

**Marine Mammal Protection Act  
Incidental Harassment Authorization**

**Draft Monitoring Report**

**Submitted by:**

**Partnership for Interdisciplinary Studies of Coastal Oceans  
University of California Santa Cruz  
Center for Ocean Health  
115 McAllister Way  
Santa Cruz, CA 95060**



**UNIVERSITY OF CALIFORNIA  
SANTA CRUZ**

**To:**

**Permits, Conservation, and Education Division  
National Marine Fisheries Service (NMFS)  
Office of Protected Resources  
1315 East-West Highway  
Silver Spring, MD 20910**

**January 2019**

This draft monitoring report covers research activities related to rocky intertidal monitoring along the Oregon and California coasts for the period of March 12, 2018 to December 31, 2018.

### **Summary of Research Activities:**

Our research group at UC Santa Cruz operates in collaboration with two large-scale marine research programs: the Multi-Agency Rocky Intertidal Network (MARINe, [www.marine.gov](http://www.marine.gov), [www.pacificrockyintertidal.org](http://www.pacificrockyintertidal.org)) and the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO, [www.piscoweb.org](http://www.piscoweb.org)).

MARINe is a consortium of multiple agencies, universities, and private organizations conducting long-term rocky intertidal monitoring at more than 200 sites along the west coast of North America. This program uses a set of standardized monitoring protocols that allows for comparisons of data over space and time.

The PISCO project is comprised of researchers from the University of California Santa Cruz and Santa Barbara campuses, Oregon State University, and Stanford University Hopkins Marine Station. This program focuses on understanding the near-shore ecosystems of the U.S. West Coast through a number of interdisciplinary collaborations. PISCO integrates long-term monitoring of ecological and oceanographic processes at dozens of sites with experimental work in the lab and field.

Data from these long-term research programs have been used to inform marine policy including the design and evaluation of marine protected areas (MPAs), natural resource damage assessments (NRDA), and critical habitat designations. Research findings are also made available to the public through websites, outreach, and educational programs.

Our research group at UC Santa Cruz is responsible for much of these programs' ongoing rocky intertidal monitoring along the Pacific coast. Monitoring occurs at rocky intertidal sites, often large bedrock benches, from the high intertidal to the water's edge. Our long-term monitoring projects, carried out under the direction of principal investigator Dr. Pete Raimondi, include the following:

#### **Community Structure Monitoring**

The community structure monitoring approach is based largely on surveys that quantify the cover and distribution of algae and invertebrates in intertidal communities. This approach allows us to quantify the patterns of abundance of targeted species and characterize changes within the communities in which they reside. Such information provides resource managers with insight into the causes and consequences of changes in community structure and forms the basis of "ecosystem-based management" of rocky intertidal communities.

Community structure monitoring involves the use of permanent photoplot quadrats which target specific algal and invertebrate assemblages (e.g. mussels, rockweeds, barnacles). Each photoplot is photographed and scored for percent cover. In addition, permanent plots and transects are sampled to determine patterns of abundance of targeted species including ochre sea stars

(*Pisaster ochraceus*), owl limpets (*Lottia gigantea*), abalone (*Haliotis* spp.), surfgrass (*Phyllospadix* spp.), and sea palms (*Postelsia palmaeformis*). Sea surface temperature data are also collected. Community structure monitoring follows the established protocols of MARINE. For more information please visit [www.eeb.ucsc.edu/pacificrockyintertidal/methods/index.html](http://www.eeb.ucsc.edu/pacificrockyintertidal/methods/index.html).

Community structure surveys are conducted over a one day period during a low tide series one to two times each year. Site locations, survey frequency, and survey seasons are shown in Table 1.

### **Biodiversity Surveys**

Biodiversity surveys are complimentary with the community structure monitoring approach and provide greater information on species richness at a site and biogeographic patterns across regions. These surveys involve point contact identification along permanent transects, mobile invertebrate quadrat counts, sea star band counts, and tidal height topographic measurements. Biodiversity surveys typically require one to two days to complete and are usually conducted every 3-5 years at established sites. Current funding programs supporting biodiversity surveys include marine protected area (MPA) and Area of Special Biological Significance (ASBS) evaluation as well as MARINE. Table 1 lists biodiversity survey sites in Oregon and California and indicates those sites sampled during the reporting period. Note that many biodiversity sites are also community structure sites. For more information on sites and protocols please visit [www.eeb.ucsc.edu/pacificrockyintertidal/methods/index.html](http://www.eeb.ucsc.edu/pacificrockyintertidal/methods/index.html)

One new biodiversity site, Tarantulas, was established and sampled during this period (Table 1).

### **NSF - Sea Star Wasting Syndrome Ecosystem Effects and Recovery Study**

In April 2018 we, along with Oregon State University, initiated a NSF funded study to examine the ecosystem level effects of sea star wasting syndrome as well as mechanisms for ecosystem recovery. This project requires additional annual visits to the following sites: Pigeon Point, Davenport Landing, Terrace Point, Hopkins, Vista Del Mar, Hazards, Lompoc Landing. As well as monthly visits to Waddell (new in 2018), Soberanes, and Point Sierra Nevada (Tables 1 and 2)

Site	Latitude	Longitude	Community Structure (CS) Survey	CS Surveys/Year	CS Survey Season	Biodiversity Survey	Biodiversity Survey sampled
Ecola	45.91809	-123.98031	X	1	SU	X	
Cape Meares	45.471788	-123.97204				X	
Roads End	45.025747	-124.01265				X	
Fogarty Creek	44.83864	-124.05875	X	1	SU	X	
Otter Rock	44.752715	-124.06606				X	
Seal Rock	44.499939	-124.08437				X	
Bob Creek	44.24456	-124.11443	X	1	SU	X	
Cape Arago	43.30894	-124.40077	X	1	SU	X	
Coquille Point	43.114718	-124.43851				X	
Burnt Hill	42.22814	-124.38786	X	1	SU	X	
Pyramid Point	41.989841	-124.2093				X	X
Point Saint George	41.784644	-124.25513				X	
Enderets	41.69	-124.14257	X	2	SP,FA	X	X
Damnation Creek	41.65249	-124.12784	X	2	SP,FA	X	
False Klamath Cove	41.594264	-124.10533	X	2	SP,FA	X	X
Launcher Beach	41.057155	-124.14532				X	X
Old Home Beach	41.055273	-124.13683				X	
Cape Mendocino	40.341	-124.36317	X	1	SU	X	
Shelter Cove	40.02254	-124.07366	X	1	SU	X	
Mal Coombs	40.021697	-124.06825				X	X
Kibesillah Hill	39.60412	-123.78887	X	1	SU	X	X
Abalobadiah Creek	39.56906	-123.77182				X	X
MacKerricher	39.4826	-123.80359				X	X
Fort Bragg	39.4392	-123.81841				X	
Stornetta	38.93787	-123.7288	X	1	SU	X	
Moat Creek	38.880915	-123.67475				X	
Saunders Reef	38.86138	-123.65361				X	
Del Mar Landing	38.740513	-123.51086				X	
Sea Ranch	38.7305	-123.48864	X	1	SU	X	X
Phillips Gulch	38.585852	-123.34147				X	
Stewarts Point	38.61364	-123.36753				X	
Gerstle Cove	38.566136	-123.32919				X	
Windermere Point	38.523943	-123.26747				X	
North Jenner Beach	38.456176	-123.14244				X	
Bodega	38.3182	-123.07365	X	1	SU	X	
Horseshoe Cove	38.316439	-123.0721				X	
Bodega Head	38.3104	-123.0824				X	
Santa Maria Creek	38.012429	-122.84915				X	X
Chimney Rock	37.99383	-122.96729				X	
Bolinas Point	37.903537	-122.72721				X	
Bolinas Point Wreck	37.902617	-122.7242				X	
Alder Creek; Duxbury	37.897426	-122.71069				X	
Slide Ranch	37.874061	-122.60094				X	
Alcatraz	37.825	-122.42194				X	
Mussel Flat Farallones	37.6959	-123.0029				X	
Fitzgerald Marine Reserve	37.521647	-122.51679				X	
Pebble Beach	37.23263	-122.41607	X	1	SP		
Pigeon Point	37.18361	-122.39529	X	1	SP	X	
Franklin Point	37.1495	-122.36101	X	1	SP		
Ano Nuevo	37.11257	-122.32956				X	
Waddell*	37.10681	-122.29325					
Scott Creek	37.04425	-122.23493	X	2	SP, FA	X	
Davenport Landing	37.02208	-122.21538				X	

Sandhill Bluff	36.98017	-122.15503	X	2	SP, FA	X	
Wilder Ranch	36.94915	-122.10383				X	
Terrace Point	36.94841	-122.06457	X	2	SP, FA	X	
Natural Bridges	36.94915	-122.06107				X	
Hopkins	36.6212	-121.9073	X	2	SP, FA	X	
Point Pinos	36.63796	-121.93758	X	2	SP, FA	X	
Asilomar	36.6296	-121.93852	X	1	SP	X	
China Rocks	36.60616	-121.95939	X	1	SP	X	
Pescadero Point	36.56109	-121.95436	X	1	SP		
Stillwater	36.56087	-121.94053	X	2	SP, FA	X	
Carmel Point	36.54376	-121.93412	X	1	SP		
Point Lobos	36.51366	-121.94688	X	2	SP, FA	X	
Mal Paso	36.47994	-121.93913	X	2	SP, FA		
Garrapata	36.46904	-121.93444	X	1	SP	X	
Soberanes	36.44787	-121.92874	X	1	SP		
Andrew Molera	36.28061	-121.86317	X	2	SP, FA	X	
Partington Cove	36.17376	-121.69653	X	1	SP	X	
Lucia	36.014383	-121.5405				X	
Mill Creek	35.97965	-121.49034	X	2	SP, FA	X	
Pacific Valley	35.94705	-121.48053	X	1	SP		
Duck Pond	35.85918	-121.42249				X	
Point Sierra Nevada	35.72883	-121.31866	X	2	SP, FA	X	
Piedras Blancas	35.66493	-121.28699	X	2	SP, FA	X	
San Simeon Point	35.63455	-121.19562				X	
Vista del Mar	35.60414	-121.14232	X	2	SP, FA	X	
Rancho Marino; Cambria	35.52244	-121.073	X	2	SP, FA	X	
Harmony Headlands	35.47448	-121.01707	X	1	FA		
Cayucos	35.44739	-120.94982	X	2	SP, FA	X	
Hazards	35.28966	-120.88325	X	2	SP, FA	X	
Diablo	35.22691	-120.87428				X	
Shell Beach	35.16881	-120.69668	X	2	SP, FA	X	
Oculto	34.88122	-120.63954	X	2	SP, FA		
Purisima	34.7556	-120.64076	X	2	SP, FA		
Stairs	34.73038	-120.61546	X	2	SP, FA	X	
Lompoc Landing	34.719057	-120.6088				X	
Boat House	34.55388	-120.61167	X	2	SP, FA	X	
Tarantulas*	34.4946	-120.4956				X	X
Government Point	34.44334	-120.45655	X	2	SP, FA	X	
Alegria	34.467137	-120.27818				X	
Arroyo Hondo	34.473308	-120.14539				X	
Ellwood	34.435194	-119.93078				X	
Coal Oil Point	34.40686	-119.87829				X	
Carpinteria	34.387037	-119.51408				X	
Mussel Shoals	34.355565	-119.44074				X	
Old Stairs	34.066224	-118.9981				X	
Deer Creek	34.060685	-118.98221				X	
Sequit Point	34.043235	-118.937				X	
Lechuza Point	34.034458	-118.86179				X	
Point Dume	34.000357	-118.80703				X	
Paradise Cove	34.012005	-118.79214				X	X
Point Vicente	33.741014	-118.40947				X	
Abalone Cove	33.737777	-118.37612				X	X
White Point	33.71573	-118.31999				X	
Point Fermin	33.70679	-118.28614				X	
Buck Gully South	33.588246	-117.86736				X	
Crystal Cove	33.570864	-117.83785				X	
Muddy Canyon	33.565763	-117.83314				X	
Shaws Cove	33.54473	-117.79974				X	
Heisler Park	33.542594	-117.78928				X	
Treasure Island	33.51335	-117.75793				X	
Dana Point	33.459941	-117.71461				X	
Cardiff Reef	32.99984	-117.27867				X	

Scripps Reef	32.871395	-117.25321				X	
La Jolla Caves	32.848614	-117.26535				X	
Wind and Sea	32.832849	-117.28231				X	
Sea Ridge	32.807987	-117.26793				X	
Navy North	32.692784	-117.25306				X	
Cabrillo I	32.669434	-117.24541				X	
Cabrillo III	32.664899	-117.24282				X	
Cuyler Harbor	34.048612	-120.33642				X	
Crook Point	34.022067	-120.37924				X	
Fossil Reef	33.993295	-120.23813				X	
NW Talcott	34.008386	-120.21368				X	
East Point	33.9427	-119.96793				X	
Ford Point	33.91457	-120.0506				X	
Johnsons Lee	33.90883	-120.08691				X	
Trailer	34.051821	-119.90344				X	
Forney	34.056485	-119.92204				X	
Fraser Cove	34.062645	-119.91905				X	
Prisoners Harbor	34.020197	-119.68663				X	
Valley	33.983724	-119.66588				X	
Willows Anchorage	33.961885	-119.75493				X	
Cat Rock	34.005599	-119.41941				X	
Middle West	34.005841	-119.39643				X	
S Frenchys Cove	34.006553	-119.41104				X	
Landing Cove	33.481366	-119.0292				X	
Sea Lion Rookery	33.471738	-119.03075				X	
Thousand Springs	33.28491	-119.52972				X	
Tranquility Beach	33.265668	-119.4921				X	
Marker Poles	33.2187	-119.49575				X	
Two Harbors	33.444353	-118.49888				X	
Bird Rock	33.451665	-118.48761				X	
Big Fisherman Cove	33.446447	-118.48526				X	
Goat Harbor	33.416797	-118.39407				X	
Avalon Quarry	33.322	-118.3052				X	
Little Harbor	33.385025	-118.47524				X	
West Cove	33.014938	-118.60614				X	
North Head	33.032867	-118.60057				X	
Graduation Point	33.033274	-118.5756				X	
Boy Scout Camp	33.00112	-118.54832				X	
Eel Point	32.918007	-118.54668				X	

**Table 1. UCSC rocky intertidal monitoring sites in Oregon and California. (Sample Season: SP=March, April, May; SU=June, July, August; FA= October, November, December) \*New in 2018**

### **Summary of Incidental Take Authorization**

Research activities take place in the rocky intertidal throughout the year. Sites range from northern Oregon to the California/Mexico border. Within this area the following marine mammals may be found hauled-out at or in the vicinity of research sites:

- California sea lion (*Zalophus californianus*), U.S. stock
- Pacific harbor seal (*Phoca vitulina richardii*), California and Oregon/Washington stocks
- Northern elephant seal (*Mirounga angustirostris*), California stock
- Steller sea lion (*Eumetopias jubatus*), Eastern U.S. stock

### **Harbor seal (*Phoca vitulina richardii*)**

Harbor seals range widely along coastal areas of the North Pacific and North Atlantic. There are five subspecies based on geographic ranges, with *Phoca vitulina richardii* occurring along the west coast of North America from the Aleutian Islands to Baja California. For management purposes there are three recognized harbor seal stocks along the west coast of the continental United States: California, Oregon and Washington outer coast, and Washington inland coast. Only the California and the Oregon/Washington outer coast stocks are found in the activity area considered under this IHA.

This species was hunted by indigenous peoples and early hunters for several thousand years. In the 1800s and early 1900s, harbor seals were killed during commercial hunting and in attempts to reduce competition with commercial fisheries. The population was eventually reduced to a few hundred individuals (Bonnet 1928). Since the passage of the MMPA, the population has increased dramatically (Carretta et al. 2010).

According to the 2016 Pacific Marine Mammal Stock Assessment, the minimum population size of the California stock is 27,348 and the population is estimated to number 30,968. Based on 1999 aerial surveys, the Oregon/Washington outer coast stock is estimated to number 24,732 (Carretta et al. 2017). Due to outdated survey data, there is no current minimum population size available for the Oregon/Washington stock (Carretta et al. 2017). This species is not listed under the ESA and is not a strategic species or considered depleted under the MMPA.

### **California sea lion (*Zalophus californianus*)**

California sea lions are distributed along the west coast of North America from British Columbia to Baja California and throughout the Gulf of California. Breeding occurs on offshore islands along the west coast of Baja California and the Gulf of California as well as on the California Channel Islands. There are three recognized California sea lion stocks (U.S. stock, Western Baja stock, and the Gulf of California stock) with the U.S. stock ranging from the U.S./Mexico border into Canada. Although there is some movement between stocks, U.S. rookeries are considered to be isolated from rookeries off of Baja California (Barlow et al. 1995).

California sea lions were hunted for several thousand years by indigenous peoples and early hunters. In the early 1900s, sea lions were killed in an effort to reduce competition with commercial fisheries. They were also hunted commercially from the 1920-1940s. Following the passage of the Marine Mammal Protection Act (MMPA) in 1972, as well as limits on killing and harassment in Mexico, the population has rapidly increased (Reeves et al. 2002). Declines in pup production did occur during the 1983-84, 1992-93, 1997-98, and 2003 El Niño events, but production returned to pre- El Niño levels within 2-5 years (Carretta et al. 2017). In 2013, NOAA declared an Unusual Mortality Event (UME) due to the elevated number of sea lion pup strandings in southern California. The cause of this event is thought to be nutritional stress related to declines in prey availability. This UME continued through 2016 (NMFS 2016).

According to the 2016 Pacific Marine Mammal Stock Assessment, California sea lions have a minimum population size of 153,337 and the population is estimated to be 296,750 (Carretta et al. 2017). This species is not listed under the Endangered Species Act (ESA) and is not a strategic species nor considered depleted under the MMPA.

### **Northern elephant seal (*Mirounga angustirostris*)**

Northern elephant seals range widely throughout the eastern Pacific for most of the year to forage. They return to haul-out locations along the west coast of the continental United States including the Channel Islands and the central California coast, and the islands off of Baja California to breed and molt. Breeding occurs from December through early spring, with males returning to haul-out locations earlier than females to establish dominance hierarchies. Molting occurs from late April to August, with juveniles and adult females returning earlier than adult males (Reeves et al. 2002). Due to very little movement between colonies in Mexico and those in California, the California population is considered to be a separate stock (Carretta et al. 2010).

This species was hunted by indigenous peoples for several thousand years and by commercial sealers in the 1800s. By the late 1800s the species was thought to be extinct, although several were seen on Guadalupe Island in the 1880s and a few dozen to several hundred survived off of Mexico (Stewart et al. 1994). The population began increasing in the early 1900s and progressively colonized southern and central California through the 1980s (Reeves et al. 2002).

According to the 2016 Pacific Marine Mammal Stock Assessment, the minimum population size of the California stock is 81,368 and the estimated population size is 179,000 (Carretta et al. 2017, Lowry et al. 2014). This species has grown at 3.8% annually since 1988 (Lowry et al. 2014). Northern elephant seals are not listed under the ESA and are not a strategic species nor considered depleted under the MMPA.

### **Steller sea lion (*Eumetopias jubatus*)**

Steller sea lions range throughout the north Pacific from Japan to the Kamchatka Peninsula, along the Aleutian Islands, into the Gulf of Alaska, and down the west coast of North America to central California. Based on distribution, population dynamics, and genotypic data, the species occurring in United States waters has been divided into two stocks, the eastern U.S. stock (east of Cape Suckling, AK) and the western U.S. stock (west of Cape Sucking, AK) (Loughlin 1997). Breeding of the eastern stock occurs in rookeries in Alaska, British Columbia, Oregon, and California.

This species was hunted by indigenous peoples for several thousand years throughout its range and as recently as the 1990s in the Aleutian Islands. Individuals from British Columbia to California were also killed in the early 1900s to reduce competition with commercial fisheries. The species dramatically declined from the 1970s to 1990s due to competition with commercial fishing and long-term environmental changes (Reeves et al. 2002). There has also been a continued decrease in population numbers along the southern and central California coast possibly due to a northward shift, and subsequent southern contraction in breeding locations



(Pitcher et al. 2007). In 1990, due to accelerating declines across its range, the species was listed as threatened under the ESA.

According to the 2016 Alaska Marine Mammal Stock Assessment, the minimum population size of the eastern U.S stock is estimated to be 41,638 (Muto et al. 2017). In 2013, the eastern U.S. stock was determined to be recovered and was delisted from the ESA (NMFS 2013) and is therefore no longer a strategic species under the MMPA. Steller sea lions remain rare at our research sites and, therefore, we did not request any take of steller sea lions under this IHA.

### **Incidental Harassment Authorization:**

Although uncommon, hauled-out pinnipeds are occasionally encountered by researchers accessing and sampling research sites. In some occasions pinnipeds may need to be flushed in order for researchers to gain access to a site or conduct sampling.

For the period of March 12, 2018 to March 11, 2018 UCSC-PISCO was issued Incidental Harassment Authorization under Section 101(a)(5)(D) of the Marine Mammal Protection Act for take, by level B harassment only, of a small number of pinnipeds incidental to rocky intertidal monitoring and research. The issued IHA allows for the following take:

<b>Species</b>	<b>Authorized Take</b>
California sea lion ( <i>Zalophus californianus</i> )	90
Pacific harbor seal ( <i>Phoca vitulina richardii</i> )	255
Northern elephant seal ( <i>Mirounga angustirostris</i> )	50

### **Monitoring Methods**

Prior to approaching research sites, researchers observed the site from a distance and recorded any pinnipeds by species, and sex/age when possible, present at or near the site. Any pinnipeds observed during sampling were also recorded. Number of disturbances from researchers accessing the site or conducting sampling were recorded by species, and sex/age when possible.

Observations and disturbances were recorded on a four-point scale:

- 0 = observation by researchers from a distance, no reaction by pinniped
- 1 = pinniped reacted to presence of researchers with movement <1 meter
- 2 = pinniped reacted to presence of researchers with short movement of 1-3 meters
- 3 = pinniped flushed to the water or moved >3 meters in retreat

Categories 2 and 3 are considered Take.

### **Monitoring Results**

For the period of March 12, 2018 to December 31, 2018, our research group conducted rocky intertidal surveys at 56 sites over 73 days (Table 2). During this period there were 87 takes of harbor seals. An additional 138 adult harbor seals and 1 pup, were observed at research sites with

71 of those exhibiting minor reactions to researchers (Table 3). Sixty takes occurred at Government Point on December 6, 2018. A large group of adult harbor seals was hauled-out on a reef upcoast of the main site. When researchers approached this reef to access part of the site about 30 of these harbor seals flushed to the water. The same event occurred when researchers departed this part of the site about an hour later.

During this period there was one take of a California sea lion. An additional eight sea lions were observed at research sites (Table 4).

During this period, there were no takes of northern elephant seals. Only one elephant seal was observed at research sites - an adult swimming offshore at Point Sierra Nevada (Table 5).

All takes were Level B harassment only. There were no unusual behaviors prior to or following any takes. Surrounding waters were scanned for predators prior to any intentional flushing and no predators were observed. No steller sea lions were observed during the reporting period.

One injured California sea lion was observed at Point Lobos on November 11, 2018. This individual was a sub-adult male that appeared lethargic and had an injury to its eye. The sea lion remained high above the water on rocks within the vicinity of several survey plots. Researchers approached the sea lion but it did not move more than a few feet. The sea lion remained in the same location throughout the day (13:00-17:00). Researchers reported the injured sea lion to the Southwest Regional Stranding Coordinator and the Marine Mammal Center at 16:45. The event was also reported to Point Lobos State Park rangers and staff. The Marine Mammal Center planned to respond early the next morning.

Date	Site	Time	Swell	Wind	Rain	Date	Site	Time	Swell	Wind	Rain
03/25/18	Paradise Cove	0945-1430	L	L	0	07/13/18	Hazards	0345-1000	L	L	0
03/26/18	White Point	1000-1500	M	L	0	07/14/18	Kibesillah Hill	0500-1130	L	L	0
03/27/18	Crystal Cove	1100-1645	L	L	0	07/14/18	Fogarty Creek	0500-1000	M	M	0
03/28/18	Dana Point	1130-1730	L	L	0	07/15/18	Cape Arago	0615-1100	L	M	0
04/17/18	Terrace Point	0600-0800	M	L	0	07/15/18	Mal Coombs	0430-0930	L	L	0
04/18/18	Scott Creek	0530-0900	L	L	0	07/15/18	Point Sierra Nevada	0345-0945	L	L	0
04/18/18	Point Pinos	0545-0840	M	0	0	07/16/18	Shelter Cove	0545-0945	L	L	0
04/19/18	Waddell	0600-1130	M	M	0	07/16/18	Soberanes	0620-1000	L	L	0
04/20/18	Soberanes	0545-1100	M	M	0	07/17/18	Cape Mendocino	0630-1000	L	L	0
04/21/18	Hopkins	0830-1130	L	M	0	08/10/18	Hazards	0345-0745	L	0	0
04/21/18	Point Sierra Nevada	0610-1215	L	L	0	08/11/18	Point Sierra Nevada	0515-0830	L	0	0
04/22/18	Pigeon Point	1000-1015	L	L	0	08/12/18	Soberanes	0615-0745	L	0	0
04/22/18	Sandhill Bluff	1100-1200	M	L	0	08/13/18	Waddell	0620-0840	L	0	0
04/23/18	Carmel Point	1045-1215	L	L	0	08/15/18	Hazards	0710-0820	L	0	0
04/24/18	China Rocks	1230-1415	M	L	0	09/10/18	Waddell	0630-0700	L	L	0
05/02/18	Asilomar	0545-0735	M	L	0	09/11/18	Soberanes	0630-0700	L	L	0
05/03/18	Soberanes	0630-0900	L	L	0	10/09/18	Scott Creek	1430-1845	M	L	0
05/15/18	Pescadero Point	0545-0730	L	L	0	10/09/18	Soberanes	0410-0635	M	L	0
05/15/18	Waddell	0530-0945	L	L	0	10/10/18	Terrace Point	1530-1820	M	L	0
05/16/18	Stillwater Cove	0530-0730	L	L	0	10/10/18	Point Sierra Nevada	0315-0545	M	L	0
05/17/18	Garrapata	0545-0800	L	L	0	10/11/18	Sandhill Bluff	1545-1830	H	L	0
05/18/18	Mill Creek	0545-0845	L	L	0	10/11/18	Waddell	1610-2050	M	L	0
05/18/18	Point Sierra Nevada	0500-0945	L	L	0	10/12/18	Pigeon Point	1920-1950	M	L	0
05/19/18	Soberanes	0630-0830	L	M	0	10/24/18	Sandhill Bluff	1545-1615	M	M	0
05/19/18	Waddell	0615-1130	L	L	0	10/24/18	Terrace Point	1615-1730	M	L	0
05/19/18	Andrew Molera	0630-0840	L	M	0	10/25/18	Hopkins	1430-1830	M	L	0
05/20/18	Partington Point	0845-1030	L	L	0	11/05/18	Point Lobos	1300-1645	L	L	0
05/20/18	Pacific Valley	0630-0800	L	L	0	11/06/18	Stillwater Cove	1230-1545	M	L	0
05/21/18	Point Lobos	0945-1230	L	L	0	11/06/18	Soberanes	1315-1630	M	L	0
05/28/18	False Klamath Cove	0430-0930	L	L	0	11/07/18	Waddell	1245-1820	M	M	0
05/29/18	Enderts	0500-0900	M	L	0	11/08/18	Point Sierra Nevada	1330-1825	L	L	0
05/30/18	False Klamath Cove	0515-1015	L	L	0	11/21/18	Mill Creek	1530-1700	M	L	L
05/31/18	Enderts	0545-0915	L	L	0	11/22/18	Mill Creek	1400-1645	M	L	0
06/01/18	Pyramis Point	0530-0900	L	L	0	11/23/18	Harmony Headland	1345-1515	M	L	0
06/02/18	Damnation Creek	0630-1015	L	L	0	11/23/18	Vista Del Mar	1615-1735	M	L	L
06/03/18	Launcher Beach	0645-1200	L	L	0	11/23/18	Andrew Molera	1430-1745	M	L	L
06/14/18	Stornetta	0430-0900	M	M	0	11/24/18	Piedras Blancas	1610-1830	M	L	0
06/15/18	Sea Ranch	0400-1130	M	L	0	11/24/18	Point Sierra Nevada	1345-1700	M	M	0
06/16/18	Bodega	0530-0915	M	L	0	11/25/18	Cayucos	1435-1800	M	L	0
06/16/18	Point Sierra Nevada	0500-1000	L	L	0	11/25/18	Rancho Marino	1900-2015	M	L	0
06/17/18	Vista Del Mar	0500-1250	L	L	0	11/26/18	Hazards	1410-1715	L	L	0
06/18/18	Santa Maria Creek	0600-1030	L	L	0	11/27/18	Shell Beach	1545-1815	H	L	0
06/18/18	Waddell	0600-1015	L	L	0	12/04/18	Boathouse	1145-1600	L	L	L
06/27/18	Terrace Point	0330-0820	L	0	0	12/04/18	Waddell	1210-1535	M	M	0
06/28/18	Davenport Landing	0345-0845	L	L	0	12/05/18	Tarantulas	1200-1700	L	H	M
06/29/18	Hopkins	0500-0845	L	0	0	12/05/18	Soberanes	1330-1600	M	L	L
06/30/18	Pigeon Point	0530-0830	L	L	0	12/06/18	Government Point	1245-1705	M	L	L
07/11/18	Mackerricher	1700-1730	L	L	0	12/07/18	Stairs	1245-1745	H	L	0
07/12/18	Mackerricher	0430-0800	L	L	0	12/07/18	Point Sierra Nevada	1300-1600	H	L	0
07/13/18	Kibesillah Hill	1000-1130	L	L	0	12/08/18	Purisima	1740-1830	M	0	0
07/13/18	Bob Creek	0500-1000	M	M	0	12/08/18	Occulto	1500-1730	M	L	0
07/13/18	Abalobadiah	0445-0800	L	L	0	12/08/18	Waddell	1630-1700	L	L	0

**Table 2. Field sampling dates, sites, times, and physical conditions noted during sampling (0-none, L-low, M-moderate, H-high, ND-no data) for the period of March 12 – December 31, 2018**

Site	Date	Time	harbor seal								Notes		
			adults				pups						
			0	1	2	3	0	1	2	3			
Point Pinos	04/18/18	0600				3							Flushed off of reef as researchers approached site
Soberanes	04/20/18	1050	1										Swimming offshore
Hopkins	04/21/18	0930	2										Swimming offshore
Stillwater Cove	05/16/18	0730	2					1					Swimming offshore
Waddell	05/19/18	0620				1							Flushed off of reef as researchers approached site
Stornetta	06/14/18	0800	5										Hauled-out on offshore reef
Bodega	06/16/18	0530		3		7							Seven flushed off of main reef. Three downcoast of site observed researchers
Bodega	06/16/18	0915	15										Hauled-out on reef downcoast of site
Horseshoe Cove	06/17/18	0530		5		1							One adult flushed off of reef. Five adults downcoast of site observed researchers
Hopkins	06/29/18	0530	2	1		1							Three adults upcoast of site, one observed researchers. One adult on site flushed
Mackerricher	07/11/18	1700				1							Flushed off of reef as researchers approached site
Kibesillah Hill	07/13/18	1000				13							Flushed off of reef as researchers approached site
Kibesillah Hill	07/14/18	0600		2									Hauled-out on reef downcoast of site, observed researchers
Mal Coombs	07/15/18	0930	5										Hauled-out on offshore reef
Shelter Cove	07/16/18	0800	1										Swimming offshore
Sandhill Bluff	10/24/18	1600	1										Swimming offshore
Hopkins	10/25/18	1430	20										Hauled-out on pocket beach upcoast of site
Point Lobos	11/05/18	1630	1										Swimming offshore
Shell Beach	11/27/18	1600	1										Swimming offshore
Boathouse	12/04/18	1200	1										Swimming offshore
Government Point	12/06/18	1300	10										Swimming offshore
Government Point	12/06/18	1315		30		30							Approximately 60 adults on reef upcoast of site, 30 flushed to water when researchers approached
Government Point	12/06/18	1615		30		30							Approximately 60 adults on reef upcoast of site, 30 flushed to water when researchers approached
<b>Totals</b>			<b>67</b>	<b>71</b>	<b>0</b>	<b>87</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>		
<b>Total Takes</b>	<b>87</b>												

**Table 3. Observations and takes of harbor seals (0-observation by researchers only, 1- reacted to presence of researchers with movement <1m, 2- reacted to presence of researchers with short movement of 1-3m, 3- flushed to the water or moved >3m in retreat)**

Site	Date	Time	California sea lion								Notes		
			adults				pups						
			0	1	2	3	0	1	2	3			
Soberanes	04/20/18	0800	3										Swimming offshore
Point Sierra Nevada	04/21/18	0615	1										Swimming offshore
Point Sierra Nevada	06/16/18	0800	1										Swimming offshore
Cape Arago	07/15/18	1000	1										Swimming offshore
Point Lobos	11/05/18	1300			1								Sub-adult male high on reef, injured, reacted to researchers but did not flush.
Government Point	12/06/18	1300	2										Swimming offshore
<b>Totals</b>			<b>8</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>Total Takes</b>	<b>1</b>												

**Table 4. Observations and takes of California sea lions (0-observation by researchers only, 1- reacted to presence of researchers with movement <1m, 2- reacted to presence of researchers with short movement of 1-3m, 3- flushed to the water or moved >3m in retreat)**

Site	Date	Time	northern elephant seal								Notes		
			adults				pups (*weaned)						
			0	1	2	3	0	1	2	3			
Point Sierra Nevada	04/21/18	0615	1										Swimming offshore
<b>Totals</b>			<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>Total Takes</b>	<b>0</b>												

**Table 5. Observations and takes of northern elephant seals (0-observation by researchers only, 1- reacted to presence of researchers with movement <1m, 2- reacted to presence of researchers with short movement of 1-3m, 3- flushed to the water or moved >3m in retreat)**

## References

- Allen, B.M. and R.P. Angliss. 2014. Alaska marine mammal stock assessments, 2013. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-277: 294.
- Barlow, J., R.L. Brownell, Jr., D.P. DeMaster, K.A. Forney, M.S. Lowry, S. Osmek, T.J. Ragen, R.R. Reeves, and R.J. Small. 1995. U.S. Pacific marine mammal stock assessments: 1995. NOAA Technical Memorandum NMFS-SWFSC-219: 162.
- Bonnot, P. 1928. Report on the seals and sea lions of California. Fish Bulletin 14. California Division of Fish and Game.
- Carretta, J.V., K.A. Forney, E. Olsen, K. Martien, M.M. Muto, M.S. Lowry, J. Barlow, J. Baker, D. Johnston, B. Hanson, D. Lynch, L. Carswell, R.L. Brownell Jr., J. Robbins, D.K. Mattila, K. Ralls, and M.C. Hill. 2010. U.S. Pacific marine mammal stock assessments: 2009. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-453: 336.
- Carretta, J.V., K.A. Forney, E. Oleson, D.W. Weller, A.R. Lang, J. Baker, M.M. Muto, B. Hanson, A.J. Orr, H. Hubet, M.S. Lowry, J. Barlow, J.E. Moore, D. Lynch, L. Carswell, and R. L. Brownell Jr. 2017. U.S. Pacific marine mammal stock assessments: 2016. U.S. Department of Commerce, NOAA Technical Memorandum, NMFS-SWFSC-561: 419.
- Loughlin, T. R. 1997. Using the phylogeographic method to identify Steller sea lion stocks. Pp. 329-341 In A. Dizon, S. J. Chivers, and W. Perrin (eds), Molecular genetics of marine mammals, incorporating the proceedings of a workshop on the analysis of genetic data to address problems of stock identity as related to management of marine mammals. Society of Marine Mammals, Spec. Rep. No. 3.
- Muto, M.M, V. T. Helker, R. P. Angliss, B. A. Allen, P. L. Boveng, J. M. Breiwick, M. F. Cameron, P. J. Clapham, S. P. Dahle, M. E. Dahlheim, B. S. Fadely, M. C. Ferguson, L. W. Fritz, R. C. Hobbs, Y. V. Ivashchenko, A. S. Kennedy, J. M. London, S. A. Mizroch, R. R. Ream, E. L. Richmond, K. E. W. Sheldon, R. G. Towell, P. R. Wade, J. M. Waite, and A. N. Zerbini. 2017. Alaska marine mammal stock assessments, 2016. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-AFSC-355, 366 p. doi:10.7289/V5/TM-AFSC-355.
- National Marine Fisheries Service (NMFS). 2013. Endangered and threatened species: delisting of the eastern distinct population segment of Steller sea lion under the Endangered Species Act; amendment to special protection measures for endangered marine mammals/Final rule. Federal Register 78: 66140-66199.

National Marine Fisheries Service (NMFS). 2016, March 17. 2013-2016 California sea lion unusual mortality event in California. Retrieved from <http://www.nmfs.noaa.gov/pr/health/mmume/californiasealions2013.htm>

Pitcher, K.W., P.F. Olesiuk, R.F. Brown, M.S. Lowry, S.J. Jeffries, J.L. Sease, W. L. Perryman, C.E. Stinchcomb, and L.F. Lowry. 2007. Status and trends in abundance and distribution of the eastern Steller sea lion (*Eumetopias jubatus*) population. Fisheries Bulletin 107: 102-115

Reeves, R.R., B.S. Stewart, P.J. Clapham, J.A. Powell. 2002. National Audubon Society: Guide to Marine Mammals of the World. Alfred A. Knopf, New York.

Stewart, B.S., B.J. Le Boeuf, P.K. Yochem, H.R. Huber, R.L. DeLong, R.J. Jameson, W. Sydeman, and S.G. Allen. 1994. History and present status of the northern elephant seal population. In: B.J. Le Boeuf and R.M. Laws (eds.) Elephant Seals. Univ. Calif. Press, Los Angeles.