

**Marine Mammal Protection Act
Incidental Harassment Authorization**

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**



To:

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

March 2019

This monitoring report covers research activities related to rocky intertidal monitoring along the Oregon and California coasts for the period of March 12, 2018 to March 11, 2019.

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, www.pacificrockyintertidal.org) and the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO, 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.

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

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 | |
| Enderts | 41.69 | -124.14257 | X | 1 | SP | X | X |
| Damnation Creek | 41.65249 | -124.12784 | X | 1 | SP | X | |
| False Klamath Cove | 41.594264 | -124.10533 | X | 1 | SP | 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 | X |
| Occulto | 34.88122 | -120.63954 | X | 2 | SP, FA | | |
| Purissima | 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 | X |
| Mussel Shoals | 34.355565 | -119.44074 | | | | X | |
| Old Stairs | 34.066224 | -118.9981 | | | | X | 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 | 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 | X |
| North Head | 33.032867 | -118.60057 | | | | X | |
| Graduation Point | 33.033274 | -118.5756 | | | | X | |
| Boy Scout Camp | 33.00112 | -118.54832 | | | | X | 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 Suckling, 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:

| Species | Authorized Take |
|---|------------------------|
| 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 March 11, 2019, our research group conducted rocky intertidal surveys at 63 sites over 88 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 | 07/16/18 | Soberanes | 0620-1000 | L | L | 0 |
| 03/26/18 | White Point | 1000-1500 | M | L | 0 | 07/17/18 | Cape Mendocino | 0630-1000 | L | L | 0 |
| 03/27/18 | Crystal Cove | 1100-1645 | L | L | 0 | 08/10/18 | Hazards | 0345-0745 | L | 0 | 0 |
| 03/28/18 | Dana Point | 1130-1730 | L | L | 0 | 08/11/18 | Point Sierra Nevada | 0515-0830 | L | 0 | 0 |
| 03/29/18 | Cabrillo I & III | 1500-1650 | L | L | 0 | 08/12/18 | Soberanes | 0615-0745 | L | 0 | 0 |
| 04/17/18 | Terrace Point | 0600-0800 | M | L | 0 | 08/13/18 | Waddell | 0620-0840 | L | 0 | 0 |
| 04/18/18 | Scott Creek | 0530-0900 | L | L | 0 | 08/15/18 | Hazards | 0710-0820 | L | 0 | 0 |
| 04/18/18 | Point Pinos | 0545-0840 | M | 0 | 0 | 09/10/18 | Waddell | 0630-0700 | L | L | 0 |
| 04/19/18 | Waddell | 0600-1130 | M | M | 0 | 09/11/18 | Soberanes | 0630-0700 | L | L | 0 |
| 04/20/18 | Soberanes | 0545-1100 | M | M | 0 | 10/09/18 | Scott Creek | 1430-1845 | M | L | 0 |
| 04/21/18 | Hopkins | 0830-1130 | L | M | 0 | 10/09/18 | Soberanes | 0410-0635 | M | L | 0 |
| 04/21/18 | Point Sierra Nevada | 0610-1215 | L | L | 0 | 10/10/18 | Terrace Point | 1530-1820 | M | L | 0 |
| 04/22/18 | Pigeon Point | 1000-1015 | L | L | 0 | 10/10/18 | Point Sierra Nevada | 0315-0545 | M | L | 0 |
| 04/22/18 | Sandhill Bluff | 1100-1200 | M | L | 0 | 10/11/18 | Sandhill Bluff | 1545-1830 | H | L | 0 |
| 04/23/18 | Carmel Point | 1045-1215 | L | L | 0 | 10/11/18 | Waddell | 1610-2050 | M | L | 0 |
| 04/24/18 | China Rocks | 1230-1415 | M | L | 0 | 10/12/18 | Pigeon Point | 1920-1950 | M | L | 0 |
| 05/02/18 | Asilomar | 0545-0735 | M | L | 0 | 10/24/18 | Sandhill Bluff | 1545-1615 | M | M | 0 |
| 05/03/18 | Soberanes | 0630-0900 | L | L | 0 | 10/24/18 | Terrace Point | 1615-1730 | M | L | 0 |
| 05/15/18 | Pescadero Point | 0545-0730 | L | L | 0 | 10/25/18 | Hopkins | 1430-1830 | M | L | 0 |
| 05/15/18 | Waddell | 0530-0945 | L | L | 0 | 11/05/18 | Point Lobos | 1300-1645 | L | L | 0 |
| 05/16/18 | Stillwater Cove | 0530-0730 | L | L | 0 | 11/06/18 | Stillwater Cove | 1230-1545 | M | L | 0 |
| 05/17/18 | Garrapata | 0545-0800 | L | L | 0 | 11/06/18 | Soberanes | 1315-1630 | M | L | 0 |
| 05/18/18 | Mill Creek | 0545-0845 | L | L | 0 | 11/07/18 | Waddell | 1245-1820 | M | M | 0 |
| 05/18/18 | Point Sierra Nevada | 0500-0945 | L | L | 0 | 11/08/18 | Point Sierra Nevada | 1330-1825 | L | L | 0 |
| 05/19/18 | Soberanes | 0630-0830 | L | M | 0 | 11/21/18 | Mill Creek | 1530-1700 | M | L | L |
| 05/19/18 | Waddell | 0615-1130 | L | L | 0 | 11/22/18 | Mill Creek | 1400-1645 | M | L | 0 |
| 05/19/18 | Andrew Molera | 0630-0840 | L | M | 0 | 11/23/18 | Harmony Headland | 1345-1515 | M | L | 0 |
| 05/20/18 | Partington Point | 0845-1030 | L | L | 0 | 11/23/18 | Vista Del Mar | 1615-1735 | M | L | L |
| 05/20/18 | Pacific Valley | 0630-0800 | L | L | 0 | 11/23/18 | Andrew Molera | 1430-1745 | M | L | L |
| 05/21/18 | Point Lobos | 0945-1230 | L | L | 0 | 11/24/18 | Piedras Blancas | 1610-1830 | M | L | 0 |
| 05/28/18 | False Klamath Cove | 0430-0930 | L | L | 0 | 11/24/18 | Point Sierra Nevada | 1345-1700 | M | M | 0 |
| 05/29/18 | Enderts | 0500-0900 | M | L | 0 | 11/25/18 | Cayucos | 1435-1800 | M | L | 0 |
| 05/30/18 | False Klamath Cove | 0515-1015 | L | L | 0 | 11/25/18 | Rancho Marino | 1900-2015 | M | L | 0 |
| 05/31/18 | Enderts | 0545-0915 | L | L | 0 | 11/26/18 | Hazards | 1410-1715 | L | L | 0 |
| 06/01/18 | Pyramis Point | 0530-0900 | L | L | 0 | 11/27/18 | Shell Beach | 1545-1815 | H | L | 0 |
| 06/02/18 | Damnation Creek | 0630-1015 | L | L | 0 | 12/04/18 | Boathouse | 1145-1600 | L | L | L |
| 06/03/18 | Launcher Beach | 0645-1200 | L | L | 0 | 12/04/18 | Waddell | 1210-1535 | M | M | 0 |
| 06/14/18 | Stornetta | 0430-0900 | M | M | 0 | 12/05/18 | Tarantulas | 1200-1700 | L | H | M |
| 06/15/18 | Sea Ranch | 0400-1130 | M | L | 0 | 12/05/18 | Soberanes | 1330-1600 | M | L | L |
| 06/16/18 | Bodega | 0530-0915 | M | L | 0 | 12/06/18 | Government Point | 1245-1705 | M | L | L |
| 06/16/18 | Point Sierra Nevada | 0500-1000 | L | L | 0 | 12/07/18 | Stairs | 1245-1745 | H | L | 0 |
| 06/17/18 | Vista Del Mar | 0500-1250 | L | L | 0 | 12/07/18 | Point Sierra Nevada | 1300-1600 | H | L | 0 |
| 06/18/18 | Santa Maria Creek | 0600-1030 | L | L | 0 | 12/08/18 | Purisima | 1740-1830 | M | 0 | 0 |
| 06/18/18 | Waddell | 0600-1015 | L | L | 0 | 12/08/18 | Occulto | 1500-1730 | M | L | 0 |
| 06/27/18 | Terrace Point | 0330-0820 | L | 0 | 0 | 12/08/18 | Waddell | 1630-1700 | L | L | 0 |
| 06/28/18 | Davenport Landing | 0345-0845 | L | L | 0 | 01/03/19 | Soberanes | 1300-1445 | M | L | 0 |
| 06/29/18 | Hopkins | 0500-0845 | L | 0 | 0 | 01/04/19 | Point Sierra Nevada | 1330-1600 | M | M | 0 |
| 06/30/18 | Pigeon Point | 0530-0830 | L | L | 0 | 01/31/19 | West Cove | 1200-1600 | M | L | M |
| 07/11/18 | Mackerricher | 1700-1730 | L | L | 0 | 01/31/19 | Waddell | 1200-1530 | M | L | 0 |
| 07/12/18 | Mackerricher | 0430-0800 | L | L | 0 | 02/01/19 | West Cove | 1330-1500 | M | L | 0 |
| 07/13/18 | Kibesillah Hill | 1000-1130 | L | L | 0 | 02/02/19 | Eel Point | 1300-1400 | H | H | M |
| 07/13/18 | Bob Creek | 0500-1000 | M | M | 0 | 02/03/19 | Boyscout Camp | 1130-1645 | L | L | 0 |
| 07/13/18 | Abalobadiah | 0445-0800 | L | L | 0 | 02/04/19 | Soberanes | 1430-1630 | M | M | L |
| 07/13/18 | Hazards | 0345-1000 | L | L | 0 | 02/17/19 | Old Stairs | 1130-1545 | M | M | 0 |
| 07/14/18 | Kibesillah Hill | 0500-1130 | L | L | 0 | 02/18/19 | Carpinteria | 1200-1745 | L | L | 0 |
| 07/14/18 | Fogarty Creek | 0500-1000 | M | M | 0 | 02/19/19 | Point Fermin | 1230-1730 | L | L | 0 |
| 07/15/18 | Cape Arago | 0615-1100 | L | M | 0 | 03/02/19 | Waddell | 1200-1620 | M | M | M |
| 07/15/18 | Mal Coombs | 0430-0930 | L | L | 0 | 03/03/19 | Point Sierra Nevada | 1245-1650 | L | L | L |
| 07/15/18 | Point Sierra Nevada | 0345-0945 | L | L | 0 | 03/04/19 | Shell Beach | 1145-1630 | L | L | 0 |
| 07/16/18 | Shelter Cove | 0545-0945 | L | L | 0 | 03/05/19 | Soberanes | 1355-1555 | M | H | L |

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, 2018 to March 11, 2019

| | | | harbor seal | | | | | | | | | | |
|--------------------|----------|-----------|-------------|----|---|----|------|---|---|---|-------|--|--|
| Site | Date | Time | adults | | | | pups | | | | Notes | | |
| | | | 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 |
| Totals | | | 67 | 71 | 0 | 87 | 1 | 0 | 0 | 0 | | | |
| Total Takes | | 87 | | | | | | | | | | | |

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)

| | | | California sea lion | | | | | | | | | | |
|---------------------|----------|----------|---------------------|---|---|---|------|---|---|---|-------|--|---|
| Site | Date | Time | adults | | | | pups | | | | Notes | | |
| | | | 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 |
| Totals | | | 8 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | | | |
| Total Takes | | 1 | | | | | | | | | | | |

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)

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

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.