Marine Mammal Protection Act

Letter of Authorization

Draft Monitoring Report

2022-2023

Submitted by:

Partnership for Interdisciplinary Studies of Coastal Oceans
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Center for Ocean Health
115 McAllister Way
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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

August 2023

Contents

Summary of Research Activities

This monitoring report covers research activities related to rocky intertidal monitoring along the Oregon and California coasts for the period of August 1, 2022 to July 31, 2023.

Our research group at UC Santa Cruz operates in collaboration with two large-scale marine research programs: the Multi-Agency Rocky Intertidal Network (MARINe, marine.ucsc.edu) 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 in Oregon and California along the west coast of North America. This program uses a set of standardized monitoring protocols that allow for comparisons of data over space and time. MARINe is committed to making its findings accessible to policymakers and the public.

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 also made available to the public through 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. 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 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) (Figure 2). 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 marine.ucsc.edu/methods/).

Community structure monitoring surveys are conducted over a one-day period during a low tide series one to two times each year. There are 48 community structure survey sites in Oregon and California. Site locations, survey frequency, and survey seasons are shown in Table 1.

Biodiversity Surveys

Biodiversity surveys complement the community structure monitoring approach and provide greater information on species composition 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 (Figure 1). 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) evaluation and MARINe. Table 1 lists the 143 biodiversity survey sites in Oregon and California. Note that many biodiversity sites are also community structure sites (for more information on sites and protocols please visit marine.ucsc.edu/methods/).

Data from these long-term monitoring projects provide important information about the structure and dynamics of rocky intertidal communities. This information has been used for the design and evaluation of MPAs, listing and management of endangered species, natural resource damage assessments (NRDA), fisheries management, and tracking and understanding marine disease events.

All research activities take place in the rocky intertidal, on large bedrock benches or boulders, from the high intertidal zone to the low intertidal zone. Surveys are typically done with 3-6 people over a 4-6-hour period during a negative low tide. Biodiversity surveys encompass 20 or 30 meters of shoreline and extend from the high intertidal to the water's edge (at low tide), a width that ranges from 5 to 100+ meters depending on the site (Figure 1). Community structure plots are typically spread out over 50 to 100+ meters of shoreline and from the high intertidal to the low intertidal (Figure 2). Community structure photoplots, plots, transects, and biodiversity survey grids are marked with permanent bolts. Bolts are 2" to 5" long, stainless steel 3/8" Hex or Carriage bolts. They are installed by drilling a hole with a battery powered 24v rotary hammer drill with a 3/8" bit. The bolts protrude ½"-3" above the rock surface and are held in place with marine epoxy. Other sampling equipment, including temperature loggers, is attached to the rock with ¼" stainless steel lag screws anchored with concrete wall anchors.

Table 1. UCSC rocky intertidal monitoring sites in Oregon and California with locations, survey type (community structure, biodiversity), community structure survey frequency, and survey seasons. Sample Season: SP=March, April, May; SU=June, July, August; FA= October, November, December.

Site	State	Latitude	Longitude	Community Structure	CS Surveys/Year	CS Survey Season	Biodiversity Survey
Ecola	OR	45.91809	-123.98031	X	1	SU	X
Cape Meares	OR	45.471788	-123.97204				X
Roads End	OR	45.025747	-124.01265				X
Fogarty Creek	OR	44.83864	-124.05875	X	1	SU	X
Otter Rock	OR	44.752715	-124.06606				X
Seal Rock	OR	44.499939	-124.08437				X
Bob Creek	OR	44.24456	-124.11443	X	1	SU	X
Cape Arago	OR	43.30894	-124.40077	X	1	SU	X
Coquille Point	OR	43.114718	-124.43851				X
Burnt Hill	OR	42.22814	-124.38786	X	1	SU	X
Pyramid Point	CA	41.989841	-124.2093				X
Point Saint George	CA	41.784644	-124.25513				X
Enderts	CA	41.69	-124.14257	X	1	SP	X
Damnation Creek	CA	41.65249	-124.12784	X	1	SP	X
False Klamath Cove	CA	41.594264	-124.10533	X	1	SP	X
Launcher Beach	CA	41.057155	-124.14532				X
Old Home Beach	CA	41.055273	-124.13683				X
Cape Mendocino	CA	40.341	-124.36317	X	1	SU	X
Shelter Cove	CA	40.02254	-124.07366	X	1	SU	X
Mal Coombs	CA	40.021697	-124.06825				X
Kibesillah Hill	CA	39.60412	-123.78887	X	1	SU	X
Abalobadiah Creek	CA	39.56906	-123.77182				X
MacKerricher	CA	39.4826	-123.80359				X
Fort Bragg	CA	39.4392	-123.81841				X
Stornetta	CA	38.93787	-123.7288	X	1	SU	X
Moat Creek	CA	38.880915	-123.67475				X
Saunders Reef	CA	38.86138	-123.65361				X
Del Mar Landing	CA	38.740513	-123.51086				X
Sea Ranch	CA	38.7305	-123.48864	X	1	SU	X
Stewarts Point	CA	38.61364	-123.36753				X
Phillips Gulch	CA	38.585852	-123.34147				X
Gerstle Cove	CA	38.566136	-123.32919				X
Windermere Point	CA	38.523943	-123.26747				X
North Jenner Beach	CA	38.456176	-123.14244				X
Bodega	CA	38.3182	-123.07365	X	1	SU	X
Horseshoe Cove	CA	38.316439	-123.0721				X
Bodega Head	CA	38.3104	-123.0824				X

Santa Maria Creek	CA	38.012429	-122.84915				X
Chimney Rock	CA	37.99383	-122.96729				X
Bolinas Point	CA	37.903537	-122.72721				X
Bolinas Point Wreck	CA	37.902617	-122.7242				X
Alder Creek; Duxbury	CA	37.897426	-122.71069				X
Slide Ranch	CA	37.874061	-122.60094				X
Alcatraz	CA	37.825	-122.42194				X
Mussel Flat Farallones	CA	37.6959	-123.0029				X
Fitzgerald Marine Reserve	CA	37.521647	-122.51679				X
Pebble Beach	CA	37.23263	-122.41607	X	1	SP	
Pigeon Point	CA	37.18361	-122.39529	X	1	SP	X
Franklin Point	CA	37.1495	-122.36101	X	1	SP	
Ano Nuevo	CA	37.11257	-122.32956				X
Scott Creek	CA	37.04425	-122.23493	X	2	SP, FA	X
Davenport Landing	CA	37.02208	-122.21538				X
Sandhill Bluff	CA	36.98017	-122.15503	X	2	SP, FA	X
Wilder Ranch	CA	36.94915	-122.10383				X
Natural Bridges	CA	36.94915	-122.06107				X
Terrace Point	CA	36.94841	-122.06457	X	2	SP, FA	X
Point Pinos	CA	36.63796	-121.93758	X	2	SP, FA	X
Asilomar	CA	36.6296	-121.93852	X	1	SP	X
Hopkins	CA	36.6212	-121.9073	X	2	SP, FA	X
China Rocks	CA	36.60616	-121.95939	X	1	SP	X
Pescadero Point	CA	36.56109	-121.95436	X	1	SP	
Stillwater	CA	36.56087	-121.94053	X	2	SP, FA	X
Carmel Point	CA	36.54376	-121.93412	X	1	SP	
Point Lobos	CA	36.51366	-121.94688	X	2	SP, FA	X
Mal Paso	CA	36.47994	-121.93913	X	2	SP, FA	
Garrapata	CA	36.46904	-121.93444	X	1	SP	X
Soberanes	CA	36.44787	-121.92874	X	1	SP	
Andrew Molera	CA	36.28061	-121.86317	X	2	SP, FA	X
Partington Cove	CA	36.17376	-121.69653	X	1	SP	X
Lucia	CA	36.014383	-121.5405				X
Mill Creek	CA	35.97965	-121.49034	X	2	SP, FA	X
Pacific Valley	CA	35.94705	-121.48053	X	1	SP	
Duck Pond	CA	35.85918	-121.42249				X
Point Sierra Nevada	CA	35.72883	-121.31866	X	2	SP, FA	X
Piedras Blancas	CA	35.66493	-121.28699	X	2	SP, FA	X
San Simeon Point	CA	35.63455	-121.19562				X
Vista del Mar	CA	35.60414	-121.14232	X	2	SP, FA	X

Rancho Marino; Cambria	CA	35.52244	-121.073	X	2	SP, FA	X
Harmony Headlands	CA	35.47448	-121.01707	X	1	FA	
Cayucos	CA	35.44739	-120.94982	X	2	SP, FA	X
Hazards	CA	35.28966	-120.88325	X	2	SP, FA	X
Diablo	CA	35.22691	-120.87428				X
Shell Beach	CA	35.16881	-120.69668	X	2	SP, FA	X
Occulto	CA	34.88122	-120.63954	X	2	SP, FA	
Purisima	CA	34.7556	-120.64076	X	2	SP, FA	
Stairs	CA	34.73038	-120.61546	X	2	SP, FA	X
Lompoc Landing	CA	34.719057	-120.6088				X
Boat House	CA	34.55388	-120.61167	X	2	SP, FA	X
Taratnutulas	CA	34.4946	-120.4956				X
Arroyo Hondo	CA	34.473308	-120.14539				X
Alegria	CA	34.467137	-120.27818				X
Government Point	CA	34.44334	-120.45655	X	2	SP, FA	X
Ellwood	CA	34.435194	-119.93078				X
Coal Oil Point	CA	34.40686	-119.87829				X
Carpinteria	CA	34.387037	-119.51408				X
Mussel Shoals	CA	34.355565	-119.44074				X
Old Stairs	CA	34.066224	-118.9981				X
Fraser Cove	CA	34.062645	-119.91905				X
Deer Creek	CA	34.060685	-118.98221				X
Forney	CA	34.056485	-119.92204				X
Trailer	CA	34.051821	-119.90344				X
Cuyler Harbor	CA	34.048612	-120.33642				X
Orizaba Cove	CA	34.0447521	-119.72299				X
Sequit Point	CA	34.043235	-118.937				X
Lechuza Point	CA	34.034458	-118.86179				X
Pelican Bay	CA	34.0312548	-119.69871				X
Crook Point	CA	34.022067	-120.37924				X
Prisoners Harbor	CA	34.020197	-119.68663				X
Paradise Cove	CA	34.012005	-118.79214				X
NW Talcott	CA	34.008386	-120.21368				X
S Frenchys Cove	CA	34.006553	-119.41104				X
Middle West	CA	34.005841	-119.39643				X
Cat Rock	CA	34.005599	-119.41941				X
Point Dume	CA	34.000357	-118.80703				X
Fossil Reef	CA	33.993295	-120.23813				X
Valley	CA	33.983724	-119.66588				X
Willows Anchorage	CA	33.961885	-119.75493				X

East Point	CA	33.9427	-119.96793				X
Ford Point	CA	33.91457	-120.0506				X
Johnsons Lee	CA	33.90883	-120.08691				X
Lunada Bay	CA	33.7680514	-118.42276				X
Point Vicente	CA	33.741014	-118.40947				X
Abalone Cove	CA	33.737777	-118.37612				X
Royal Palms	CA	33.7197434	-118.32857				X
White Point	CA	33.71573	-118.31999				X
Point Fermin	CA	33.70679	-118.28614				X
Buck Gully South	CA	33.588246	-117.86736				X
Crystal Cove	CA	33.570864	-117.83785				X
Muddy Canyon	CA	33.565763	-117.83314				X
Shaws Cove	CA	33.54473	-117.79974				X
Heisler Park	CA	33.542594	-117.78928				X
Treasure Island	CA	33.51335	-117.75793				X
Landing Cove	CA	33.481366	-119.0292				X
Sea Lion Rookery	CA	33.471738	-119.03075				X
Dana Point	CA	33.459941	-117.71461				X
Bird Rock	CA	33.451665	-118.48761				X
Big Fisherman Cove	CA	33.446447	-118.48526				X
Two Harbors	CA	33.444353	-118.49888				X
Goat Harbor	CA	33.416797	-118.39407				X
Little Harbor	CA	33.385025	-118.47524				X
Avalon Quarry	CA	33.322	-118.3052				X
Thousand Springs	CA	33.28491	-119.52972				X
Tranquility Beach	CA	33.265668	-119.4921				X
Marker Poles	CA	33.2187	-119.49575				X
Graduation Point	CA	33.033274	-118.5756				X
North Head	CA	33.032867	-118.60057				X
West Cove	CA	33.014938	-118.60614				X
Boy Scout Camp	CA	33.00112	-118.54832				X
Cardiff Reef	CA	32.99984	-117.27867				X
Eel Point	CA	32.918007	-118.54668				X
Scripps Reef	CA	32.871395	-117.25321				X
La Jolla Caves	CA	32.848614	-117.26535				X
Wind and Sea	CA	32.832849	-117.28231				X
Sea Ridge	CA	32.807987	-117.26793				X
Sunset Cliffs	CA	32.7191315	-117.25683				X
Navy North	CA	32.692784	-117.25306				X
Cabrillo I	CA	32.669434	-117.24541				X
Cabrillo III	CA	32.664899	-117.24282				X

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 ricchardii* ranging 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 in this application.

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 Marine Mammal Protection Act (MMPA), the population has increased dramatically (Carretta et al. 2010).

According to the 2021 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. 2022, Jeffries et al. 2003). Due to outdated survey data, there is no current minimum population size available for the Oregon/Washington stock (Carretta et al. 2022). 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 MMPA in 1972, as well as limits on killing and harassment in Mexico, the population has rapidly increased (Reeves et al. 2002). Declines is 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 2021 Pacific Marine Mammal Stock Assessment, the U.S. stock of California sea lions has a minimum population size of 233,515 and the population is estimated to be 257,606 animals (Carretta et al. 2022, Laake et al. 2018). 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 2021 Pacific Marine Mammal Stock Assessment, the minimum population size of the California stock is 85,369, and the estimated population size is 187,386 (Carretta et al. 2022, Lowry et al. 2020). This species has grown at 3.1% annually since 1988 (Lowry et al. 2020). 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 2021 Alaska Marine Mammal Stock Assessment, the minimum population size of the eastern U.S stock is estimated to be 43,201 (Muto et al. 2022). Due to an unknown number of animals at sea, there is no current estimated population size. 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.

LOA

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

UCSC-PISCO was issued an LOA 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 for the period of May 3, 2020 to April 11, 2025. The issued LOA allows for the following take:

Table 2. Authorized take numbers by species

Species	Authorized Take
California sea lion (*Zalophus californianus*)	636
Pacific harbor seal (*Phoca vitulina richardii*)	1466
Northern elephant seal (*Mirounga angustirostris*)	156
Steller sea lion (*Eumetopias jubatus*)	25

Monitoring Methods

Prior to approaching research sites, researchers observed the site from a distance and recorded any pinnipeds by species, and sex and 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 and age when possible. Observations and disturbances were recorded on a four- level scale with levels 2 and 3 considered Take (Table 3).

Table 3. Levels of pinniped disturbance response recorded during monitoring

Disturbance Level	Level of Response	Description
0	Observation	Observation by researchers from a distance, no disturbance to pinniped
1	Alert	Head orientation or brief movement in response to disturbance, which may include turning head towards the disturbance, craning head and neck while holding the body rigid in a u-shaped position, changing from a lying to a sitting position, or brief movement of less than twice the animal's body length
2	Movement	Movements in response to source of disturbance, ranging from short withdrawals at least twice the animal's body length to longer retreats over the beach, or if already moving a change of direction of greater than 90 degrees
3	Flush	All retreats (flushes) to the water

Monitoring Results

For the period of August 1, 2022 to July 31, 2023, our research group conducted rocky intertidal surveys at 73 sites over 79 days (Table 4). During this period there were 50 takes of harbor seals. An additional 109 adult harbor seals observed at research sites with 22 of those exhibiting minor reactions (Level 1 response) to researchers (Table 5).

During this period there was one take of a juvenile California sea lion. An additional 23 adult sea lion was observed at research sites, with four exhibiting minor reaction to researchers (Table 6).

During this period, there were zero takes of northern elephant seals. Four adult males were observed at research sites (Table 7).

All takes were Level B harassment and only very small percentage of each population was affected by research activities (Table 8). 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. No sick or injured mammals were observed during this period. Table 9 list cumulative takes to date and authorized takes remaining during the LOA period.

Table 4. 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 August 1, 2022 to July 31, 2023

Site	Date	Start Time	End Time	Swell	Wind	Rain
Dana Point	10/9/2022	12:30	17:30	ND	ND	ND
Terrace Point	10/10/2022	15:15	18:45	M	L	0
Treasure Island	10/10/2022	13:30	17:30	ND	ND	ND
Sandhill Bluff	10/11/2022	15:30	18:15	M	L	0
Heisler Park	10/11/2022	14:00	17:30	ND	ND	ND
Buck Gully	10/12/2022	14:30	18:30	ND	ND	ND
Shaws Cove	10/24/2022	13:00	16:30	ND	ND	ND
Scott Creek	10/25/2022	14:00	18:00	M	H	0
Crystal Cove	10/25/2022	13:00	18:00	ND	ND	ND
White Point	10/26/2022	13:45	17:30	ND	ND	ND
Terrace Point	10/27/2022	17:00	19:00	ND	ND	ND
Point Fermin	10/27/2022	14:15	18:45	ND	ND	ND
Harmony Headlands	11/7/2022	12:30	14:30	M	L	0
Vista del Mar	11/7/2022	15:20	16:45	M	L	0
Eel Point	11/7/2022	12:20	17:00	ND	ND	ND
Piedras Blancas	11/8/2022	16:00	17:30	M	L	M
Point Sierra Nevada	11/8/2022	13:00	16:30	H	L	L
Boy Scout Camp	11/8/2022	13:00	17:00	ND	ND	ND
Cayucos	11/9/2022	13:15	18:15	M	L	0
Rancho Marino; Cambria	11/9/2022	16:50	19:00	M	L	0
North Head	11/9/2022	12:30	16:30	ND	ND	ND
Hazards	11/10/2022	13:15	17:30	M	M	0
Shell Beach	11/11/2022	14:15	17:00	L	L	0
Point Lobos	11/21/2022	11:00	14:45	L	L	0
Pigeon Point	11/22/2022	15:15	15:30	L	L	0
Sandhill Bluff	11/22/2022	14:10	15:20	M	L	0
Stillwater	11/22/2022	12:15	15:45	L	L	0
Andrew Molera	11/23/2022	13:00	16:00	L	L	0
Mill Creek	11/24/2022	13:30	17:00	L	L	0
Hopkins	11/25/2022	14:45	18:30	L	L	0
Government Point	12/5/2022	12:00	17:20	M	M	0
West Cove	12/5/2022	14:30	17:00	ND	ND	ND
Owl Bluff	12/5/2022	11:45	18:45	ND	ND	ND
Graduation Point	12/6/2022	11:30	17:00	ND	ND	ND
West Cove	12/6/2022	12:00	16:30	ND	ND	ND
Occulto	12/7/2022	12:30	16:10	L	L	0
Point Sierra Nevada	12/7/2022	15:15	16:00	L	L	0
Purisima	12/7/2022	17:30	19:10	L	L	0

Hopkins	12/8/2022	14:00	16:00	ND	ND	ND
Stairs	12/8/2022	12:30	19:30	L	L	0
Eel Point	12/8/2022	12:30	16:00	ND	ND	ND
Boat House	12/9/2022	13:35	19:30	L	L	0
Lompoc Landing	1/19/2023	12:30	17:00	M	H	0
Boat House	1/20/2023	12:15	17:00	M	L	0
Boat House	1/21/2023	13:45	18:00	M	L	0
Boat House	1/22/2023	15:00	18:00	M	M	0
Boat House	1/23/2023	15:30	18:20	M	L	0
Carmel Point	2/1/2023	13:00	16:20	M	M	0
Scott Creek	2/2/2023	13:45	16:00	L	L	0
Pebble Beach	2/3/2023	14:40	16:00	M	L	0
Franklin Point	2/3/2023	14:45	16:00	M	L	L
Point Pinos	2/4/2023	14:25	17:00	M	H	L
Asilomar	2/4/2023	15:00	16:30	M	M	L
Boat House	2/16/2023	11:30	15:00	M	L	0
Government Point	2/17/2023	11:30	16:30	M	L	0
Boat House	2/17/2023	12:45	17:00	M	L	0
Government Point	2/18/2023	12:30	17:00	M	L	0
Government Point	2/18/2023	11:45	16:30	M	L	0
Boat House	2/18/2023	12:00	16:40	L	L	0
Government Point	2/19/2023	12:45	16:30	M	L	0
Boat House	2/19/2023	13:15	18:00	M	L	0
Terrace Point	3/16/2023	11:00	15:00	L	M	0
Fraser Cove	3/16/2023	10:30	15:30	L	L	0
China Rock	3/17/2023	12:15	14:15	L	L	0
Pescadero Point	3/17/2023	15:00	16:30	L	L	0
Fraser Cove	3/17/2023	11:00	14:00	L	L	0
Garrapata	3/18/2023	14:40	16:40	L	L	0
Soberanes	3/18/2023	12:30	14:00	L	L	0
Government Point	3/19/2023	12:30	15:30	L	H	L
Pigeon Point	3/19/2023	14:00	15:00	M	L	M
Government Point	3/20/2023	13:00	15:30	L	L	0
Government Point	3/31/2023	12:30	14:45	L	L	0
Point Lobos	4/11/2023	8:30	10:30	L	L	0
Stillwater	4/12/2023	9:30	12:15	M	M	0
Hopkins	4/13/2023	10:30	13:30	M	M	0
Government Point	4/14/2023	12:15	14:00	M	M	0
Scott Creek	4/27/2023	10:30	14:00	L	L	0
False Klamath Cove	5/6/2023	5:30	10:45	L	L	M
Scott Creek	5/6/2023	5:40	7:15	M	L	L

False Klamath Cove	5/7/2023	5:30	8:30	L	L	L
Soberanes	5/8/2023	5:30	10:15	M	L	0
Burnt Hill	5/8/2023	7:00	9:45	L	L	0
Pigeon Point	5/9/2023	7:30	10:30	M	L	0
Damnation Creek	5/9/2023	6:30	12:00	M	L	0
Sandhill Bluff	5/10/2023	8:00	10:00	M	L	0
Partington Cove	5/10/2023	8:15	10:45	M	M	0
Enderts	5/10/2023	6:30	9:00	M	L	0
Point Lobos	5/11/2023	8:30	13:00	L	L	0
Carmel Point	5/12/2023	9:30	14:10	M	M	0
Davenport	5/17/2023	5:00	9:00	M	L	L
Government Point	5/20/2023	5:30	8:30	M	L	0
Franklin Point	5/21/2023	6:20	9:00	L	L	0
Point Conception	5/21/2023	5:30	8:15	L	L	0
Gerstle Cove	6/3/2023	4:00	8:30	M	L	0
Sea Ranch	6/4/2023	4:00	9:30	M	L	0
Point Arena	6/4/2023	4:30	9:00	H	H	0
Moat Creek	6/4/2023	4:00	8:30	L	L	M
Stornetta	6/5/2023	5:00	9:30	H	M	0
Moat Creek	6/5/2023	4:40	9:00	L	L	L
Kibesillah Hill	6/6/2023	5:30	10:45	L	L	L
Shelter Cove	6/7/2023	5:35	9:45	L	L	L
Cape Mendocino	6/8/2023	6:00	11:00	L	L	L
Bodega	6/17/2023	5:00	9:15	M	M	0
Horseshoe Cove	6/18/2023	5:00	9:00	M	H	0
Bodega	6/19/2023	5:15	10:00	M	H	0
Fort Ross	6/20/2023	6:00	10:50	L	L	0
Government Point	6/20/2023	5:45	7:50	L	L	0
Bodega	6/21/2023	6:30	10:00	L	L	0
Fogarty Creek	7/1/2023	3:00	8:50	L	M	0
Otter Rock	7/1/2023	2:45	8:45	ND	ND	ND
Roads End	7/2/2023	3:30	9:30	ND	ND	ND
Bob Creek	7/3/2023	4:30	10:30	L	M	0
Seal Rock	7/3/2023	4:00	9:00	ND	ND	ND
Bob Creek	7/4/2023	4:30	9:30	L	M	0
Fogarty Creek	7/5/2023	5:00	10:00	L	M	0
Ecola	7/6/2023	7:00	10:00	L	L	0
Fraser Cove	7/6/2023	5:30	9:30	L	L	0
Cape Arago	7/7/2023	6:30	12:45	L	L	0
Andrew Molera	7/16/2023	5:00	7:10	L	L	0
Pacific Valley	7/17/2023	4:20	9:45	M	L	0

Mill Creek	7/18/2023	4:00	8:25	L	L	0
Pacific Valley	7/19/2023	5:15	7:30	M	L	0
Government Point	7/19/2023	5:15	8:45	L	L	0

Table 5. Observations and disturbances of harbor seals (0 = Observation by researchers only, 1 = Alert response, 2 = Movement response, 3 = Flush, as described in Table 3). Levels 2 and 3 = Take

Site	Date	Time	Age	Sex	Detail	0	1	2	3
Vista del Mar	11/7/2022	16:30	adult	unk.	Hauled-out on reef adjacent to site	10	0	0	0
Point Lobos	11/21/2022	14:25	adult	unk.	No Data	1	0	0	0
Hopkins	11/25/2022	15:15	adult	unk.	No Data	1	0	0	0
Occulto	12/7/2022	12:30	adult	unk.	Hauled-out on beach adjacent to site	1	0	0	0
Occulto	12/7/2022	12:30	adult	unk.	Hauled-out on offshore rocks	0	5	0	0
Franklin Point	2/3/2023	15:29	adult	unk.	Hauled-out on offshore rocks	0	0	0	4
Pebble Beach	2/3/2023	14:40	adult	unk.	No Data	7	0	0	0
Fraser Cove	3/17/2023	6:00	adult	unk.	Swimming offshore of site	3	0	0	0
Pescadero Point	3/17/2023	15:00	adult	unk.	Swimming offshore of site	1	0	0	0
Government Point	3/17/2023	12:00	adult	unk.	Swimming offshore of site	1	0	0	0
Government Point	3/19/2023	13:00	adult	unk.	Swimming offshore of site	1	0	0	0
Burnt Hill	5/8/2023	7:00	adult	unk.	Hauled-out on reef adjacent to site	0	0	0	12
Government Point	5/20/2023	7:00	adult	unk.	Swimming offshore of site	2	0	0	0
Gerstle Cove	6/3/2023	7:00	adult	unk.	No Data	0	1	0	0
Point Arena	6/4/2023	5:00	adult	unk.	No Data	0	2	0	1
Stornetta	6/5/2023	7:00	adult	unk.	Hauled-out on reef adjacent to site	6	0	0	0
Stornetta	6/5/2023	8:00	adult	unk.	No Data	0	5	0	0
Kibesillah Hill	6/6/2023	5:30	adult	unk.	Hauled-out on reef adjacent to site	0	0	0	10
Shelter Cove	6/7/2023	7:30	adult	unk.	No Data	0	1	0	0
Bodega	6/17/2023	9:15	adult	unk.	Swimming offshore of site	16	0	0	0
Horseshoe Cove	6/18/2023	5:00	adult	unk.	Hauled-out on site	0	0	0	8
Bodega	6/19/2023	6:30	adult	unk.	Hauled-out on site	0	0	0	1
Bodega	6/19/2023	9:45	adult	unk.	Hauled-out on offshore rocks	12	0	0	0
Fort Ross	6/20/2023	8:30	adult	unk.	Hauled-out on reef adjacent to site	0	4	0	0
Bodega	6/21/2023	7:45	adult	unk.	Hauled-out on reef adjacent to site	17	4	0	0
Bodega	6/21/2023	7:45	adult	unk.	Hauled-out on site	0	0	0	6
Fogarty Creek	7/1/2023	8:00	adult	unk.	Swimming offshore of site	6	0	0	0
Fogarty Creek	7/5/2023	8:00	adult	unk.	Hauled-out on site	0	0	0	8
Fraser Cove	7/6/2023	6:00	adult	unk.	Swimming offshore of site	1	0	0	0
Cape Arago	7/7/2023	11:30	adult	unk.	Swimming offshore of site	1	0	0	0
Totals						**87**	**22**	**0**	**50**

Table 6. Observations and takes of California sea lions (0 = Observation by researchers only, 1 = Alert response, 2 = Movement response, 3 = Flush, as described in Table 3). Levels 2 and 3 = Take

Site	Date	Time	Age	Sex	Detail	0	1	2	3
Andrew Molera	11/23/2022	13:00	juvenile	male	Hauled-out on site	0	0	0	1
Government Point	3/17/2023	12:00	adult	unk.	Swimming offshore of site	1	0	0	0
Partington Cove	5/10/2023	8:15	adult	unk.	Swimming offshore of site	1	0	0	0
Sandhill Bluff	5/10/2023	8:00	adult	unk.	Swimming offshore of site	6	0	0	0
Point Conception	5/21/2023	8:00	adult	unk.	Swimming offshore of site	1	0	0	0
Gerstle Cove	6/3/2023	6:30	adult	unk.	Swimming offshore of site	1	0	0	0
Stornetta	6/5/2023	8:00	adult	unk.	Hauled-out on beach adjacent to site	1	0	0	0
Kibesillah Hill	6/6/2023	6:00	adult	unk.	No Data	0	1	0	0
Shelter Cove	6/7/2023	7:00	adult	male	No Data	0	1	0	0
Shelter Cove	6/7/2023	8:30	adult	female	No Data	0	2	0	0
Bodega	6/17/2023	8:30	adult	unk.	Swimming offshore of site	4	0	0	0
Government Point	6/20/2023	7:00	adult	unk.	Swimming offshore of site	1	0	0	0
Fraser Cove	7/6/2023	6:00	adult	unk.	Swimming offshore of site	1	0	0	0
Cape Arago	7/7/2023	7:35	adult	unk.	Swimming offshore of site	2	0	0	0
Totals						**19**	**4**	**0**	**1**

Table 7. Observations and takes of northern elephant seals (0 = Observation by researchers only, 1 = Alert response, 2 = Movement response, 3 = Flush, as described in Table 3). Levels 2 and 3 = Take.

Site	Date	Time	Age	Sex	Detail	0	1	2	3
Boat House	12/9/2022	13:30	adult	male	Hauled-out on beach adjacent to site	2	0	0	0
Boat House	2/19/2023	14:30	adult	male	Hauled-out on beach adjacent to site	2	0	0	0
Totals						**4**	**0**	**0**	**0**

Table 8. Percentage of population affected by level B harassment incidental to rocky intertidal research activities during reporting period. *Abundance of both California and Oregon/Washington stocks combined, based on unofficial, out of date Oregon/Washington abundance estimate

Species	Abundance (Carretta et al. 2022)	# Takes	% of Population Affected
Harbor seal (*Phoca vitulina richardii*)	55,700	50	0.090
California sea lion (*Zalophus californianus*)	257,606	1	0.0004
Northern elephant seal (*Mirounga angustirostris*)	187,386	0	0.000

Table 9. Cumulative takes and authorized take remaining during LOA period.

Species	Authorized Take	Takes Year 1	Takes Year 2	Takes Year 3	Cumulative Takes	Authorized Take Remaining
California sea lion (Zalophus californianus)	636	80	0	1	81	**555**
Pacific harbor seal (Phoca vitulina richardii)	1466	55	17	50	122	**1344**
Northern elephant seal (Mirounga angustirostris)	156	0	4	0	4	**152**
Steller sea lion (Eumetopias jubatus)	25	0	0	0	0	**25**

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Figures

Figure 1. Biodiversity survey transects at Cambria, CA.

Figure 2. Community Structure photoplot quadrats at Enderts, CA.

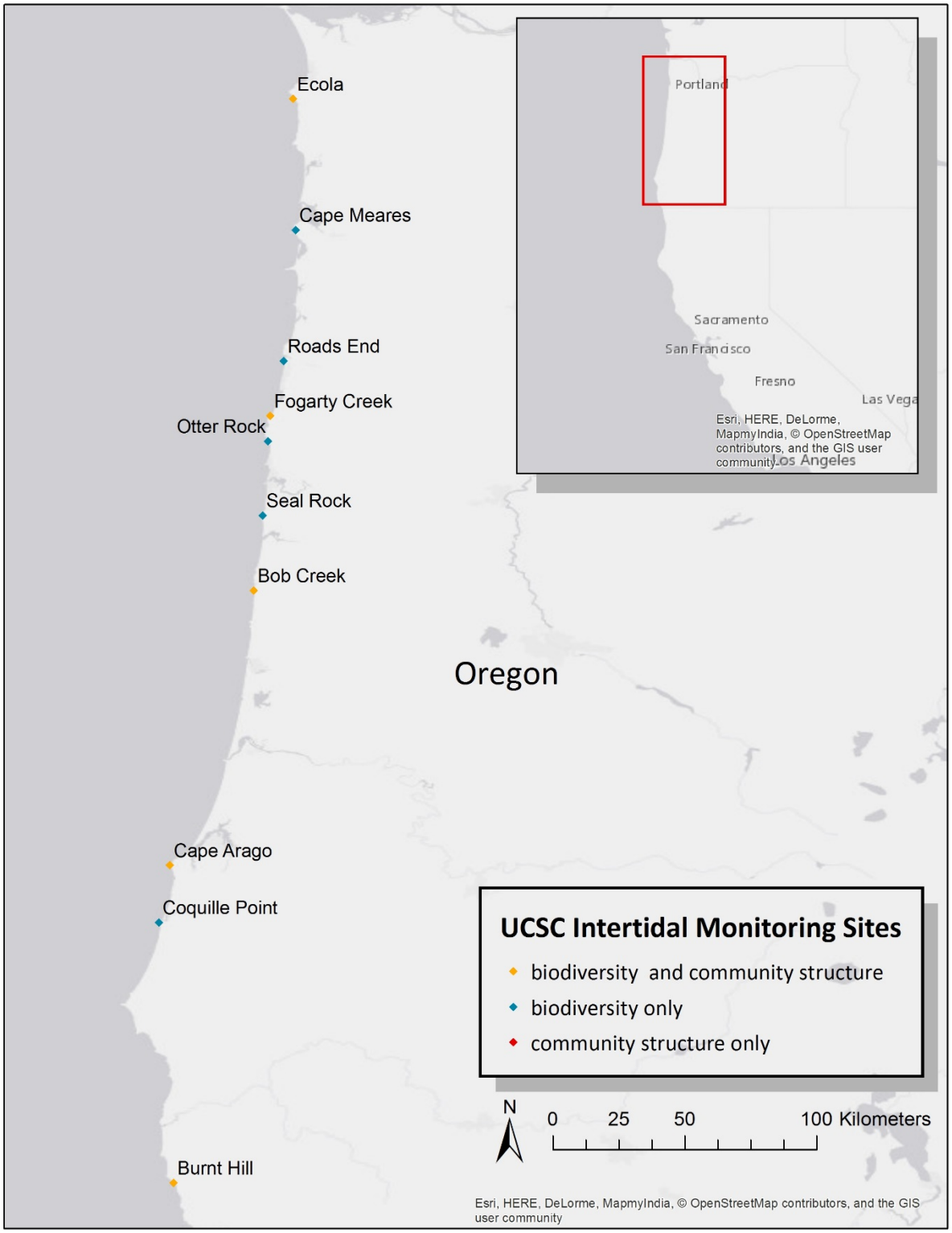

Figure 3. UCSC intertidal monitoring sites in Oregon.

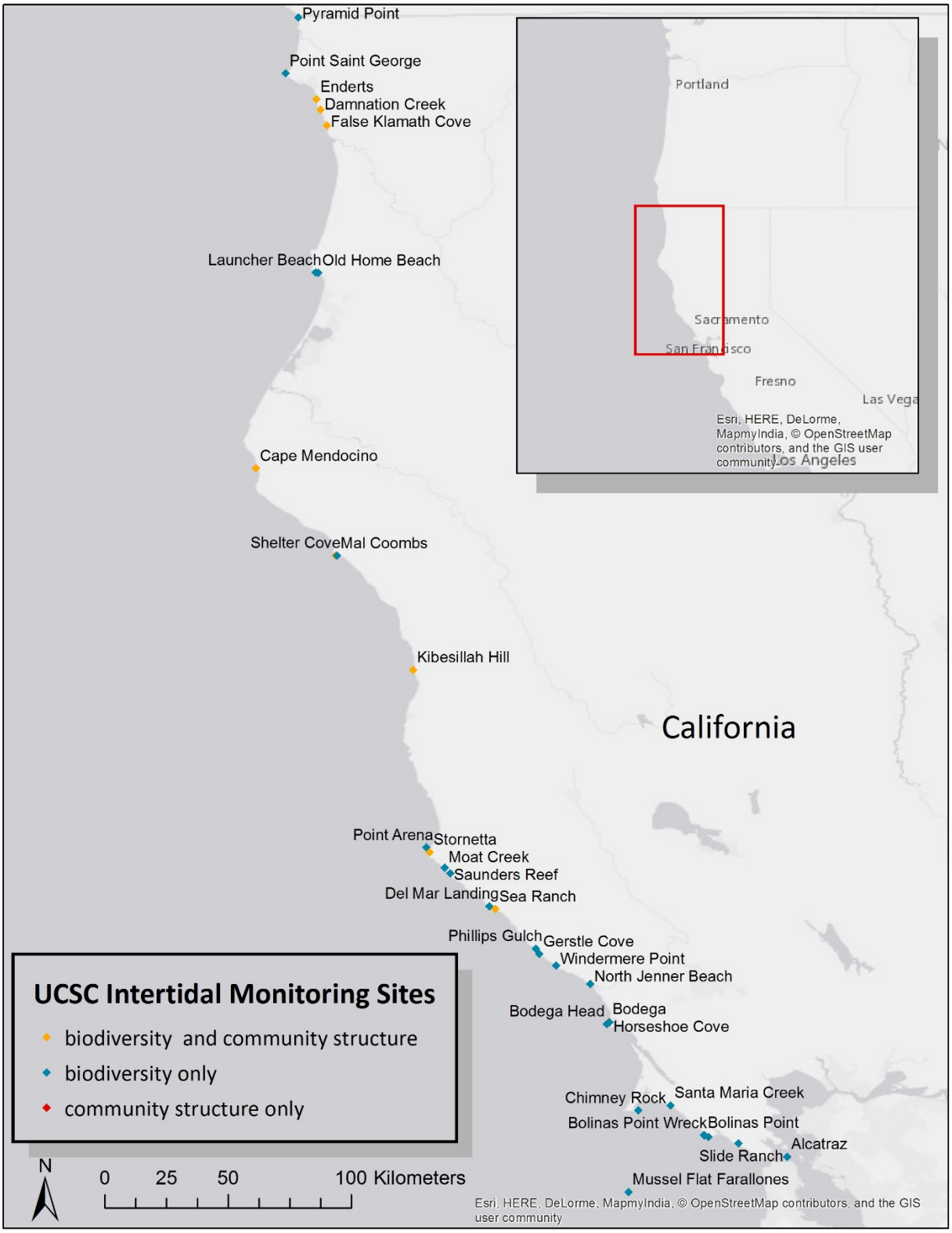

Figure 4. UCSC intertidal monitoring sites in Northern California (Oregon border to San Francisco Bay).

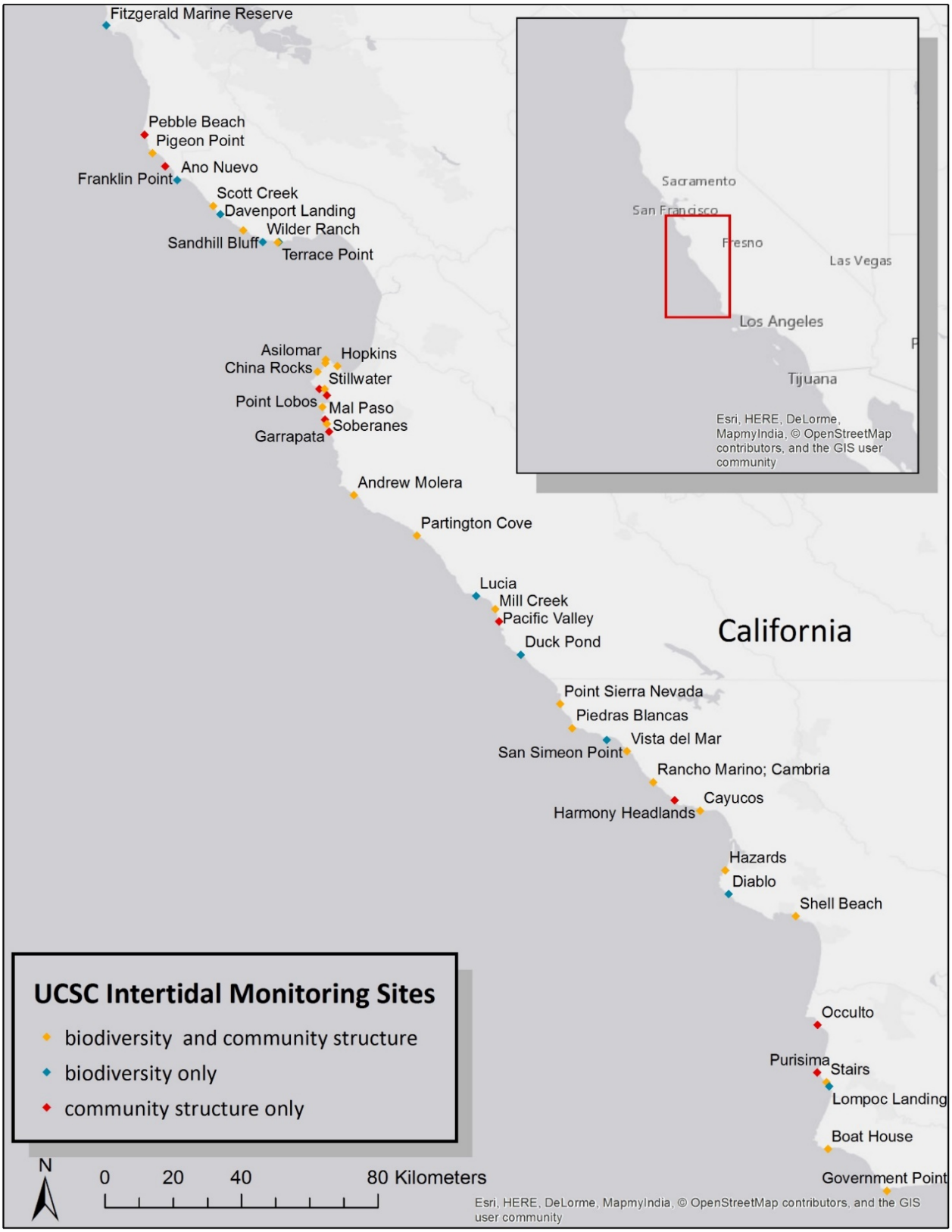

Figure 5. UCSC intertidal monitoring sites in Central California (San Francisco to Point Conception).

Figure 6. UCSC intertidal monitoring sites in Southern California (Point Conception to Mexico border including the Channel Islands)