15:07	0.76	28	
33.980	120.219	Southern CA	Santa Rosa Island	3.7 km ESE of Sandy Point	5/20/2004	15:07	0.76	10	
33.978	120.217	Southern CA	Santa Rosa Island	4.0 km ESE of Sandy Point	5/20/2004	15:09	0.73	3	
33.977	120.216	Southern CA	Santa Rosa Island	4.2 km ESE of Sandy Point	5/20/2004	15:10	0.73	12	
33.976	120.214	Southern CA	Santa Rosa Island	4.4 km ESE of Sandy Point	5/20/2004	15:10	0.73	35	
33.951	120.194	Southern CA	Santa Rosa Island	3.2 km ESE of Cluster Point	5/20/2004	15:14	0.73	13	
33.950	120.192	Southern CA	Santa Rosa Island	3.0 km ESE of Cluster Point	5/20/2004	15:14	0.73	1	
33.911	120.150	Southern CA	Santa Rosa Island	3.1 km ESE of Cluster Point	5/20/2004	15:16	0.73	34	
33.911	120.149	Southern CA	Santa Rosa Island	3.2 km ESE of Cluster Point	5/20/2004	15:16	0.73	7	
33.910	120.148	Southern CA	Santa Rosa Island	3.4 km ESE of Cluster Point	5/20/2004	15:16	0.73	27	
33.925	120.035	Southern CA	Santa Rosa Island	1.6 km NE of Ford Point	5/20/2004	15:19	0.73	23	
33.926	120.034	Southern CA	Santa Rosa Island	1.7 km NE of Ford Point	5/20/2004	15:19	0.73	17	
33.928	120.029	Southern CA	Santa Rosa Island	2.3 km NE of Ford Point	5/20/2004	15:19	0.73	20	
33.930	120.025	Southern CA	Santa Rosa Island	2.7 km NE of Ford Point	5/20/2004	15:19	0.73	18	
33.931	120.024	Southern CA	Santa Rosa Island	2.8 km NE of Ford Point	5/20/2004	15:19	0.73	4	
34.102	119.097	Southern CA	D	Mugu Lagoon	5/20/2004	16:25	0.70	396	
35.340	120.848	Central CA	F	Morro Bay estuary	6/23/2004	9:05	0.09	43	
35.449	120.915	Central CA	F	0.9 km W of Cayucos Pier	6/23/2004	9:16	0.06	25	
35.447	120.923	Central CA	F	1.5 km W of Cayucos Pier	6/23/2004	9:16	0.06	21	
35.446	120.939	Central CA	F	Cayucos Point	6/23/2004	9:16	0.06	62	
35.445	120.941	Central CA	F	Cayucos Point	6/23/2004	9:18	0.06	1	
35.709	121.312	Central CA	G	Vicinity of La Cruz Rock	6/23/2004	9:37	0.09	17	
35.699	121.300	Central CA	G	1.1 km NW of Arroyo del Oso	6/23/2004	9:37	0.09	70	
35.699	121.299	Central CA	G	1.1 km NW of Arroyo del Oso	6/23/2004	9:37	0.09	3	
35.697	121.297	Central CA	G	0.8 km NW of Arroyo del Oso	6/23/2004	9:37	0.09	4	
35.735	121.319	Central CA	G	2.8 km SSE of Ragged Point	6/23/2004	9:38	0.09	203	1
37.700	123.006	Central CA	K[a]	Southeast Farallon Islands	7/6/2004	10:50	0.03	149	
39.035	123.692	Northern CA	N	Mouth of Mallo Pass Creek	7/18/2004	9:16	0.27	71	5
39.049	123.694	Northern CA	N	10.4 km NNE of Point Arena	7/18/2004	9:18	0.27	3	
39.048	123.694	Northern CA	N	10.4 km NNE of Point Arena	7/18/2004	9:18	0.27	14	4
39.041	123.696	Northern CA	N	10.4 km NNE of Point Arena	7/18/2004	9:18	0.27	20	2
39.051	123.692	Northern CA	N	11.3 km NNE of Point Arena	7/18/2004	9:20	0.31	120	15

[a]SE Farallon Islands are included in stratum K (latitude segments 37.50° to 37.99°).