

# CENTRAL CALIFORNIA COOPERATIVE HARBOR SEAL CENSUS

One of the objectives of the SEALS program is to determine the health and stability of harbor seal populations within and around the GFNMS. The first census was organized by the GFNMS and was conducted during the 1998 pupping season. These counts provided estimates of the number of adult seals and pups from southern San Mateo county to northern Sonoma County. In 1999, additional sites were added and the census was extended into the summer molting period, when seal counts can be highest (Allen and Huber, 1983). The Central California breeding and molting counts provide information on trends in harbor seal populations. GFNMS, FMR, PRNS, FMSA, Seal Watch at Jenner, and Seal Watch at Sea Ranch conducted the census. PRNS and GFNMS coordinated the counts while FMSA provided data entry and analysis.

## METHOD

Ground counts of harbor seals during 1998 were made from April 18 through June 14. Semi-monthly counts were made during the breeding season at prominent harbor seal haul-out areas from San Mateo to Sonoma County (Figure 26).

Counts during 1999 were made on selected days from April 18 through July 28. Count days were chosen to maximize the number of personnel available in order to allow the best coastal coverage and to include a low rising tide. More small-sized haul-outs with low seal counts were censused during 1999. Teams were asked to census at times when they would expect numbers to be highest. In general, seal numbers are highest in early afternoon during a low tide. However, this is not always the case. At some sites like the Russian River in Sonoma County, human disturbance can lower numbers during mid-day (Mortenson, 1996, 1997, and 1998). These haul-outs were censused early in the day.

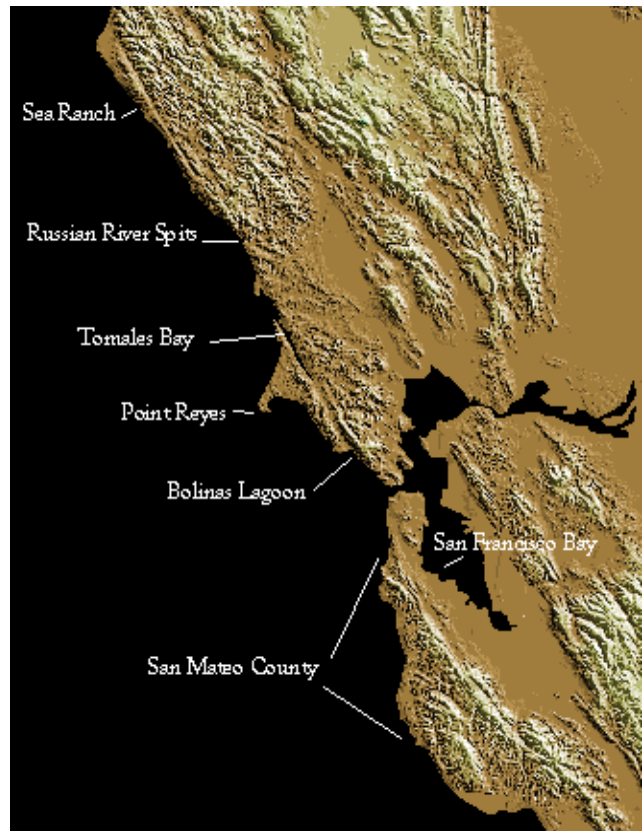


Figure 26. Central California harbor seal census locations

## RESULTS

Census results are presented for both 1998 and 1999. Sites that were consistently monitored between April and May of 1998 and 1999 were compared for total seals and pups (Figure 27). These sites were separated into three regions: Point Reyes, Sea Ranch, and Southern Sonoma county. Only 11 sites were counted regularly during both years, and many new sites were added in 1999. The data showed no clear trends, although the number of pups seen on the spits of the Russian River in Sonoma County nearly doubled.

During 1999 several sites were added to the census in San Mateo and Sonoma counties and in the San Francisco Bay. Table 8 presents the seasonal mean number of seals and pups, maximum number of seals and pups, and percentage of pups seen at all regularly censused sites during 1998 and 1999.

The size of the haul-outs varied between regions. Point Reyes National Seashore haul-outs were the largest, San Francisco haul-outs were intermediate, and San Mateo and Sonoma Counties included small haul-outs, with the exception of the large haul-out at Jenner at the mouth of the Russian River. The sites in San Mateo and Sonoma Counties had fewer pups than in the other regions of the census.

The 1999 data included many small haul-outs with low seal counts. These sites had lower percentages of pups than larger haul-outs. Regression analysis found a significant positive trend between percentage of pups and haul-out size ( $R = 0.29$ ,  $R^2 = 0.85$ ,  $P = .043$ , Figure 28). To increase the number of small haul-outs represented in the analysis, both regularly and irregularly observed sites were included. These irregular census sites were not listed in Table 8, however.

## DISCUSSION

A pilot analysis indicated that there was a general positive relationship between percentage of pups and haul-out size. Female harbor seals may

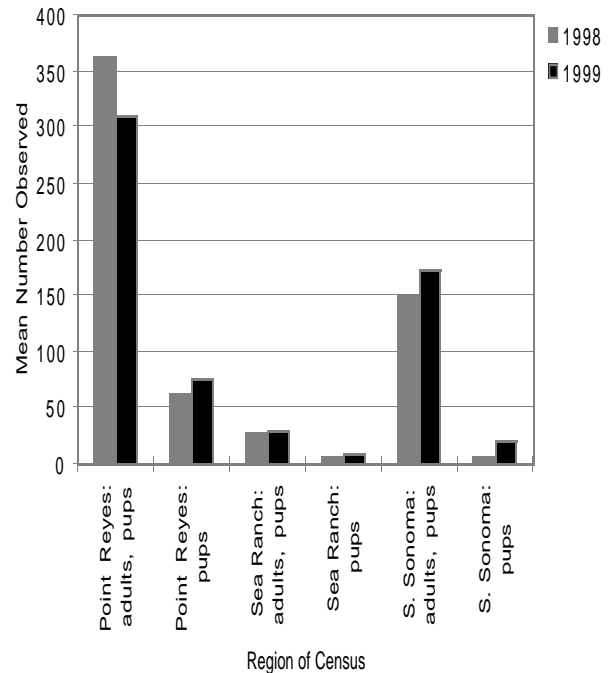


Figure 27. Mean number of harbor seals at consistently counted sites in the Point Reyes, Sea Ranch, and South Sonoma Coast Regions in May-June 1998 and 1999.

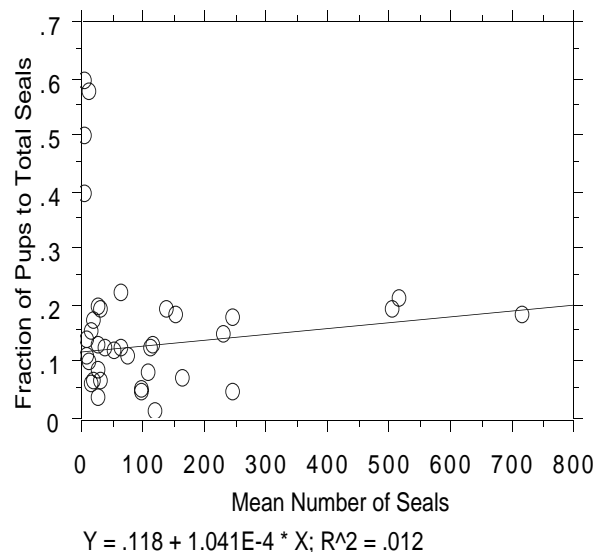


Figure 28. Mean number of seals (haul-out size) and pup proportion at census sites in May-June 1998 and 1999 ( $R = 0.108$ ).

Table 8. Mean and maximum number of seals and pups, including pup percentage, observed at census sites in March-July 1998 and 1999.

Region	Site	Mean Number Seals		Mean Number Pups		Mean Pup Percentage		Maximum Number Seals		Maximum Number Pups		Maximum Pup Percentage		
		1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	
San Mateo	S. Bean Hollow Bean Hollow	66.3	—	8.0	—	12.4%	—	68	—	10	—	14.7%	—	
		—	0	—	0	—	0%	—	0	—	—	—	0%	
	Cowell Ranch	—	95.0	—	4.7	—	4.9%	—	178	—	—	—	—	50.0%
		—	27.0	—	1.0	—	3.7%	—	27	—	—	—	—	3.7%
	MM 11.62	—	36.8	—	4.7	—	12.7%	—	71	—	—	—	—	37.5%
		—	9.0	—	1.0	—	11.1%	—	27	—	—	—	—	16.7%
	Pebble Beach	—	13.7	—	0.8	—	6.1%	—	51	—	—	—	—	25.0%
		—	2.9	—	0	—	0%	—	13	—	—	—	—	0%
	N. Pebble Beach	—	31.0	—	6.0	—	19.4%	—	31	—	—	—	—	19.4%
		—	25.0	—	2.2	—	8.7%	—	39	—	—	—	—	27.2%
	S. Pescadero	—	0	—	0	—	0%	—	0	—	—	—	—	0%
		—	28.8	—	2.0	—	6.9%	—	50	—	—	—	—	17.7%
	San Pedro	—	110.0	—	14.0	—	12.7%	—	110	—	—	—	—	12.7%
		—	—	—	—	—	—	—	—	—	—	—	—	—
S. Pillar Point	—	107.7	—	9.1	—	8.5%	—	139	—	—	—	—	22.7%	
	—	—	—	—	—	—	—	—	—	—	—	—	—	
San Francisco Bay	Castro Rocks	—	136.8	—	26.4	—	19.3%	—	243	—	—	—	57.8%	
		—	119.9	—	1.9	—	1.6%	—	198	—	—	—	7.4%	
Point Reyes	Bolinas Lagoon	116.0	177.4	28.3	27.9	24.4%	15.7%	149	288	47	50	32.9%	32.9%	
		—	97.0	—	5.0	—	5.2%	—	98	—	—	10	—	10.2%
	Duxbury Reef	675.3	458.9	121.0	106.1	17.9%	23.1%	847	890	160	283	22.9%	31.8%	
		715.0	505.2	133.7	99.2	18.7%	19.6%	853	922	192	237	24.1%	33.8%	
	Drakes Limantour	63.7	131.8	15.7	14.3	24.6%	10.8%	77	431	23	38	37.1%	48.7%	
		244.2	—	12.1	—	5.0%	—	485	—	68	—	22.2%	—	
	Tomales Bay	—	74.3	—	8.4	—	11.4%	—	284	—	—	53	—	30.8%
		—	229.7	—	35.0	—	15.2%	—	356	—	—	89	—	25.0%
	Clam Island	345.3	211.6	56.0	38.9	16.2%	18.4%	485	478	68	110	22.2%	32.3%	
		—	—	—	—	—	—	—	—	—	—	—	—	—
	Seal Island	3.0	3.7	0	0	0%	0%	6	9	0	0	0%	0%	
		144.6	179.3	7.4	18.5	5.2%	10.3%	249	298	13	35	8.9%	15.0%	
	Tomales Point	1.5	7.4	0	0	0%	0%	3	26	0	0	0%	0%	
		—	—	—	—	—	—	—	—	—	—	—	—	—
S. Sonoma	Chalanchawi	22.7	27.6	5.3	5.1	23.5%	18.6%	43	44	7	19	40.0%	43.2%	
		12.0	4.9	0	0	0%	0%	13	11	0	0	0%	0%	
	Jenner	16.3	21.2	2.0	1.1	12.2%	5.3%	28	47	4	6	14.3%	40.0%	
		27.3	25.8	4.3	3.1	15.9%	12.1%	46	46	6	10	20.0%	40.0%	
	Odin Cove	2.5	—	1.5	—	60.0%	—	5	—	3	—	60.0%	—	
		56.7	63.9	17.0	12.8	30.0%	20.0%	65	146	18	44	36.0%	36.9%	
	Cormorant Reach	—	13.8	—	2.1	—	15.5%	—	34	—	—	6	—	50.0%
		—	—	—	—	—	—	—	—	—	—	—	—	—
	Del Mar	—	—	—	—	—	—	—	—	—	—	—	—	—
		—	—	—	—	—	—	—	—	—	—	—	—	—
	Dune Drift	—	—	—	—	—	—	—	—	—	—	—	—	—
		—	—	—	—	—	—	—	—	—	—	—	—	—
	Green Cove	—	—	—	—	—	—	—	—	—	—	—	—	—
		—	—	—	—	—	—	—	—	—	—	—	—	—
Shell Beach	—	—	—	—	—	—	—	—	—	—	—	—	—	
	—	—	—	—	—	—	—	—	—	—	—	—	—	
Tidepool Rookery Lodge	—	—	—	—	—	—	—	—	—	—	—	—	—	
	—	—	—	—	—	—	—	—	—	—	—	—	—	

migrate from scattered, smaller populations to the larger haul-out sites to pup. Haul-out substrate may play a role in determining haul-out size. Pregnant females may migrate from rocky coasts to sheltered mudflats or beaches to give birth. If this is the case, efforts should concentrate on protecting larger haul-out sites.

At the Russian River spits, average pup numbers and the average percentage of pups increased from 1998 to 1999. The low number of pups in 1998 may be related to the ENSO event of that year. The higher number of pups in 1999 are consistent with the gradual increase in the percentage of pups on the Russian River spits (Mortenson, unpublished data). This long-term trend of increased percentages of pups may reflect the efforts of Seal Watch docents to minimize harbor seal disturbances at the Russian River spits during pupping season.

There was no obvious trend in overall seal numbers from 1998 to 1999 at the consistently counted sites, despite the successive ENSO and La Niña years represented in the census. Harbor seals may not be as severely affected as other pinnipeds during ENSO events. The harbor seal population appears to be stable in Central California (comparison of the current values with long-term data from Fuharty, 1999; Mortenson and Twohy, unpublished data; Sarah Allen, personal communication).