

**Marine Mammal Protection Act
Incidental Harassment Authorization**

Monitoring Report

Submitted by:

**Partnership for Interdisciplinary Studies of Coastal Oceans
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To:

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

September 5, 2013

This report covers research activities related to rocky intertidal monitoring along the Oregon and California coasts for the period of December 3, 2012 to August 31, 2013.

Summary of Research Activities

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

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. The 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. Information from PISCO's research is used to inform marine policy and is made available to the public through outreach and educational programs.

MARINE is a consortium of multiple agencies, universities, and private organizations conducting long-term rocky intertidal monitoring along the west coast of the U.S. This program uses a set of standardized monitoring protocols that allows for comparisons of data over space and time. MARINE is also committed to making its findings accessible to the public.

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:

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. Mobile invertebrates are also sampled within each photoplot. 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*). Barnacle recruitment and sea surface temperature data are also collected. Community structure monitoring follows the established protocols of MARINE. For more information please visit www.marine.gov and www.pacificrockyintertidal.org.

The community structure monitoring approach is based largely on surveys that quantify the percent cover and distribution of algae and invertebrates that constitute these communities. This approach allows us to quantify both the patterns of abundance of targeted species as well as characterize changes in the communities they reside in. Such information provides managers

with insight into the causes and consequences of changes in species abundance. Such changes in species and their habitats result from both human and non-human factors and form the basis of "ecosystem-based management" of rocky intertidal communities.

Each community structure site is surveyed over a one day period during a low tide series one to two times a year. Sites, location, number of times sampled per year, and typical sampling months for each site are presented in Table 1.

Biodiversity Surveys:

Biodiversity surveys involve point contact identification along permanent transects, mobile invertebrate quadrat counts, sea star band counts, and tidal height topographic measurements. Biodiversity surveys are part of a long-term monitoring project with sites ranging from Southeast Alaska to Baja California Sur, Mexico. Biodiversity surveys are conducted every 3-5 years at established sites. In addition, biodiversity surveys are a component of our Marine Protected Area (MPA) baseline monitoring and Wave Energy Conversion Device (WECD) baseline monitoring (described below). Table 2 lists established biodiversity sites in Oregon and California. For more information on sites and protocols please visit www.pacificrockyintertidal.org.

Marine Protected Area Baseline Monitoring

In September of 2007, the state of California began establishing a network of Marine Protected Areas along the California coast as part of the Marine Life Protection Act (MLPA). Under baseline monitoring programs funded by Sea Grant and the Ocean Protection Council, PISCO established additional intertidal monitoring sites within the Central Coast (Table 3), North Central Coast (Table 4), and South Coast (Table 5) study regions. Baseline characterization of MPAs involved sampling of new sites as well as established sites both within and outside of MPAs. These sites were sampled using existing community structure and biodiversity survey protocols for consistency, and to ensure that adequate baseline data were collected both at the newly established MPAs and at appropriate reference locations. Resampling of newly established sites may take place every 5 years as part of future MPA evaluation.

Site	Latitude (dd)	Longitude (dd)	Samples/year	Sampling seasons
Ecola (Oregon)	45.91809	-123.98031	1	July
Fogarty Creek (Oregon)	44.83684	-124.05875	1	July
Bob Creek (Oregon)	44.24456	-124.11443	1	July
Cape Arago (Oregon)	43.30894	-124.40077	1	June/July
Burnt Hill (Oregon)	42.22814	-124.38786	1	May/June/July
Enderts	41.69	-124.14257	2	May/June, November/December
Damnation Creek	41.65249	-124.12784	2	May/June, November/December
False Klamath Cove	41.59476	-124.10643	2	May/June, November/December
Cape Mendocino	40.341	-124.36317	1	June/July
Shelter Cove	40.02254	-124.07366	1	June/July
Kibesillah Hill	39.60412	-123.78887	1	June/July
Stornetta	38.93787	-123.7288	1	June/July
Sea Ranch	38.7305	-123.48864	1	June/July
Bodega	38.3182	-123.07365	1	June/July
Pebble Beach	37.23263	-122.41607	1	May/June
Pigeon Point	37.18361	-122.39529	1	May
Franklin Point	37.1495	-122.36101	1	May/June
Scott Creek	37.04425	-122.23493	2	March/April, October/November
Sandhill Bluff	36.98017	-122.15503	2	March/April, October/November
Terrace Point	36.94841	-122.06457	2	March/April, October/November
Hopkins	36.6212	-121.9073	2	March/April, October/November
Point Piños	36.63796	-121.93758	1	May
China Rocks	36.60616	-121.95939	1	May
Pescadero Point	36.56109	-121.95436	1	May
Stillwater	36.56087	-121.94053	2	March/April, October/November
Carmel Point	36.54376	-121.93412	1	May/June
Point Lobos	36.51366	-121.94688	2	March/April, October/November
Mal Paso	36.47994	-121.93913	2	March/April, October/November
Garrapata	36.46904	-121.93444	1	May
Soberanes	36.44787	-121.92874	1	May/June
Andrew Molera	36.28061	-121.86317	2	March/April, October/November
Partington Cove	36.17376	-121.69653	1	May/June
Mill Creek	35.97965	-121.49034	2	March/April, October/November
Pacific Valley	35.94705	-121.48053	1	May/June
Point Sierra Nevada	35.72883	-121.31866	2	March/April, October/November
Piedras Blancas Lighthouse	35.66493	-121.28699	2	March/April, October/November
Vista Del Mar	35.60414	-121.14232	2	March/April, October/November
Rancho Marino Reserve	35.52244	-121.073	2	March/April, October/November
Harmony Headlands	35.47448	-121.01707	2	March/April, October/November
Cayucos	35.44739	-120.94982	2	March/April, October/November
Hazard's	35.28966	-120.88325	2	March/April, October/November
Shell Beach	35.16881	-120.69668	2	March/April, October/November
Occulto	34.88122	-120.63954	2	March/April, October/November
Purisima	34.7556	-120.64076	2	February, October/November
Stairs	34.73038	-120.61546	2	March/April, October/November
Boathouse	34.55388	-120.61167	2	March/April, October/November
Government Point	34.44334	-120.45655	2	March/April, October/November

Table 1. UCSC Community Structure monitoring sites, location, sampling frequency, and months sampled

Site	Latitude (dd)	Longitude (dd)	Site	Latitude (dd)	Longitude (dd)
Ecola	45.91809	-123.98031	Hazards	35.28966	-120.88325
Cape Meares (new)	45.47177	-123.97214	Diablo	35.22665	-120.87367
Fogarty Creek	44.83684	-124.05875	Shell Beach	35.169167	-120.69639
Seal Rock (new)	44.49944	-124.08438	Stairs	34.730556	-120.61528
Bob Creek	44.24456	-124.11443	Lompoc Landing	34.7188	-120.6088
Cape Arago	43.30894	-124.40077	Boat House	34.554167	-120.61139
Coquille Point (new)	43.11492	-124.43859	Government Point	34.44334	-120.45655
Burnt Hill	42.22814	-124.38786	Alegria	34.467222	-120.27806
Damnation Creek	41.653	-124.12983	Arroyo Hondo	34.473611	-120.14444
Cape Mendocino	40.340833	-124.36306	Coal Oil Point	34.406667	-119.8775
Shelter Cove	40.030556	-124.07917	Carpinteria	34.38703	-119.51407
Kibesillah	39.604014	-123.78871	Mussel Shoals	34.355278	-119.44028
Point Arena	38.943371	-123.73301	Old Stairs	34.06626	-118.99805
Stornetta Ranch	38.937867	-123.72888	Deer Creek (new)	34.060685	-118.98221
Moat Creek	38.880915	-123.67475	Sequit Point	34.043235	-118.937
Saunders Reef	38.86138	-123.65361	Lechuza Point	34.034458	-118.86179
Del Mar Landing	38.740513	-123.51086	Point Dume (new)	34.000357	-118.80703
Sea Ranch	38.730278	-123.4875	Paradise Cove	34.012222	-118.7925
Phillips Gulch	38.585852	-123.34147	Whites Point	33.71578	-118.31993
Gerstle Cove	38.566136	-123.32919	Point Fermin	33.706944	-118.28611
Windermere Point	38.523943	-123.26747	Buck Gully South	33.588246	-117.86736
North Jenner Beach	38.456176	-123.14244	Crystal Cove	33.570833	-117.83778
Bodega	38.3175	-123.07278	Muddy Canyon (new)	33.565763	-117.83314
Horseshoe Cove (new 2012)	56.986613	-135.37755	Shaw's Cove	33.544722	-117.79944
Bodega Head	38.303158	-123.05261	Heisler Park	33.542594	-117.78928
Chimney Rock	37.99383	-122.96729	Dana Point	33.46	-117.71417
Santa Maria Creek	38.012222	-122.84889	Scripps	32.871389	-117.25306
Bolinas Point	37.90453	-122.72733	La Jolla Caves	32.848614	-117.26535
Bolinas Point Wreck	37.902617	-122.7242	Cabrillo Zone I	32.669167	-117.24528
Alder Creek	37.89758	-122.71071	Cabrillo Zone III	32.665833	-117.24417
Mussel Flat Farallones	37.6959	-123.0029	Cuyler Harbor SMI	34.048333	-120.33556
Alcatraz Island	37.82515	-122.42197	Crook Point SMI	34.021944	-120.37889
Fitzgerald Marine Reserve	37.521667	-122.51667	Fossil Reef SRI	33.993333	-120.23806
Pigeon Point	37.185278	-122.39694	NW Talcott SRI	34.008056	-120.21361
Año Nuevo	37.1126	-122.32957	East Point SRI	33.9417	-119.9679
Scott Creek	37.045278	-122.23694	Ford Point SRI	33.914722	-120.05056
Davenport Landing	37.0223	-122.21537	Johnsons Lee SRI	33.908889	-120.08667
Sandhill Bluff	36.980556	-122.155	Trailer SCI	34.051944	-119.90306
Wilder Ranch	36.956083	-122.10405	Fraser SCI	34.0625	-119.91944
Terrace Point	36.947778	-122.06472	Forney SCI	34.056389	-119.92222
Natural Bridges	36.949033	-122.06113	Prisoners SCI	34.02	-119.68694
Hopkins	36.621111	-121.90694	Willows SCI	33.961944	-119.755
Point Piños	36.63796	-121.93758	Valley SCI	33.983889	-119.66583
Asilomar	36.6296	-121.93852	Cat Rock AI	34.01	-119.4187
China Rocks	36.60567	-121.95975	Middle AI	34.00593	-119.39648
Stillwater Cove	36.561111	-121.94028	Frenchys Cove AI	34.0066	-119.4109
Point Lobos	36.5132	-121.94433	Thousand Springs SNI	33.28505	-119.52983
Garrapata	36.4689	-121.93434	Tranquility Beach SNI	33.265668	-119.4921
Andrew Molera	36.280556	-121.86306	Marker Poles SNI	33.218683	-119.49562
Partington Cove	36.173833	-121.6966	Landing Cove SBI	33.481667	-119.02944
Lucia	36.014383	-121.5405	Sea Lion Rookery SBI	33.471944	-119.03083
Mill Creek	35.979722	-121.49056	Bird Rock CI	33.451667	-118.4875
Duck Pond	35.85942	-121.42263	Big Fisherman Cove CI	33.446447	-118.48526
Point Sierra Nevada	35.730833	-121.32389	Goat Harbor CI	33.416797	-118.39407
Piedras Blancas	35.66568	-121.28653	Little Harbor CI	33.385	-118.47528
San Simeon Point	35.63485	-121.19577	Boy Scout Camp SCLI	33.00112	-118.54832
Vista del Mar	35.60434	-121.14227	Eel Point SCLI	32.918007	-118.54668
Rancho Marino	35.540283	-121.09283	West Cove, SCLI (new)	33.014938	-118.60614
Cayucos	35.44748	-120.9501			

Table 2. Biodiversity Survey sites and locations in Oregon and California

Site	Latitude (dd)	Longitude (dd)
Point Arena	38.9433714	-123.73301
Moat Creek	38.8809149	-123.67475
Saunders Reef	38.8613795	-123.65361
Del Mar Landing	38.7405128	-123.51086
Phillips Gulch	38.5858523	-123.34147
Gerstle Cove	38.5661362	-123.32919
Windermere Point	38.5239429	-123.26747
North Jenner Beach	38.4561761	-123.14244
Bodega Head	38.3031581	-123.05261
Chimney Rock	37.9938296	-122.96729

Table 3. North Central Coast MPA Baseline Monitoring Program sites

Site	Latitude (dd)	Longitude (dd)
Davenport Landing	37.0223	-122.21537
Wilder Ranch	36.956083	-122.10405
Natural Bridges	36.949033	-122.06113
Point Piños	36.63796	-121.93758
China Rocks	36.60567	-121.95975
Pescadero Point	36.56109	-121.95436
Garrapata	36.46904	-121.93444
Duck Pond	35.85942	-121.42263
Piedras Blancas	35.66568	-121.28653
San Simeon Point	35.63485	-121.19577
Vista del Mar	35.60434	-121.14227
Diablo	35.22665	-120.87367

Table 4. Central Coast MPA Baseline Monitoring Program sites

Site	Latitude (dd)	Longitude (dd)
Ellwood	34.4347	-119.949
Point Vicente	33.741	-118.4115
Abalone Cove	33.7379	-118.3758
Cardiff Reef	32.8476	-117.279
Wind and Sea	32.8142	-117.2733
Sea Ridge	32.6829	-117.2496
Navy North	32.6829	-117.2496

Table 5. South Coast MPA Baseline Monitoring Program sites

Intertidal Recruitment monitoring:

Intertidal recruitment monitoring collects data on invertebrate larval recruitment. Mussel and other bivalve recruits are collected in Tuffies (mesh pot-scrubbers) bolted into the substrate. Barnacle recruits and cyprids are collected on PVC plates covered in Safetywalk (non-slip tape) and bolted to the substrate. Both Tuffies and barnacle plates are collected once a month and processed in the lab. Recruitment monitoring helps to quantify larval input into the intertidal environment. Long-term quantification of recruitment allows us to distinguish long-term trends from natural annual and seasonal variability. Intertidal recruitment monitoring is currently conducted on a monthly basis at two central California sites, Terrace Point and Hopkins (Table 6).

Ocean Acidification:

The Ocean Margin Ecosystems Group for Acidification Studies (OMEGAS) is a National Science Foundation funded project that involves research at eight sites along the California Current Upwelling System. Our group is responsible for research at three sites located in the Monterey Bay region of mainland California (Table 6). The intention of this project is to monitor oceanic pH on large spatial and temporal scales and to determine if any relationship exists between changing ocean chemistry and the state of intertidal calcifying organisms. The project involves field experiments as well as lab studies. The field component entails intertidal and moored pH sensors, dissolved oxygen readings, temperature, bi-monthly water samples (nutrients, chlorophyll a, dissolved inorganic carbon, salinity, and alkalinity), and mussel growth plots. Currently these sites are visited 2-3 times per month for sampling and equipment maintenance.

Site	Latitude (dd)	Longitude (dd)
Terrace Point	36.94841	-122.06457
Hopkins	36.6212	-121.9073
Soberanes (added 2013)	36.44787	-121.92874

Table 6. Intertidal Recruitment and Ocean Acidification monitoring sites and location

Wave Energy Conversion Device Baseline Project:

During the summer of 2013 our research group sampled eight sites along the Oregon coast using a combination of community structure and biodiversity survey methods. This sampling will be used to establish a biological baseline prior to the proposed installation of several Wave Energy Conversion Device (WECD) arrays along the Oregon coastline. This baseline will be used to assess the effects of WECDs on near-shore communities. Sampling occurred at five existing Oregon sites and at three additional sites established in summer 2013 (Table 7).

Site	Latitude (dd)	Longitude (dd)
Ecola	45.91810194	-123.9805046
Cape Meares (new 2013)	45.47177	-123.97214
Fogarty Creek	44.83708449	-124.0577834
Seal Rock (new 2013)	44.49944	-124.08438
Bob Creek	44.2446404	-124.1143035
Cape Arago	43.30891446	-124.4005323
Coquille Point (new 2013)	43.11492	-124.43859
Burnt Hill	42.22819108	-124.3879989

Table 7. Oregon Wave Energy Conversion Device baseline monitoring sites

Summary of Incidental Take Authorization

Research activities take place in the rocky intertidal throughout the year. Most sampling occurs over a one day (2-6 hours) period during a low tide series. Sites range from northern Oregon to the California/Mexico border. Within this area the following marine mammals may be found hauled-out at or adjacent to 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

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

For the period of December 3, 2012 to December 2, 2013 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>)	56
Pacific harbor seal (<i>Phoca vitulina richardii</i>)	487
Northern elephant seal (<i>Mirounga angustirostris</i>)	30

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

Monitoring Results

For the period of December 3, 2012 to August 31, 2013 our research group conducted rocky intertidal sampling at 73 sites during 79 days (Table 8). Marine mammal observations and disturbances are detailed in Table 9 (harbor seals), Table 10 (California sea lions), and Table 11 (northern elephant seals).

All takes were Level B harassment only.

Actual take of harbor seals was well below authorized limits. This was largely due to an alternative access route at Hopkins which allowed researchers to access the site downcoast of a beach where a large group of harbor seals (~20 adults and pups) is regularly hauled-out. This access point was established in fall 2012 and has considerably reduced the number of takes at this site from what had been anticipated. Takes at Hopkins did occur on several occasions when harbor seals were hauled-out on the site. Additional takes occurred at Stillwater Cove, Piedras Blancas, Bodega, and Shelter Cove (Table 9).

Actual take of California sea lions was slightly above authorized limits. This was due to a flushing event at Bird Rock, Catalina Island. A large group of adults flushed to the water as the site was accessed by boat. The flushed sea lions observed researchers from the water before hauling-out south of the site. Additional sea lions, hauled-out south of the site, reacted to and observed researchers but did not flush to the water. Additional takes occurred at Cape Arago and along the beach just south of Old Stairs (Table 10).

All take of northern elephant seals occurred during a one day period at Piedras Blancas. These takes were level 1 with elephant seals observing researchers but not flushing (Table 11).

During this time period no injured, stranded, or dead pinnipeds were observed, nor were there any unusual behaviors prior to or following any takes. Surrounding waters were scanned for predators prior to intentional flushing and no predators were ever observed. There were no observations or takes of Steller sea lions.

Date	Site	Time	Swell	Wind	Rain	Date	Site	Time	Swell	Wind	Rain
12/11/2012	False Klamath Cove	1330-1645	H	L	M	4/28/2013	Pacific Valley	0515-0715	L	L	0
12/12/2012	Damnation Creek	1400-1710	H	M	0	4/28/2013	Cayucos	0645-1100	L	L	0
12/13/2012	Enderets	1445-1730	M	L	0	4/28/2013	Rancho Marino	0420-0545	L	L	0
12/26/2012	Terrace Pt.	1445-1545	H	M	M	4/29/2013	Andrew Molera	0630-0930	L	L	0
1/7/2013	La Jolla Caves	1045-1430	ND	ND	ND	4/29/2013	Hazarads	0610-1200	L	L	0
1/7/2013	West Cove SCLI	1415-1510	ND	ND	ND	4/29/2013	Eel Pt. SCLI	0600-0930	M	L	0
1/8/2013	La Jolla Caves	1045-1430	ND	ND	ND	4/29/2013	Soberanes	0630-1200	L	L	0
1/8/2013	West Cove SCLI	0945-1620	ND	ND	ND	4/30/2013	Piedras Blancas	1000-1200	L	L	L
1/9/2013	Cabrillo Zone I	1100-1630	ND	ND	ND	4/30/2013	Garrapata	0700-1000	H	L	0
1/9/2013	West Cove SCLI	1100-1600	ND	ND	ND	4/30/2013	Vista del Mar	0635-0910	L	L	L
1/10/2013	Boy Scout Camp SCLI	1100-1700	M	H	0	4/30/2013	Hopkins	0720-1120	M	L	0
1/10/2013	Cabrillo Zone I	1230-1530	ND	ND	ND	5/1/2013	Scott Creek	0745-1020	M	M	0
1/11/2013	Eel Pt. SCLI	1200-1700	M	L	0	5/1/2013	China Rocks	0800-1000	M	L	0
1/11/2013	Scripps	1230-1730	ND	ND	ND	5/2/2013	Pt. Lobos	0930-1115	L	L	0
1/12/2013	Eel Pt. SCLI	1200-1600	M	L	0	5/9/2013	Terrace Pt.	0630-0730	L	L	0
1/12/2013	Scripps	1300-1700	ND	ND	ND	5/10/2013	Hopkins	0650-0800	L	L	0
1/13/2013	Boy Scout Camp SCLI	1400-1700	L	L	0	5/11/2013	Soberanes	0645-0845	L	L	0
1/22/2013	Sequit Pt	0800-1530	ND	ND	ND	5/24/2013	False Klamath Cove	0530-0950	M	L	0
1/23/2013	Lechuza Pt.	1100-1300	ND	ND	ND	5/24/2013	False Klamath Cove	0500-0950	M	L	0
1/24/2013	Paradise Cove	1100-1430	ND	ND	ND	5/25/2013	Scott Creek	0545-0830	L	M	0
1/25/2013	Point Dume	1245-1545	ND	ND	ND	5/25/2013	Damnation Creek	0545-1000	L	L	0
1/25/2013	Terrace Pt.	1530-1630	L	L	0	5/26/2013	Pigeon Pt	0515-0930	L	L	0
1/26/2013	Deer Creek	1345-1715	ND	ND	ND	5/26/2013	Enderets	0545-0945	L	L	L
1/27/2013	Old Stairs	1315-1730	ND	ND	ND	5/27/2013	Burnt Hill	0600-1100	L	M	M
2/5/2013	Heisler Park	0945-1415	ND	ND	ND	5/27/2013	Carmel Pt.	0540-0915	L	L	0
2/6/2013	Heisler Park	0930-1100	ND	ND	ND	5/28/2013	Burnt Hill	0600-1100	L	L	L
2/7/2013	Dana Point	1000-1515	ND	ND	ND	5/28/2013	Pt. Pinos	0530-0730	L	L	0
2/7/2013	Purisima	1245-1400	M	L	0	5/28/2013	Pescadero Pt.	0800-0940	L	L	0
2/9/2013	Muddy Canyon	1200-1600	ND	ND	ND	5/29/2013	Sand Hill	0730-1000	M	L	0
2/10/2013	Buck Gully South	1230-1715	ND	ND	ND	5/29/2013	Burnt Hill	0600-1200	L	L	0
2/11/2013	Hopkins	1450-1630	M	L	0	6/10/2013	Hopkins	0630-0800	L	L	0
2/11/2013	Terrace Pt.	1620-1745	M	L	0	6/11/2013	Eel Pt. SCLI	0545-0800	L	L	0
2/21/2013	Big Fisherman Cove CI	1030-1345	L	L	0	6/11/2013	Soberanes	0645-0815	L	L	0
2/22/2013	Avalon Quarry CI	1145-1600	L	L	0	6/12/2013	West Cove SCLI	0545-0800	L	L	0
2/23/2013	Goat Harbor CI	1145-1430	L	L	0	6/12/2013	Terrace Pt.	0710-0800	L	L	0
2/24/2013	Two Harbors CI	1200-1500	L	L	0	6/22/2013	Sea Ranch	0430-1030	L	L	M
2/25/2013	Bird Rock CI	1215-1600	L	L	0	6/22/2013	Bodega	0445-0900	L	L	0
3/6/2013	Thousand Springs SNI	1145-1500	L	L	0	6/23/2013	Stornetta	0415-0930	L	L	L
3/6/2013	Shell Beach	1035-1505	M	L	M	6/24/2013	Kibesillah Hill	0545-0930	L	L	L
3/6/2013	Terrace Pt.	1100-1300	M	L	0	6/24/2013	Hopkins	0620-0820	L	L	0
3/7/2013	Tranquility Beach SNI	1000-1345	L	L	0	6/25/2013	Shelter Cove	0550-0940	L	L	M
3/7/2013	Oculito	1045-1500	M	M	M	6/25/2013	Soberanes	0640-0840	L	L	0
3/8/2013	Stairs	1045-1600	M	M	L	6/26/2013	Cape Mendocino	0715-1100	M	L	L
3/8/2013	Soberanes	1300-1430	M	L	0	6/27/2013	Cape Arago	0630-1300	H	L	0
3/9/2013	Marker Poles SNI	1100-1500	H	H	0	6/28/2013	Cape Arago	0700-1300	M	L	0
3/9/2013	Boat House	1115-1645	M	M	0	7/8/2013	Hopkins	0645-0845	M	L	0
3/9/2013	Hopkins	1300-1400	L	L	0	7/9/2013	Soberanes	0615-0715	L	M	0
4/1/2013	Franklin Point	0845-1030	M	L	L	7/10/2013	Terrace Pt.	0630-0830	L	L	0
4/1/2013	Soberanes	0800-1045	L	L	L	7/19/2013	Seal Rock	0530-0830	L	L	0
4/1/2013	Soberanes	0740-1110	M	L	L	7/20/2013	Bob Creek	0500-1000	M	M	0
4/2/2013	Hopkins	0945-1330	L	L	0	7/20/2013	Seal Rock	0530-0930	M	L	0
4/2/2013	Pebble Beach	0900-1115	M	L	0	7/21/2013	Fogarty Creek	0530-1000	L	L	0
4/3/2013	Terrace Pt.	1015-1215	M	L	0	7/21/2013	Seal Rock	0515-0930	M	L	0
4/4/2013	Terrace Pt.	1200-1330	L	L	0	7/22/2013	Fogarty Creek	0515-1200	L	L	0
4/11/2013	Terrace Pt.	0610-0740	L	L	0	7/23/2013	Fogarty Creek	0545-0930	L	L	0
4/12/2013	Hopkins	0630-0830	M	L	0	7/23/2013	Cape Meares	0515-1150	L	L	0
4/13/2013	Soberanes	0645-0745	L	M	0	7/24/2013	Ecola	0600-1145	L	L	0
4/26/2013	Stillwater Cove	0530-0830	L	L	0	7/24/2013	Cape Meares	0500-1100	L	L	0
4/27/2013	Mill Creek	0545-0830	L	L	0	8/9/2013	Soberanes	0630-0900	L	L	0
4/27/2013	Pt. Sierra Nevada	0500-1145	L	L	0	8/18/2013	Coquille Pt.	0600-0800	L	L	0
4/27/2013	West Cove SCLI	0600-0930	L	0	0	8/19/2013	Coquille Pt.	0500-0800	L	L	0
4/28/2013	West Cove	0600-0945	L	L	0	8/20/2013	Coquille Pt.	0400-0800	L	L	0
4/28/2013	Partington Cove	0800-1015	L	L	0	8/21/2013	Bob Creek	0600-1030	M	L	0

Table 8. Field sampling dates, sites, and times as well as physical conditions noted during sampling (0-none, L-low, M-moderate, H-high, ND-no data available)

Date	Site	Time	harbor seal									Explanation	
			pups			adults							
			0	1	2	3	1	2	3				
2/11/2013	Hopkins	1450	20										Large group hauled-out on small beach upcoast of site, adults and pups
3/9/2013	Marker Poles SNI	1000	10										Adults and pups observed on beaches below access way to site
3/9/2013	Hopkins	1300	20										Large group hauled-out on small beach upcoast of site, adults and pups
4/2/2013	Hopkins	945	20										Large group hauled-out on small beach upcoast of site, adults and pups
4/2/2013	Pebble Beach	900	15										Adults hauled-out downcoast of site
4/2/2013	Hopkins	900	20										Large group hauled-out on small beach upcoast of site, adults and pups
4/12/2013	Hopkins	630	20										Large group hauled-out on small beach upcoast of site, adults and pups
4/26/2013	Stillwater Cove	530						4					Hauled-out adjacent to site, observed researchers but did not flush
4/28/2013	Cayucos	645	14										Adults hauled-out on rocks offshore of site
4/30/2013	Piedras Blancas	1000								3			Hauled-out on site. Intentionally flushed from plot
4/30/2013	Hopkins	720	20										Large group hauled-out on small beach upcoast of site, adults and pups
5/10/2013	Hopkins	730				2				2			Hauled-out on site, flushed to water as researchers approached
5/10/2013	Hopkins	650	20										Large group hauled-out on small beach upcoast of site, adults and pups
5/24/2013	False Klamath Cove	530	1										Adult in water offshore of site
5/28/2013	Point Pinos	530	4										Adults hauled-out upcoast of site
6/10/2013	Hopkins	630	20										Large group hauled-out on small beach upcoast of site, adults and pups
6/22/2013	Bodega	600							4				Hauled-out on bench just downcoast of site. Reacted to researchers but did not flush to water
6/22/2013	Bodega	600								5			Hauled-out on bench just downcoast of site, flushed to water
6/22/2013	Bodega	800						9					Hauled-out on bench just downcoast of site, observed researchers but did not flush
6/24/2013	Kibesillah Hill	600	10										Adults hauled-out upcoast and downcoast of site
6/24/2013	Hopkins	620	20										Large group hauled-out on small beach upcoast of site, adults and pups
6/24/2013	Hopkins	630								5			Hauled-out on site, flushed to water as researchers approached
6/25/2013	Shelter Cove	630								3			Hauled-out on site, flushed to water as researchers approached
7/8/2013	Hopkins	645	20										Large group hauled-out on small beach upcoast of site, adults and pups
Totals			254	0	0	2	13	4	18				
Total Takes			37										

Table 9. 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)

Date	Site	Time	California sea lion									Explanation	
			pups			adults							
			0	1	2	3	1	2	3				
12/11/2012	False Klamath Cove	1330	1										Adult in water offshore of site
1/27/2013	Old Stairs	1300				2							Hauled-out on rip-rap on approach to site, were accidentally flushed as researchers passed by
2/25/2013	Bird Rock CI	1200							20				Large group south of site reacted to researchers accessing site but did not flush
2/25/2013	Bird Rock CI	1200									40		Large group flushed to the water as researchers accessed the site by boat
3/9/2013	Marker Poles SNI	1000	200+										Adults and pups observed on beaches below access way to site
4/30/2013	Piedras Blancas	1000	25										Adults hauled-out on offshore rocks
6/27/2013	Cape Arago	630	2										Two adult females observed on bench prior to researchers accessing site
6/27/2013	Cape Arago	700									1		One adult male flushed by researchers while accessing site
6/28/2013	Cape Arago	900									1		Adult male in water attempted to haul-out on bench while researchers were sampling
Totals			228+	0	0	2	0	20	42				
Total Takes			64										

Table 10. 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							
			pups			adult				
Date	Site	Time	0	1	2	3	1	2	3	Explanation
3/7/2013	Tranquility Beach SNI	930	50							About 50 weaned pups* observed on beach along access way to site
3/9/2013	Marker Poles SNI	1000	200+							Adults and pups observed on beaches below access way to site
4/30/2013	Piedras Blancas	1000					19			Sub-adults* in channels adjacent to site, observed researchers but did not flush
4/30/2013	Piedras Blancas	1000					1			Adult female in channel adjacent to site, observed researchers but did not flush
Totals			250+	0	0	0	20	0	0	
Total Takes		20								

Table 11. 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)

* weaned pups = 2-3 months old, sub-adults = 1-2 years old