Request for Marine Mammal Protection Act
Incidental Harassment Authorization

Sanctuary Ecosystem Assessment Surveys
Rocky Intertidal Monitoring on the South Farallon Islands

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Purpose and Background

The Gulf of the Farallones National Marine Sanctuary (GFNMS) requests an Incidental Harassment Authorization (IHA) under the Marine Mammal Protection Act (MMPA) for incidental take by 'Level B' harassment (behavioral disturbance) of California sea lions, harbor seals, northern elephant seals, northern fur seals, and Steller sea lions on the Farallon Islands. We are applying for an IHA because there is no potential for serious injury or mortality to any marine mammal species.

The Farallon Islands consists of a chain of seven islands located approximately 48 km (30 mi) west of San Francisco, near the edge of the continental shelf and in the geographic center of the GFNMS (Figure 1). The land of the islands above the mean high tide mark is designated as the Farallon National Wildlife Refuge (managed by US Fish and Wildlife Service), while the shore and subtidal below are in GFNMS. The nearshore and offshore waters are foraging areas for pinniped species listed in this application and described below.

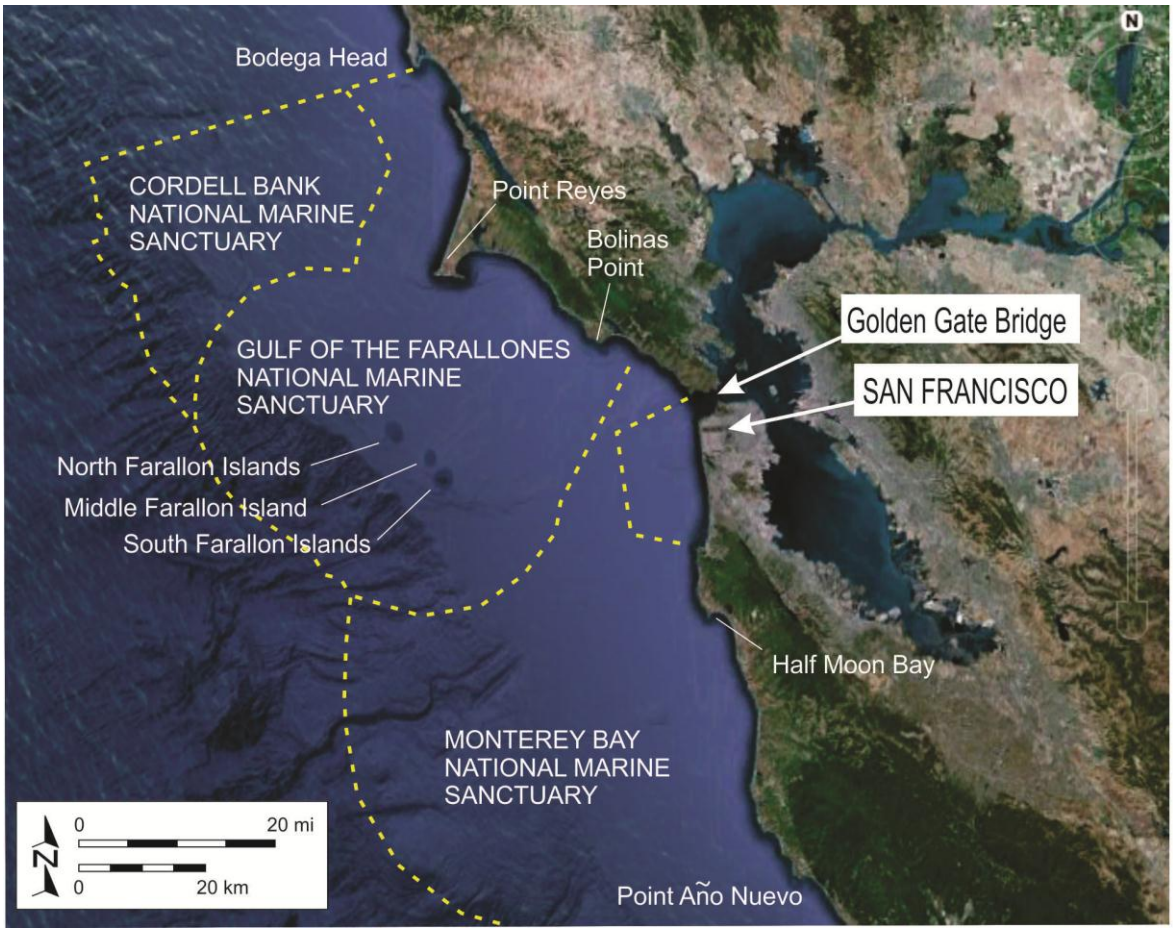

Figure 1. Farallon Islands offshore of San Francisco and site of Incidental Harassment Authorization request.

The shorelines on these islands, including areas above the mean high tide elevation, have become more heavily used over time as haul-out sites for pinnipeds to rest, give birth, and molt. The intertidal zones where we conduct intertidal monitoring are also areas where pinnipeds can be found hauled out on the shore. Accessing portions of the intertidal habitat may cause incidental harassment of pinnipeds (disturbance causing them to interrupt normal behavior or flush into the water).

The two largest islands of the seven islands are the Southeast Farallon and Maintop (aka West End) Islands. These and several smaller rocks are collectively referred to as the South Farallon Islands, and are the subject of this IHA application. The two largest islands are separated by only a 9 m (30 ft) wide surge channel. Together, these islands are approximately 49 ha (120 ac) in size with an intertidal perimeter around both islands of 7.7 km (4.8 mi). Middle Farallon Island is located 4 km (2.5 mi) to the northwest, and is an emergent rock outcrop approximately 15 m (49 ft) in diameter. The North Farallon Islands consist of four small islands located further northwest from the South Farallon Islands (11.2 km, 7.0 mi). Only two of the North Farallon Islands are named, North Farallon Island and the Isle of Saint James.

We request an Incidental Harassment Authorization (Level B) for the South Farallon Islands in order to continue our rocky intertidal monitoring work and search for black abalone in areas previously unexplored for black abalone. This ongoing monitoring work began in 1992 and the intertidal monitoring on the islands has become incorporated into a larger and more comprehensive monitoring program of the GFNMS, the Sanctuary Ecosystem Assessment Surveys (SEAS) Program (http://farallones.noaa.gov/science/seas.html). Over 40 visits have been made to the islands since 1993 to complete the intertidal surveys. With time, however, pinnipeds have increased in numbers on the islands, and hauling out more frequently on top of and in the vicinity of our sampling areas.

Since the federal listing of black abalone as “endangered” (Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), we have been requested by National Marine Fisheries Service to explore as much of the shoreline as possible, to document, map the location of quality habitat for black abalone, and the location of known animals. This listing prompted the need to expand the search for black abalone into other areas on the South Farallon Islands to gain a better understanding of the abundance and health of the black abalone population in this remote and isolated location. The monitoring is planned to remain ongoing, and efforts to assess the status and health of the black abalone population on the South Farallon Islands may take several years, and perhaps decades, because black abalone tend to be very cryptic and difficult to find, especially when they are sparse and infrequent in occurrence.

In 2010, we found a single black abalone on Southeast Farallon Island proximate to one of our quadrat sampling areas. Another black abalone was recently found in 2012. Other black abalone have been found in previous surveys, in the 1990s on Weather Service Peninsula and Maintop (West End) Island in areas now occupied by sea lions. In order that our assessment of black abalone is more comprehensive, we need to expand our shore searches in areas beyond the proximity of our quantitative quadrat sampling areas and also in new areas on Southeast Farallon and Maintop (West End) Islands.

The National Marine Sanctuaries Act (Title 16, Chapter 32, Sections 1431 et seq., as amended) specifies long-term resource management be a fundamental component of sanctuary objectives. In order to fulfill this requirement, the sanctuary includes an assessment of and long-term monitoring of the rocky intertidal areas within the GFNMS, which includes the Farallon Islands.

Rocky intertidal monitoring on the Farallon Islands is now a component of the GFNMS Sanctuary Ecosystem Assessment Surveys (SEAS) long-term monitoring program, and is a necessity to the management and protection of the GFNMS. All GFNMS SEAS monitoring projects are designed to provide documentation on the density and biodiversity of sanctuary natural resources for condition analyses, particularly for a baseline in the event of a major natural or human-induced perturbation. In the last 25 years there have been two large shipping accidents resulting in over 5.6 million liters of oil (1.5 million gallons) spilling into the GFNMS and oiling intertidal areas of the Farallon islands (Carter 2003). The Farallon islands are also proximate to three major shipping channels so there is also a constant threat of illegal discharges of bilge waste and ballast water potentially fouling the pristine intertidal zones of the Farallon Islands. GFNMS biologists have been conducting the intertidal monitoring on the two South Farallon Islands since 1993. This program has and continues to acquire information on seasonal and annual changes of intertidal species abundances in 1-3 visits per year. The monitoring is also important to the overall management of GFNMS resources, as the Farallon Islands represent a unique habitat that is removed from the daily presence of visitors and therefore trampling and extraction by humans. The monitoring data, decades from now, can also be used to assess trends and changes from global climate change and ocean acidification, based on range extensions, changes in biodiversity, and changes in density of calcium carbonate-containing organisms.

Many of the shorelines where we conduct our routine monitoring and where we can search for black abalone have become areas used more heavily by pinnipeds. Consequently, it has become more difficult to conduct shore activities in these areas while also completely avoiding disturbance to pinnipeds in certain areas. Consequently, in the future we may occasionally cause incidental disturbance to pinnipeds in completing our work. The disturbance response will consist of hauled out animals' head raises, awakening, moving away from the biologists, sometimes entering the water, and inhibiting hauling out (behavioral disturbance responses). The shore areas to be searched are now planned to be expanded to search for black abalone. We are therefore requesting an Incidental Harassment Authorization to continue our work and expand to unexplored areas of the islands for black abalone census and mapping potential quality habitat. There is no potential for serious injury or mortality to pinnipeds from any of our activities; only minor disturbance in the form of them moving away and/or entering the water temporarily in order to keep a distance from biologists.

The following provides more detail on our work and anticipated impacts, including information to meet the requirements mandated by Section 7 of the Endangered Species Act and the National Environmental Policy Act.

1: A detailed description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals;

Our routine shore activity will continue to involve the use of only non-destructive sampling methods to monitor rocky intertidal algal and invertebrate species abundances (Figure 2). At

each sampling site there are three to four permanent 30 x 50 cm quadrat sites that occur in the low, middle, and upper elevation tidal zones (marked by white epoxy pads in the quadrat corners). Three to four random quadrats (unmarked) are also sampled at each site each survey, if time permits. Fifty randomly selected points within each permanent and random quadrat are sampled, methods described by Foster et al. (1991) and Dethier et al. (1993). All algal and sessile macroinvertebrate species under each sampling point (loci) are recorded. A photograph is also taken of each labeled quadrat. When completed, a shore walk in the immediate proximity is done by the sampling team to search for select large invertebrates. The length of the shoreline searched in the shore walks is typically about 30 m, but plans are to expand this search effort over larger areas for abalone and in more areas. All procedures are further described in Roletto et al. (1998) and GFNMS (2008) The sampling, photographic documentation, and shore walks have been scheduled up to three times annually, during February, August, and November, but this sampling has recently been reduced in frequency, including number of areas that are sampled each survey, in order to reduce incidental take by disturbance *(see below*, Sections 11 and 14), funding cuts, and logistical issues. Each survey will last for approximately four to eight days. All work will be done only during daylight minus, low tides. Each location (as listed in Tables 2 and 3) will be visited/sampled by three to four biologists, for a duration of three to four hours, one to two times each minus tide cycle, during November 2012 and February 2013 (*see* Appendix I for proposed shoreline to be searched for black abalone).

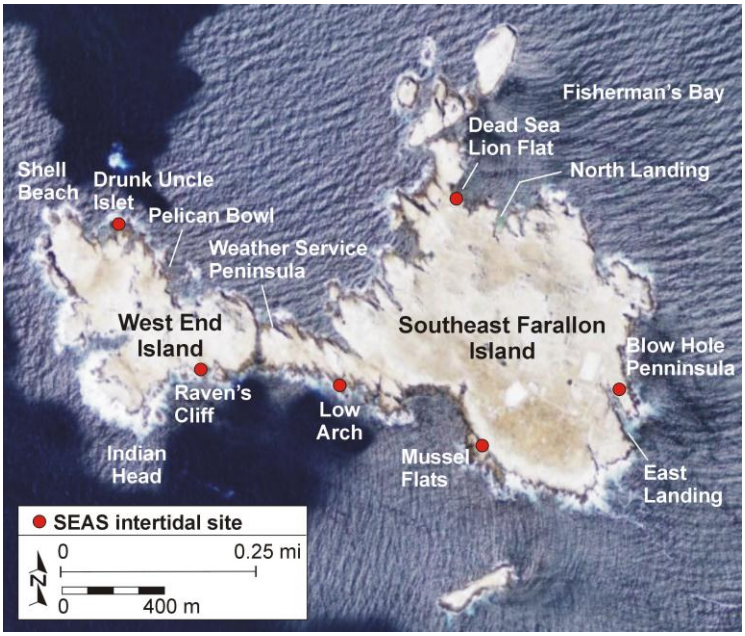

Figure 2. SEAS rocky intertidal sampling locations on Southeast Farallon and West End Islands.

Inaccessible shore areas will be surveyed by boat up to once each year, dependent on boat availability and weather conditions. This effort includes the Middle and North Farallon Islands. In this effort, the boat navigates to within 15-100 m of the shore, and intertidal species that can be seen through binoculars are recorded (presence/absence). No disturbance by boat is planned or requested in this application.

2: The date(s) and duration of such activity and the specific geographical region where it will occur;

This is a long-term monitoring project, so we are requesting an IHA November 9, 2012 through November 8, 2013, with the intent to re-apply annually. Our current areas that are sampled during November and February are: Blow Hole Peninsula, Mussel Flat, Dead Sea Lion Flat, and Low Arch (Figure 1). Our current areas that are sampled only during February additionally includes: Raven's Cliff and Drunk Uncle Islet. One of the reasons these areas were selected as part of our long-term monitoring project was because there were little to no pinnipeds hauled out

in these areas during minus tides. Due to population growth, pinnipeds are now encroaching in these areas and occasionally we will require an IHA to continue monitoring at our historic locations. Areas to be added for intensive black abalone assessment and habitat mapping sampling during November and February include: East Landing, North Landing, Fisherman's Bay, and Weather Service Peninsula on Southeast Farallon Island. Areas to be added for intensive black abalone assessment and habitat mapping during February include: Raven's Cliff, Indian Head, Shell Beach, and Drunk Uncle Islet (Figure 1). Each sample site will be visited one to two times per minus tide cycle, three to four hours each visit. Also, see Table 2 for schedule of sampling visits for each location. No sampling during August 2012 or 2013 are planned, due to funding and poor tidal conditions during daylight hours. Specific dates of sampling in February and November of each year will vary, as in the past, dependent on tide conditions, boat logistics to the island, staff schedules, island housing availability, seabird breeding cycles, and at the discretion of Refuge management. Each visit will last approximately four to eight days.

3: The species and numbers of marine mammals likely to be found within the activity area;

Many of the shores of the two South Farallon Islands provide resting, molting and breeding places for species of pinnipeds that include northern elephant seals, harbor seals, California sea lions, northern fur seals, and Steller sea lions. These species can be expected to occur on land and in the vicinity of our monitoring sites (Table 1).

Table 1. Marine mammal protection status and trends.

Scientific Name	Status	Trends
California sea lion *Zalophus californianus*	M	Increasing in most recent three year period
Northern elephant seal *Mirounga angustirostris*	M	Increasing
Pacific harbor seal *Phoca vitulina richardsi*	M	Stable
Northern fur seal *Callorhinus ursinus*	M	Increasing
Northern (Steller) sea lion *Eumetopias jubatus*	FT, M	Decreasing

Source: NMFS, 2011

Protected Status Codes:
FE – Federally listed Endangered Species
FT – Federally listed Threatened Species
M --- Protected under Marine Mammal Protection Act

PRBO Conservation Science (PRBO) obtains counts of these species in weekly surveys (four times per month) that have been conducted year round since the early 1970s. Surveys are done on Thursdays, usually between 1100 hrs and 1300 hrs. Surveys utilize binoculars and spotting scopes from the lighthouse and accessible ground areas.

Based on the PRBO counts, the species and numbers of marine mammals likely to be found when we visit our sampling areas are summarized in Tables 2 and 3. These numbers also represent the counts that would be potentially disturbed by our visits. The data are counts from February and November made in 2010 and 2011, as these are the months that we plan to schedule our sampling. Table 2 shows average counts of pinnipeds, by species, by area, during the months of anticipated disturbance. Table 3 shows maximum counts anticipated to be disturbed. Counts are from PRBO unpublished data and rounded up to the nearest 5 or 10 animals.

Based on encountering the maximum number of animals each survey in each area, we conservatively estimate that as many as 6,850 California sea lions, 175 harbor seals, 225 elephant seals, 20 northern fur seals, and 95 Steller sea lions may be disturbed by our rocky

intertidal monitoring activities over the course of a year; total of 7,365 animals disturbed per year (Table 3). The majority (~93%) of the take by disturbance will involve California sea lions. The residual (7%) will involve the other four species, combined.

We are requesting an IHA for incidental take by disturbance based on the maximum counts. While we will probably not encounter maximum numbers near our sampling sites each visit, we may search shore areas mainly for black abalone not near our sampling sites and encounter pinnipeds. Thus, the request for incidental take by disturbance based on the maximum counts is to provide us the option, flexibility, and some margin to search other areas where pinnipeds may be present (see Figure 1 for current sampling and black abalone assessment locations). We also anticipate, however, that there may be occasions when no pinnipeds will be present upon arrival to some areas (probability less than 100% of encountering animals, Table 4), thus helping to keep take by disturbance below maximums requested.

Table 2. Estimated number of animals to be disturbed per year per area based on **average** daily counts.*

	East Landing & Blowhole Peninsula	North Landing & Fisherman's Bay	Dead Sea Lion Flat	Mussel Flat	Low Arch	Weather Service Peninsula	Raven's Cliff**	Indian Head**	Shell Beach**	Drunk Uncle Islet & Pelican Bowl**	
CA Sea Lion November	3	152	535	28	269	57	NA	NA	NA	NA	
CA Sea Lion February	12	7	387	38	83	111	163	460	702	226	
Total	15	159	922	66	352	168	163	460	702	226	3233
Harbor Seal November	2	4	2	25	-	1	NA	NA	NA	NA	
Harbor Seal February	2	11	1	28	-	-	-	-	-	-	
Total	4	15	3	53	0	1	0	0	0	0	76
N. Elephant Seal November	-	13	14	31	20	-	NA	NA	NA	NA	
N. Elephant Seal February	-	1	1	2	1	-	-	5	6	-	
Total	0	14	15	33	21	0	0	5	6	0	94
N. Fur Seal November	-	-	-	-	-	-	NA	NA	NA	NA	
N. Fur Seal February	-	-	-	-	-	-	-	6	-	-	
Total	0	0	0	0	0	0	0	6	0	0	6
Steller Sea Lion November	-	-	5	-	-	-	NA	NA	NA	NA	
Steller Sea Lion February	-	-	6	5	1	1	1	8	7	-	
Total	0	0	11	5	1	1	1	8	7	0	34
									AVERAGE TOTAL		**3443**

* Estimates above are based on the SEAS team sampling each area once in each month indicated.
NA: Not applicable. **These areas on Maintop Island (West End Island) will not be sampled in November to minimize disturbance to seabirds and marine mammals.

Table 3. Estimated number of animals to be disturbed per year per area based on **maximum** daily counts.*

	East Landing & Blowhole Peninsula	North Landing & Fisherman's Bay	Dead Sea Lion Flat	Mussel Flat	Low Arch	Weather Service Peninsula**	Raven's Cliff**	Indian Head**	Shell Beach**	Drunk Uncle Islet & Pelican Bowl**	
CA Sea Lion November	5	520	880	180	575	120	NA	NA	NA	NA	
CA Sea Lion February	50	35	850	110	280	215	260	775	1420	575	
Total	55	555	1730	290	855	335	260	775	1420	575	6850
Harbor Seal November	10	10	5	50	-	5	NA	NA	NA	NA	
Harbor Seal February	10	20	10	55	-	-	-	-	-	-	
	20	30	15	105	0	5	0	0	0	0	175
N. Elephant Seal November	-	40	25	60	45	-	NA	NA	NA	NA	
N. Elephant Seal February	-	5	5	5	5	-	-	25	10	-	
Total	0	45	30	65	50	-	0	25	10	0	225
N. Fur Seal November	-	-	-	-	-	-	NA	NA	NA	NA	
N. Fur Seal February	-	-	-	-	-	-	-	20	-	-	
Total	0	0	0	0	0	0	0	20	0	0	20
Steller Sea Lion November	-	-	10	-	-	-	NA	NA	NA	NA	
Steller Sea Lion February	-	-	15	15	5	5	5	20	20	-	
Total	0	0	25	15	5	5	5	20	20	0	95
									MAXIMUM TOTAL		**7365**

* Estimates above are based on the SEAS team sampling each area once in each month indicated.
NA: Not applicable. **These areas on Maintop Island (West End Island) will not be sampled in November to minimize disturbance to seabirds and marine mammals.

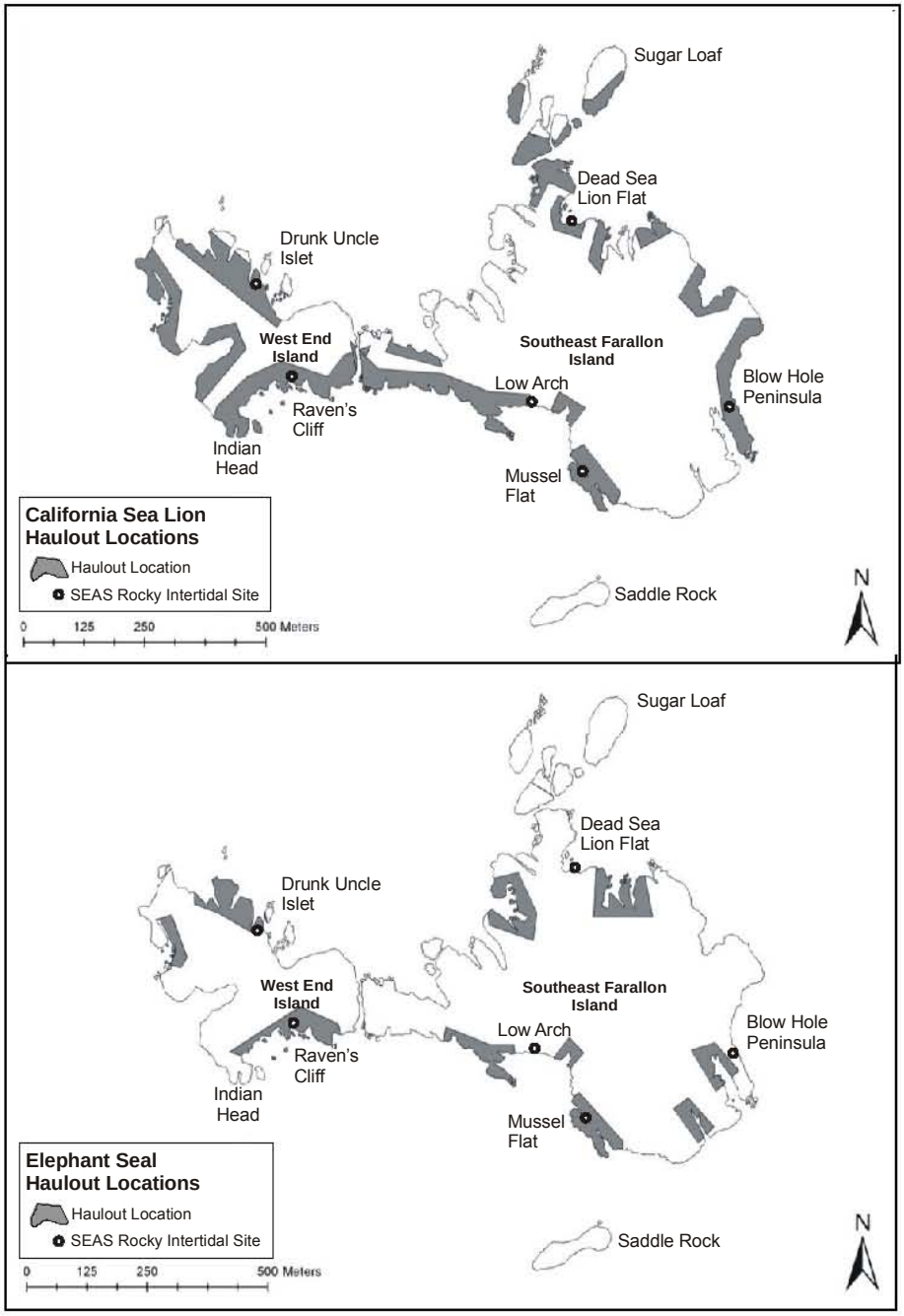

Figure 3 California sea lions and elephant seal haul-out distributions on the South Farallon Islands. Map source, PRBO Conservation Science, 2012.

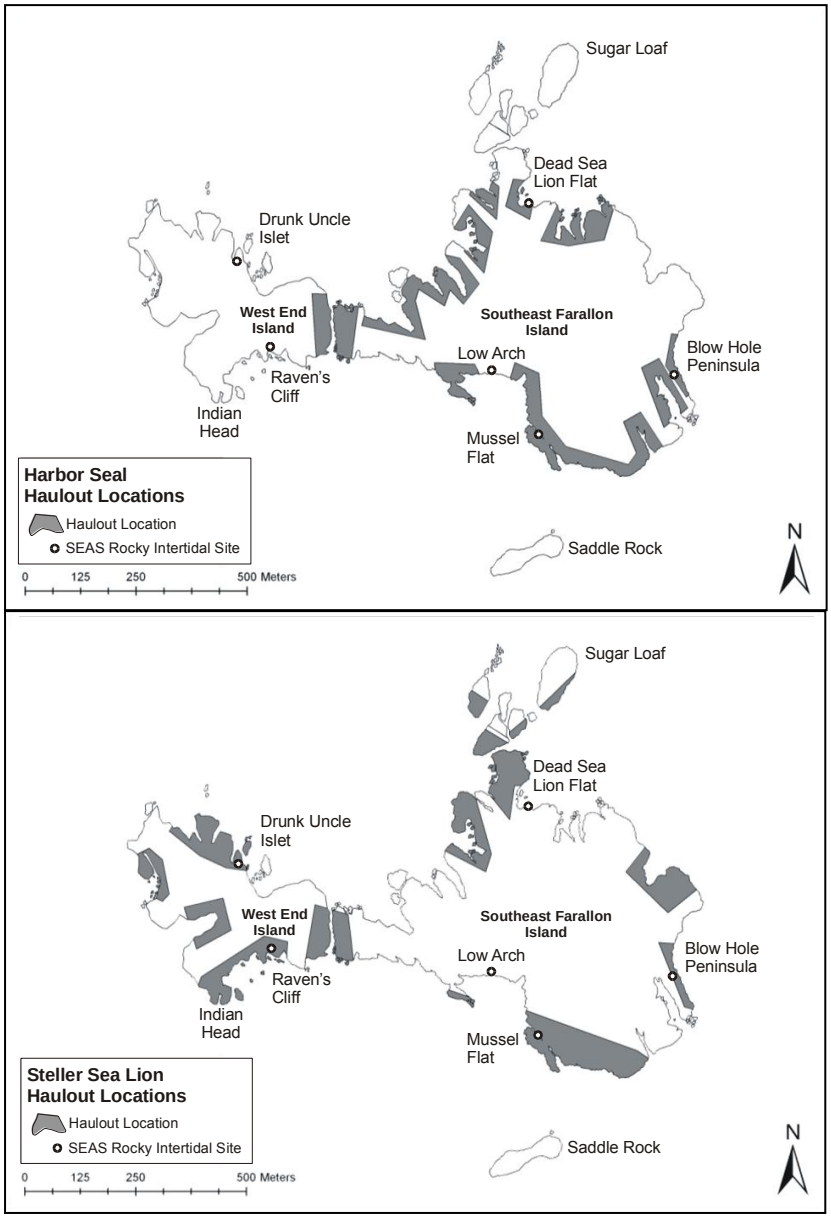

Figure 4. Harbor seal and Steller sea lion haul-out distributions on the South Farallon Islands. Map source, PRBO Conservation Science, 2012.

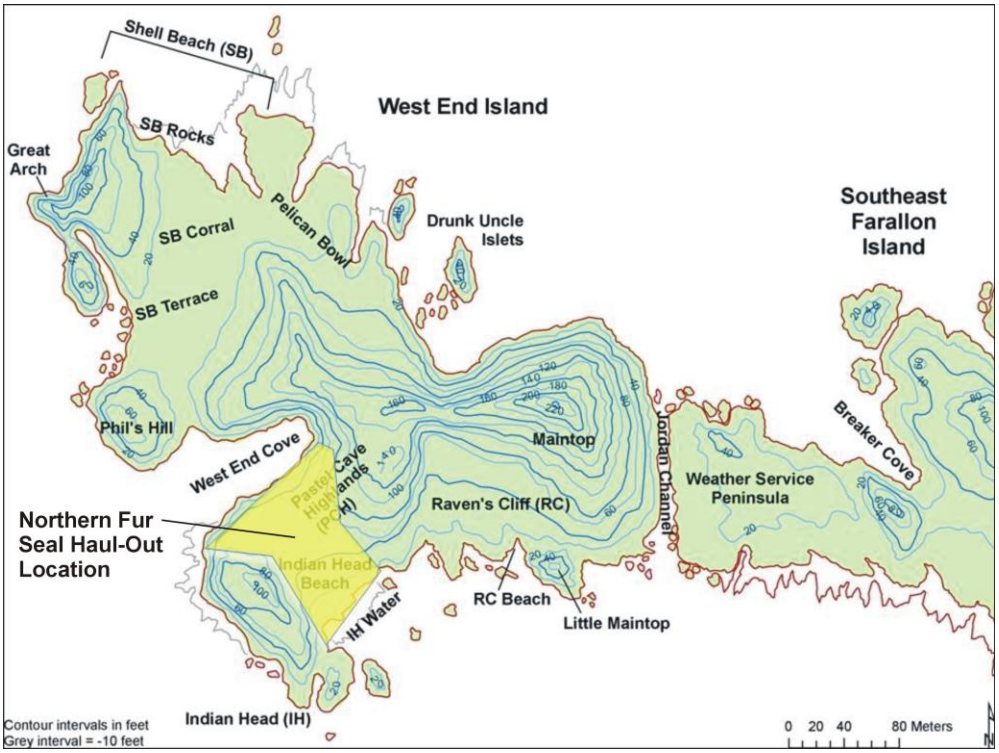

Figure 5. Northern fur seal haul-out location on the South Farallon Islands. Map source, PRBO Conservation Science, 2012.

Table 4. Probability (%) of encountering pinnipeds on any given day in each area in February and November.*

	East Landing & Blowhole Peninsula	North Landing & Fisherman's Bay	Dead Sea Lion Flat	Mussel Flat	Low Arch	Weather Service Peninsula	Raven's Cliff**	Indian Head**	Shell Beach**	Drunk Uncle's Islet & Pelican Bowl**s
CA Sea Lion November	38	100	100	50	100	100	NA	NA	NA	NA
CA Sea Lion February	38	88	100	88	88	100	100	100	100	100
Harbor Seal November	50	63	13	75	0	13	NA	NA	NA	NA
Harbor Seal February	50	63	13	75	0	0	0	0	0	0
N. Elephant Seal November	0	100	88	100	100	0	NA	NA	NA	NA
N. Elephant Seal February	0	38	50	88	88	0	0	38	100	0
N. Fur Seal November	0	0	0	0	0	0	NA	NA	NA	NA
N. Fur Seal February	0	0	0	0	0	0	0	75	0	0
Steller Sea Lion November	0	0	88	0	0	0%	NA	NA	NA	NA
Steller Sea Lion February	0	0	63	75	13	13	13	88	88	0

* Probabilities (percentages) based on counts completed once weekly each month in two years per area (2010, 2011: n=8), except Shell Beach for elephant seals in February 2010; n=7
NA: Not applicable. **These areas on Maintop Island (West End Island) will not be sampled in November to minimize disturbance to seabirds and marine mammals.

4: A description of the status, distribution, and seasonal distribution (when applicable) of the affected species or stocks of marine mammals likely to be affected by such activities;

Harbor seals, *Phoca vitulina richardsi*: Harbor seals are one of the most widely distributed northern hemisphere pinnipeds, and are also found in coastal, estuarine, and sometimes fresh water. Pacific harbor seals range from Mexico to the Aleutian Islands (Allen et al. 2011). There is considerable regional genetic differentiation between harbor seal populations, as they are generally limited in migratory movements. Presently, there are three recognized stocks along the eastern Pacific (California, Oregon and Washington Coast, and Inland Washington).
Unlike most pinnipeds occurring off California, Pacific harbor seals maintain haul-out sites on the mainland on which they pup and breed (Allen et al. 2011). Haul-outs may be occupied at any time of year for resting. Pupping generally occurs between March and June and molting occurs between May and July (NCCOS 2007). The most recent minimum population estimate of the California stock is at least 31,600 individuals (NMFS 2011). After increases in the 1990s, this population is believed to be stable and possibly reaching its carrying capacity (NMFS 2011). Harbor seals are not listed under ESA or as "depleted" under the MMPA.

In central California, harbor seals breed annually from March through May and molt in June and July. Females give birth to a single pup and attend the pup for around 30 days, at which time

they wean pups. Mating occurs in the water around the time of weaning. Harbor seals are resident year round at terrestrial colonies; however, juveniles may disperse to other colonies ranging up to 500 km. Individual adult seals may also migrate widely from breeding colonies.

Given the wide distribution of harbor seals it is not surprising that their population trends vary widely. Harbor seal populations in the Eastern North Pacific along the West Coast of the United States are all increasing. Along the coast of Washington and Oregon harbor seals increased in number at a rate of between 4 to 7% per annum with an estimated population of over 30,000 (Jefferies et al. 1997). Additionally, along the California coast harbor seal numbers have increased at 3.5% per year from 1982 to 1995 with a minimum population of approximately 28,000 (Hanan and Beeson 1994, Carretta et al. 2001). Brown et al. (2005) estimated a population of 10,087 harbor seals in Oregon. There is evidence that the population may have reached equilibrium off Oregon and Washington and central California (Barlow et al. 1998, Sydeman and Allen 1999, Carretta et al. 2010). The most recent population estimate for California based on mark-recapture analysis is 43,449, based on a correction factor of 1.65, and a population at Point Reyes was estimated to be 7,524 for the molt season based on the same correction factor (Lowry et al. 2005, Manna et al. 2006).

California sea lions, *Zalophus californianus californianus*: The California sea lion is the most abundant pinniped in California, representing 50 to 93 percent of all pinnipeds on land and about 95 percent of all sightings at sea (Bonnell et al. 1981, Bonnell and Ford 1987). This species is separated into three recognized stocks based on three geographic regions (U.S. stock, which is the stock found on the Farallon Islands, Western Baja stock, and the Gulf of California stock; NMFS 2011). The 2005 estimated minimum stock is 141,842 (Carretta et al. 2011). California sea lions are not listed under ESA or as "depleted" under MMPA. Stable rates of pup production indicate that the ecological carrying capacity may have been reached in 2000. On the Farallon Islands, California Sea Lions haul out in many intertidal areas year round, fluctuating from several hundred to several thousand animals.

California sea lions, however, breed almost entirely on islands in southern California, Western Baja California, and the Gulf of California. The breeding time period and rookery occupancy is mid-May to late July (NCCOS 2007). In central California, a small number of pups are born on Año Nuevo Island, Southeast Farallon Island, and occasionally at a few other locations; otherwise the central California population is composed of non-breeders. Breeding animals on the Farallon Islands are concentrated in areas where researchers generally do not visit (PRBO unpublished data).

Some movement has been documented between geographic stocks, but rookeries in the U.S. are widely separated from major rookeries of western Baja California, Mexico (Barlow et al. 1995). Commercial harvest of the species in southern California and Mexico reduced the population to approximately 1,500 individuals by the 1920s. Since the passage of the Marine Mammal Protection Act in 1972, the California sea lion population has steadily increased along the West Coast of the United States (Carretta et al. 2002). The California sea lion has the largest population of any sea lion species and is the only sea lion whose population is showing a healthy growth rate of 5% to 6.2% per annum. Net production between 1980 and 2001 averaged 15.1%.

Annual incidental takes in fisheries is approximately 915 individuals; however, the population is growing by 8.2% per year and fishing mortality is declining (Barlow et al. 1995).

Northern elephant seals, *Mirounga angustirostris*: The northern elephant seal is present year-round off central California; however, because they spend very little time at the surface and forage mostly offshore, at-sea sightings are rare (NCCOS 2007). The breeding population is distributed from central Baja California, Mexico to the Point Reyes Peninsula in northern California. Along this coastline there are 13 major breeding colonies. Northern elephant seals typically haul-out on land only to breed and molt and then disperse widely at sea. The breeding period is generally December through March and molting occurs April through August; females and juveniles molt in April to May; sub-adult males molt in May to June, and adult males molt in July to August; and yearlings molt in the fall. Females typically give birth to a single pup and attend the pup for up to 6 weeks. Breeding occurs after the pup is weaned by attending males. After breeding, seals migrate to the Gulf of Alaska or deeper waters in the eastern Pacific. Adult females and juveniles return to terrestrial colonies to molt in April and May, and males return in June and July to molt, remaining onshore for around 3 weeks.

The northern elephant seal was exploited for its oil during the 18th and 19th centuries and by 1900 the population was reduced to 20-30 individuals on Guadalupe Island (Hoelzel et al. 1993, Hoelzel 1999). As a result of this bottleneck, the genetic diversity found in this species is extremely low (Hoelzel 1999). The recent formation of most rookeries indicates that there is no genetic differentiation among populations. Although movement and genetic exchange occurs among colonies, most seals return to their natal site to breed (Huber et al. 1991). Recolonization of their former breeding range progressed north from the San Benito and Guadalupe Islands off Baja California to the most recent northernmost breeding site at Point Reyes Headlands. In the last three decades, annual pup production has increased at the rate of 9.43 ± 0.51% per year in California and 5.19 ± 0.33% per year over the entire range (Barlow et al. 1993).

A complete population count of elephant seals is not possible because all age classes are not ashore at the same time. Elephant seal population size is usually estimated by counting the number of pups produced and multiplying by the inverse of the expected ratio of pups to total animals (McCann 1985). Stewart et al. (1994) used McCann's multiplier of 4.5 to extrapolate from 28,164 pups to a population estimate of 127,000 elephant seals in the U.S. and Mexico in 1991. The multiplier of 4.5 was based on a stable population. Boveng (1988) and Barlow et al. (1993) argue that a multiplier of 3.5 is more appropriate for a rapidly growing population such as the California stock of elephant seals. Based on the estimated 28,450 pups born in California and this 3.5 multiplier, the California stock was estimated to be approximately 101,000 individuals in 2001 (Carretta et al. 2002). Other estimates are at least 74,913 individuals occur in California, and the stock appears to increasing (NMFS 2011). The 2005 California stock was estimated at 124,000, and the minimum population was conservatively estimated at 74,913 (U.S. Pacific Marine Mammal Stock Assessments: 2009, http://www.nmfs.noaa.gov/pr/sars/species.htm). Northern elephant seals are not listed under ESA or as "depleted" under MMPA.

At Point Reyes, the population grew at 32.8% per year between 1988 and 1997 (Sydeman and Allen 1999) and around 10% per year since 2000 (S. Allen unpubl. data), and in 2006 around 700 pups were born at three primary breeding areas. In contrast, the population on the Farallon

Islands has declined by 3.4% per year since 1983, and in recent years numbers have fluctuated between 100 and 200 pups (PRBO unpubl. data).

Steller Sea Lion, *Eumetopias jubatus*: The Steller sea lion ranges along the North Pacific rim, from northern Japan, the Aleutian Islands, Gulf of Alaska, and south to Año Nuevo Island, California (the southernmost rookery). Critical habitat identified for this species includes the major California rookeries at Año Nuevo and the Farallon Islands. In 1990, the Steller sea lion was listed as a threatened species under the ESA, and the western stock was listed as endangered in 1997.

In the 1960s and 70s the number of sea lions caught in trawl nets peaked, while present day numbers are lower. California fisheries target several of the most important prey items for Steller sea lions and millions of metric tons of prey have been removed by fisheries in recent decades. Incidental mortality of Steller sea lions in fisheries was very low between 1990 and 2001 in California. Shooting of adults during fisheries interactions in central California have been documented by the Marine Mammal Stranding Network and one adult male was found shot at Point Reyes, California in the 1990s. In Alaska, there are also several processes that have been debated as contributing to the decline of the Steller sea lion population, including global climate change and killer whale predation (Springer et al. 2003).

Adult males begin arriving on the rookeries first, in mid-May and establish territories. Pregnant females arrive in late May and give birth to a single pup. Females and pups begin leaving the rookeries in September and pups typically remain with their mother through the first year. Steller sea lions are known to feed on a variety of nearshore, sublittoral prey in estuarine and marine waters. Jones (1981) reported that Steller sea lions feed mainly on bottom-dwelling fishes, and that all the prey items normally eaten by this species inhabit waters less than about 600 feet deep. Numbers have declined precipitously in the last several decades, but the causes of the decline are not well understood (Bartholomew 1967, Le Boeuf and Bonnell 1980). The most recent population estimate for the Steller sea lion indicate that at least 42,366 individuals occur in the Western U.S. Stock (NMFS 2011). This population is decreasing (NMFS 2011). Steller sea lions were hunted during the sealing era for fur, hides, blubber, and other organs. More recently, Steller sea lions were harvested during a modern pup hunt that lasted from 1959-1972 in which approximately 45,000 pups were taken (Pasquel and Adkison 1994). At the cessation of the modern commercial hunting the Steller sea lion was found along the Pacific Rim from California to Japan with approximately 70% of the population in Alaskan waters. Two separate populations are recognized within U.S. waters: an eastern population that includes animals east of Cape Suckling, Alaska (144° W, which includes the population on the Farallon Islands), and a western population that includes animals' west of Cape Suckling.

Despite the cessation of the commercial hunt, the Steller sea lion population has experienced a rapid decrease since the mid-1980s with the western population declining by >64% in the last 30 years (Loughlin et al. 1992). The number in 1989 was estimated at 68,094 individuals. This total includes 10,000 in Russia, 47,960 in Alaska, 6,109 in British Columbia, 2,261 in Oregon, and 1,764 in California (Loughlin et al. 1992). Numbers in Alaska have been declining by 7.8 % since 1994 (National Marine Mammal Laboratory 1995) and have declined by 3% in California (Le Boeuf et al. 1991, Ono 1993).

Steller sea lions give birth in May through July and breeding occurs a couple of weeks after birth. Pups are weaned during the winter and spring of the following year.

On Southeast Farallon Island, California, the abundance of females declined an average of 3.6% per year from 1974 to 1997 (Sydeman and Allen 1999). Also, pup counts at Año Nuevo declined 5% annually through the 1990s and have apparently stabilized between 2001 and 2005 (M. Lowry, SWFSC unpublished data). In 2000, the combined pup estimate for both islands was 349. In 2005, the pup estimate was 204 on Año Nuevo. Pup counts on the Farallon Islands have generally varied from 5-15 (Hastings and Sydeman 2002, PRBO unpublished data). Pups have not been born at Point Reyes Headland since the 1970s and Steller sea lions are seen in very low numbers there currently (S. Allen, unpubl. Data).

Northern Fur Seal, *Callorhinus ursinus*: The northern fur seal is the most abundant otariid in the Northern Hemisphere. Most of the population is associated with rookery islands in the Bering Sea and the Sea of Okhotsk, although a small population has existed on San Miguel Island since the late 1950s or early 1960s (NMFS 2011), and several occur on the Farallon Islands. Adult females and juveniles migrate to the central California area (and Oregon and Washington) from rookeries on San Miguel Island in the Southern California Bight (SCB) (Carretta et al. 2006), and from the Pribilof Islands in the Bering Sea (NCCOS 2007). During winter migration, female northern fur seals from the Pribilof Islands travel south and arrive off California beginning in February and remain until about August before returning to breeding grounds (NCCOS 2007). The most recent population estimates for the San Miguel Island stock indicate that at least 74,913 individuals are known to occur (Carretta et al. 2011). No long-term population trends have been determined at this time (NMFS 2011).

The northern fur seal population on the Farallon Islands has fluctuated greatly over the past two centuries. Large numbers of northern fur seals were hunted from the Farallon Islands in the 1800s. Harvest records suggested that over 100,000 fur seals were hunted from the islands and were basically extirpated in the late 1800s through mid-1900s (Pyle et al. 2001). The first pup born on the Farallon Islands since extirpation was documented in 1996 on Maintop Island, near Indian Head. The fur seal colony has increased every year since 1996, and remains in the vicinity of Indian Head on Maintop Island. Currently PRBO weekly counts show a peak of 296 adult and juvenile fur seals and 180 pups in 2011 (PRBO, unpublished data).

Northern fur seals breed, pup and molt on the Farallon Islands and a few individuals can be seen on the island year round; however, most depart the island post-breeding in the fall months. The breeding period is mid-May to late July (NCCOS 2007) and rookery occupancy occurs until December when pups are weaned. Breeding animals on the Farallon Islands are concentrated in areas where researchers generally do not visit (PRBO unpublished data).

5: The type of incidental taking authorization that is being requested (i.e., takes by harassment only; takes by harassment, injury and/or death) and the method of incidental taking;

We are requesting authorization for incidental take, by 'Level B' harassment only (behavioral disturbance), of California sea lions, Pacific harbor seals, northern elephant seals, northern fur

seals, and Steller sea lions. Individuals of these species can be hauled out near our study sites, and breeding activity occurs near some of these areas. Although marine mammals will not be deliberately approached by survey personnel, approach may be unavoidable if pinnipeds are hauled out directly on the study plots. Disturbance may also occur while intertidal biologists walk from one location to another, in order to access the shoreline to map black abalone habitat and locate individual abalone. Incidental harassment may therefore result if hauled animals move away from the biologists conducting the surveys. No motorized equipment is involved in conducting these surveys.

6: By age, sex, and reproductive condition (if possible), the number of marine mammals (by species) that may be taken by each type of taking identified in paragraph (a)(5) of this section, and the number of times such takings by each type of taking are likely to occur;

The only type of take to occur will be incidental take by disturbance (Level B harassment). Much of the response to this description appears in Section 3 above. Based on past observations in 2010 and 2011, the maximum number of California sea lions, Pacific harbor seals, northern elephant seals, northern fur seals, and Steller sea lions likely to be present in the vicinity of our monitoring sites when arriving to those sites for sampling is estimated to be 6,850, 175, 225, 20, and 95, respectively, based on maximum counts (Table 3). These numbers are considered to be maximum numbers and most likely the number of individuals to be disturbed annually will be less. See Table 2 for calculated average numbers of disturbance s by species, location, and month. See Table 3 for percentage of time present at each location, thus likely to be disturbed during sampling in February and November.

The distribution of pinnipeds hauled out on beaches is not consistent throughout the year. The number of marine mammals disturbed will vary by month and location. Only those animals hauled out closest to the actual survey sites may be disturbed by the presence of biologists and alter their behavior or attempt to move out of the way.

No detailed data are readily available to estimate the number of disturbances by age, sex or state of reproduction. Data on age and possibly sex could be included in reporting requirements, if data are requested or required as a condition of the authorization.

7: The anticipated impact of the activity upon the species or stock;

The only anticipated impact would be causing the temporary (less than five hours) movement of pinnipeds from haul-out areas, in response to the presence of biologists. Disturbance from these activities will be expected to have a short-term negligible impact on pinniped species, population, or stock. The research activities are for only a brief duration and for limited visits each year one to two visits per site per year). See Table 3 for schedule and location of each potential disturbance and Appendix I for proposed areas to be searched for black abalone.

All measures will be used to ensure that flushes do not result in a stampede of pinnipeds heading to the sea. From our experience, conducting slow movements and staying close to the ground lowers the chance and can prevent a stampede from occurring. It is expected that any incidental disturbance to pinnipeds from our sampling and monitoring will have minimal, short-term effects and no long-term effects on the individuals, species, population or stock. Incidental disturbance

consisting of animals departing from an area will be minimal because pinnipeds usually return to a site or a nearby site within 30 minutes upon conclusion of shore activities (Allen et al. 1985). Numerous Incidental Harassment Authorizations and Letters of Authorizations under the MMPA, Incidental Take Permits under Section 10(a)(1)(b) of the ESA, issued by NMFS (e.g. 72 FR 124) and reports (e.g., Demarchi and Bentley 2004) have analyzed the potential effects of incidental disturbance to pinnipeds from various sources. Based on these reports, the effects to pinnipeds appear, at most, to displace the animals temporarily from their haul-out sites. Also, from PRBO research, it is not expected that pinnipeds would permanently abandon a haul-out sites, as precautions would be taken to not disturb the same haul-out site on frequent repeated occasions. No research would occur where the separation of mother and her nursing pup or crushing of pups can become a concern.

In all areas, the shoreline habitats of the study areas are of steeply sloping rocks with unimpeded and non-obstructive access to the water. Disturbed animals will be able to move towards the water without risk of encountering barriers or hazards that would otherwise prevent them from leaving the area. On this basis, the probability of causing serious injury, shock, or death to hauled animals should be zero.

8: The anticipated impact of the activity on the availability of the species or stocks of marine mammals for subsistence uses;

There will be no impact from the research on the availability of the species or stocks for subsistence. All disturbances will occur on the Farallon National Wildlife Refuge where there is no subsistence harvest of marine mammals.

9: The anticipated impact of the activity upon the habitat of the marine mammal populations, and the likelihood of restoration of the affected habitat;

The only habitat modification associated with our monitoring is the quadrat locations being marked with marine epoxy. The plot corners are marked with a 3x3 cm patch of marine epoxy glued to the benchrock for relocating the quadrat sites. Markers have been in place since 1993, and we have seen pinniped populations increase throughout the islands. The markers have had no affect on habitat suitability for pinnipeds. Maintenance is sometimes required, which consists of replenishing worn markers with fresh epoxy or replacing markers that have become dislodged. No gas power tools are used, so there is no potential for noise or accidental fuel spills disturbing animals and impacting habitats. Placement of markers is permitted through managerial authorization GFNMS-2009-001-A1. Access to the islands is permitted through USFWS, Farallon National Wildlife Refuge permit #81640-2010-004. Black abalone take permit has been issued to Scott Kimura, NMFS Permit No. 14400.

10: The anticipated impact of the loss or modification of the habitat on the marine mammal populations involved;

There will be no loss of marine mammal habitat. See response to Item 9 above.

11: The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and on their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance;

While our goal is to continue collecting seasonal data on intertidal species composition, abundance, and diversity on the South Farallon Islands, we also recognize the need to minimize incidental take by disturbance of hauled out pinnipeds when completing our work. Pinniped abundance and distribution have increased since the time the intertidal studies began (1993). As a result, encounters with hauled out pinnipeds have become more frequent over time. In order to minimize encounters and incidental take by disturbance to hauled out animals, we will coordinate sampling with other permitted activities (i.e. PRBO and USFWS).

We will conduct slow movements and stay close to the ground to prevent or minimize stampeding, and to give the animals ample opportunity to move slowly away from the area where we are sampling. We will avoid loud noises and leave the area as soon as we have completed our sampling.

We will monitor offshore area for predators such as killer whales and white sharks, and avoid flushing of pinnipeds when predators are observed in nearshore waters.

The presence of the field biologists will be the disturbance pinnipeds will be reactive to, not equipment or structures. We will avoid rookeries and mating grounds during breeding seasons, expect for northern elephant seals. Binoculars will be used to detect pinnipeds before close approach and to avoid being seen. The presence of pinnipeds with pups will lead to re-scheduling work at that site when possible, unless other means to accomplishing the work will be done without causing disturbance.

Workers will be trained on proper behavior to avoid disturbance. Primarily, researchers will be judicious in their route of approach to study sites to avoid close contact with pinnipeds hauled out on shore. In general, observers will stay inshore of pinnipeds whenever possible to allow maximum escape to the ocean. Sea lions, especially, will always be approached slowly to avoid stampedes. Observers will move briskly and carefully near elephant seals and with all mammal species to keep as much distance as possible, keep together as a group, keep voices low, and keep a low profile to avoid disturbing animals. In no case will marine mammals be deliberately approached, and in all cases every possible measure will be taken to select a pathway of approach to study sites that minimizes the number of potential marine mammal encounters. Each visit to a given study site will last for a maximum of 4-5 hours, after which the site will be vacated and can then be reoccupied by marine mammals that may have been disturbed by the presence of survey personnel. By arriving before low tide, worker presence will tend to encourage pinnipeds to move to other areas for the day before they haul out and settle onto rocks at low tide.

We will suspend our sampling and monitoring operations immediately if an injured marine mammal is found in the vicinity of the project area and our activities could aggravate its condition.

Incidental marine mammal takes will not result in the physical altering of marine mammal habitat. No survey or sampling equipment will be left in habitat areas, and no toxic chemicals will be present or left in place.

Disturbances to females with dependent pups can be mitigated to the greatest extent practicable by avoiding visits to those intertidal sites with pinnipeds that are actively nursing, with the exception of northern elephant seals. The time of year we plan to sample, avoids disturbance to young, dependent pups, with the exception of northern elephant seals. Thus, early February and November, at minimum, are preferable for the proposed intertidal survey work in order to minimize the risk of incidental harassment. Harassment of nursing northern elephant seal pups may occur but only to a limited extent. Disruption of nursing to northern elephant seal pups will occur only as biologists pass by the area. No flushing on nursing northern elephant seal pups will occur and no disturbance to newborn northern elephant seals (pups less than one week old) will occur.

In the event of finding pinnipeds breeding and nursing, the intertidal monitoring activities can be re-directed to sites where these activities and behaviors are not occurring. This mitigation measure will reduce the possibility of incidental harassment takes and further reduce the remote possibility of serious injury or mortality of dependent pups.

12: Where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock of marine mammal for Arctic subsistence uses, the applicant must submit either a plan of cooperation or information that identifies what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses.

Not applicable; there is no subsistence use in the region.

13: The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity. Monitoring plans should include a description of the survey techniques that would be used to determine the movement and activity of marine mammals near the activity site(s) including migration and other habitat uses, such as feeding. Guidelines for developing a site-specific monitoring plan may be obtained by writing to the Director, Office of Protected Resources;

Currently many aspects of pinniped research are being conducted by PRBO scientists on the Farallon Islands, which includes elephant seal pup tagging and behavior observations with special notice to tagged animals. Additional observations are always desired, such as observations of pinniped carcasses bearing tags, as well as any rare or unusual marine mammal occurrences. It is the GFNMS intertidal team that in 1996, observed the first northern fur seal pup born on the Farallon Islands since the late 1800s. Once the age and species of the observed pup was verified, the intertidal team immediately notified PRBO biologists and Refuge Manager (Pyle et al. 2001). Our observations and reporting will add to the observational database and marine mammal assessments on the Farallon Islands.

The general goal of improving knowledge of pinnipeds on the South Farallon Islands can be accomplished in three specific ways from our surveys.

1) Observations of unusual behaviors, numbers, or distributions of pinnipeds, such that any potential follow-up research can be conducted by the appropriate personnel.

2) Observations of tag-bearing carcasses of pinnipeds, allowing transmittal of the information to appropriate agencies and personnel.
3) Observations of rare or unusual species of marine mammals for agency follow-up.

14: Suggested means of learning of, encouraging, and coordinating research opportunities, plans, and activities relating to reducing such incidental taking and evaluating its effects.

We will continue to work in coordination with biologists of PRBO Conservation Science Farallon Island Program and management of the Farallon National Wildlife Refuge, in continuing to be consistent in implementing ways and improving ways to minimize disturbance to pinnipeds and seabirds. PRBO is the main group conducting research on the South Farallon Islands, in year round pinniped (and seabird) research and monitoring. PRBO's work, which began in 1968, remains ongoing and is conducted through a Cooperative Agreement with the U.S. Fish and Wildlife Service, Farallon National Wildlife Refuge.

PRBO's pinniped and seabird research involves permitted incidental disturbances to marine mammals, which PRBO retains and incorporates its Incidental Harassment Authorization to access the island to complete their work (Scientific Research Permit 373-1868-00). Access to the island is coordinated under the USFWS Farallon National Wildlife Refuge management and PRBO Scientific Research Permit, issued to Russell Bradley, PRBO Conservation Science. Access to and from the island (landings) will be coordinated through USFWS and PRBO. Access to and from areas on Maintop Island will be coordinated with PRBO's permitted tagging effort to minimize disturbance. Our transit to/from Maintop Island (West End Island) will fall under PRBO's Incidental Harassment Authorization, as we will be traveling with them. As required under our Farallon National Wildlife Refuge permit, the PRBO lead biologist will determine the specific dates to access Maintop Island and determine route of access. Once intertidal biologists detour from the pathway PRBO takes, the take by disturbance to/from and within the intertidal areas, will fall under our own Incidental Harassment Authorization.

The transfer of intertidal biologists on and off the islands will be coordinated through Refuge management, and with personnel exchange and supply trips, as best as possible, to minimize the potential for incidental take by disturbance at the island's landings. Incidental disturbances resulting from the transfer of intertidal biologists and their supplies on and off the island will fall under the Incidental Harassment Authorization issued to PRBO for operating the landing.

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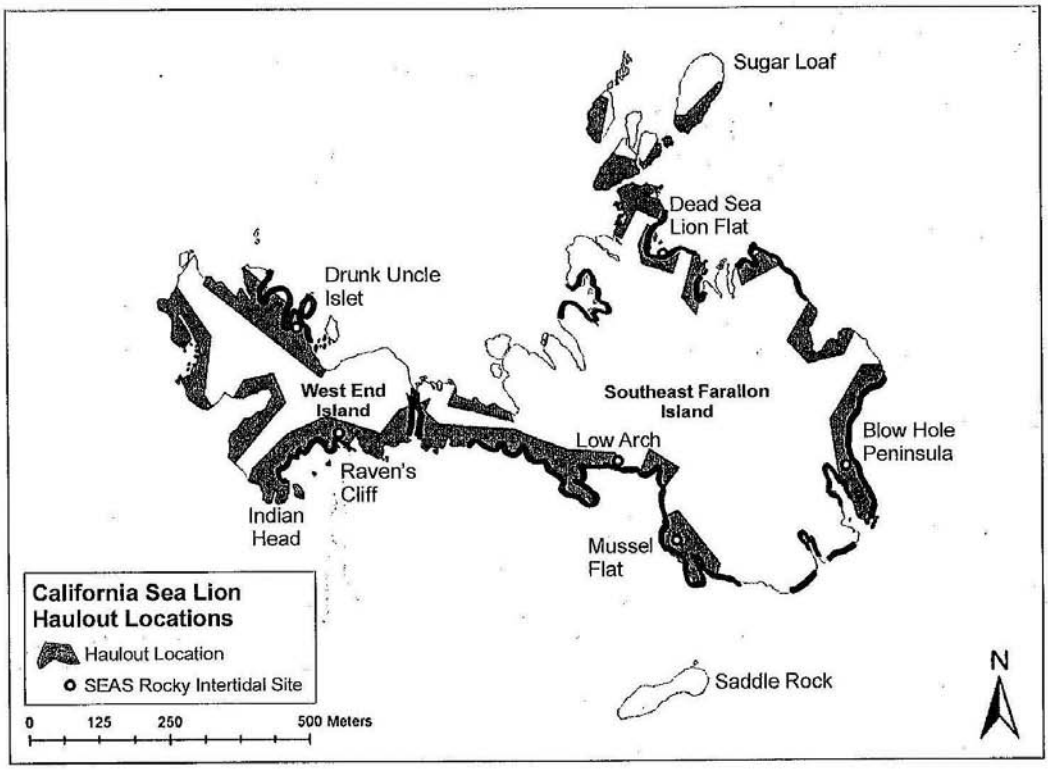
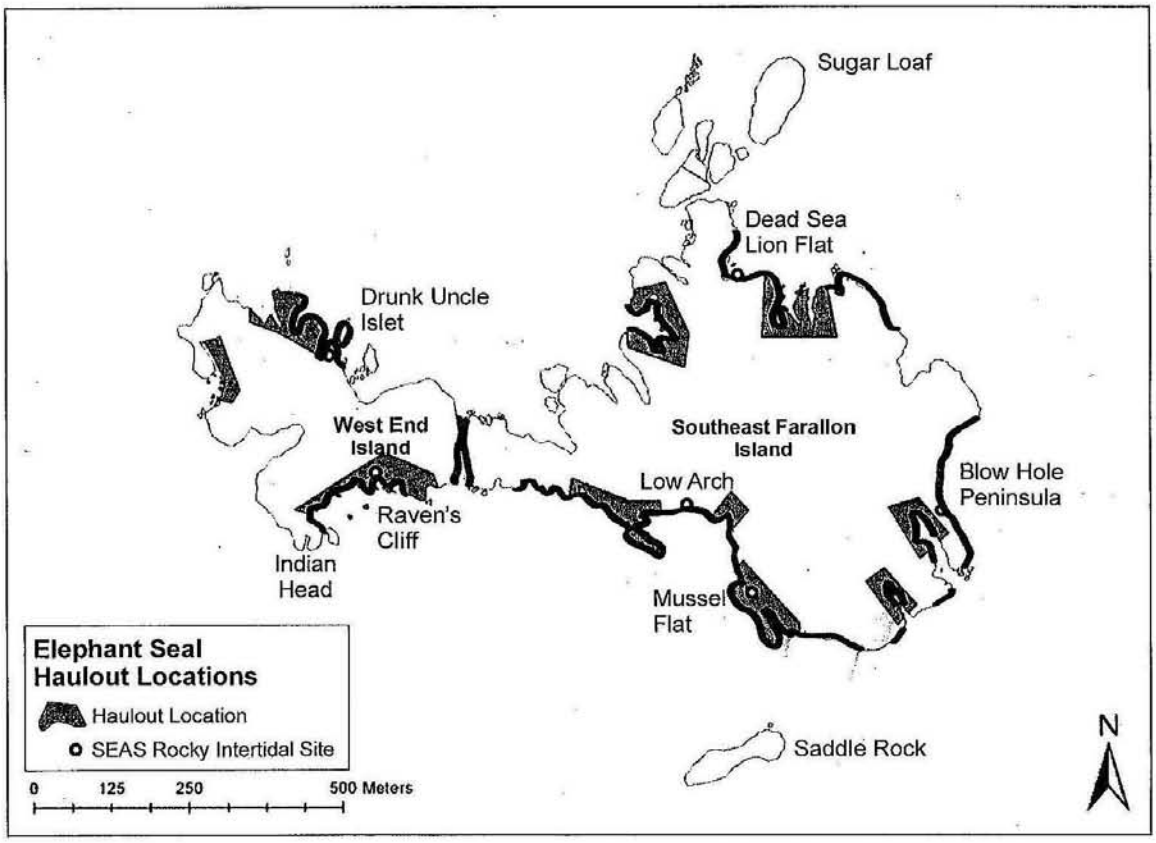
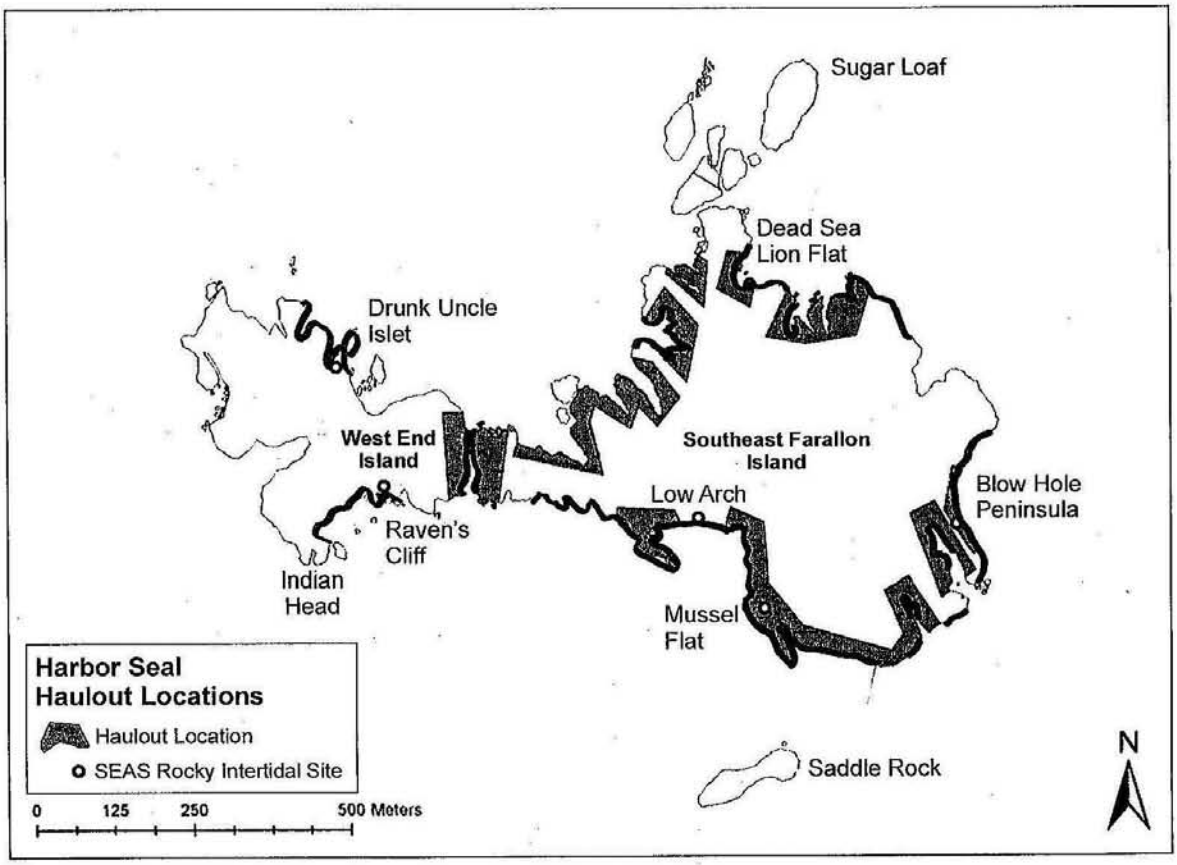
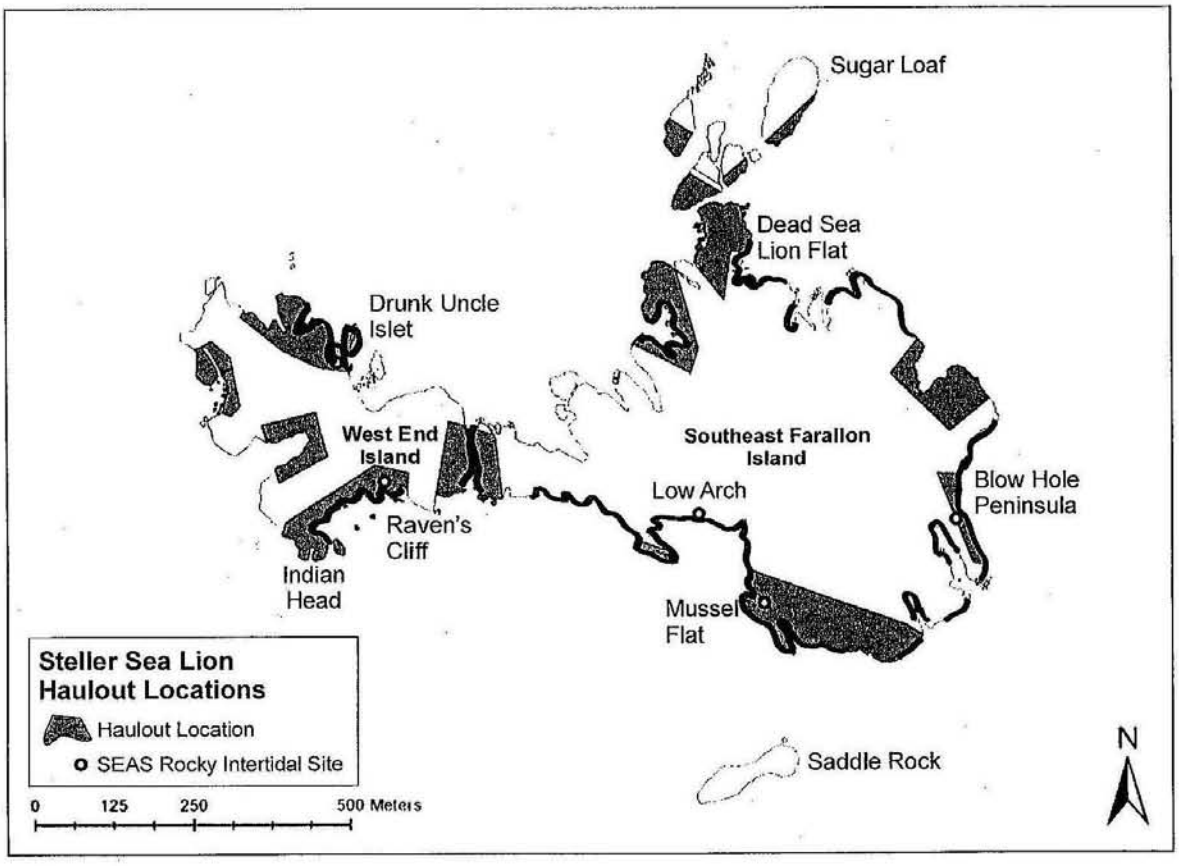
Appendix I – Proposed Sample Areas

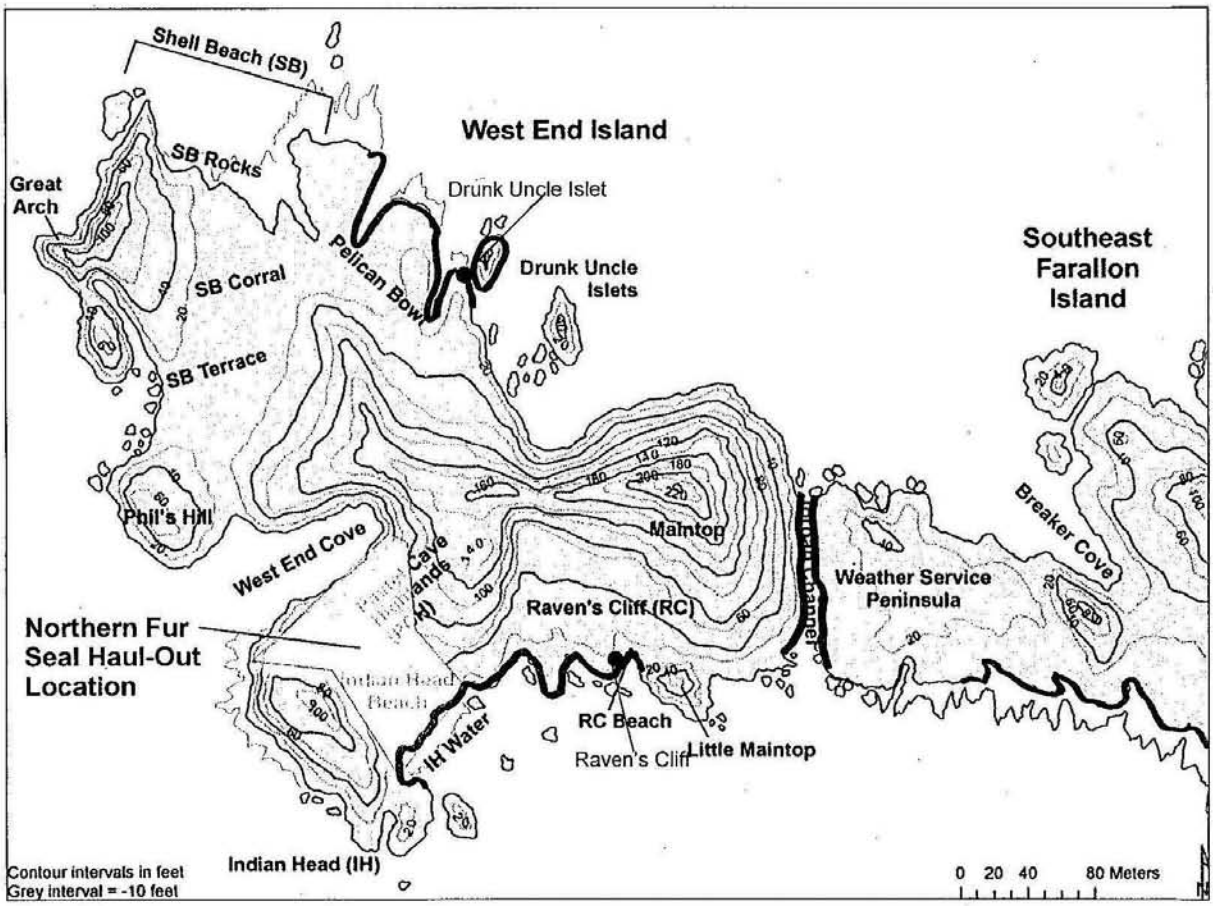
Below are the proposed sample areas, see thick black lines in each Figure. Each Figure ha the same shoreline highlighted. The northern fur seal haul-out Figure is a close up of West End Island (Maintop Island, because these fur seal do not haul out in other areas of the Refuge. Access to these areas will be coordinated by USFWS Farallon National Wildlife Refuge permit and on-site PRBO Conservation Science biologist, per direction of USFWS. Note that not all of the haul-out (shaded) areas will be searched or accessed, only shoreline areas. Our proposed sampling dates are 10-15 November 2012 and 4-12 February 2013, plus or minus 1-3 days each sample period. Dates may be adjusted by USFWS FNWR management. Each portion of the shoreline will be sampled only once during each visit.




Sugar Loaf
Dead Sea
Lion Flat
Drunk Uncle
Islet
West End
Island
Southeast Farallon
Island
Low Arch
Blow Hole
Peninsula
Raven's
Cliff
Indian
Head
Mussel
Flat
Saddle Rock
N
Elephant Seal
Haulout Locations
Haulout Location
SEAS Rocky Intertidal Site
0 125 250 500 Meters


Sugar Loaf
Dead Sea Lion Flat
Drunk Uncle Islet
West End Island
Southeast Farallon Island
Low Arch
Blow Hole Peninsula
Raven's Cliff
Indian Head
Mussel Flat
Saddle Rock
Harbor Seal Haulout Locations
Haulout Location
SEAS Rocky Intertidal Site
0 125 250 500 Meters
N


Sugar Loaf
Dead Sea Lion Flat
Drunk Uncle Islet
West End Island
Southeast Farallon Island
Low Arch
Blow Hole Peninsula
Raven's Cliff
Indian Head
Mussel Flat
Saddle Rock
N
Steller Sea Lion Haulout Locations
Haulout Location
SEAS Rocky Intertidal Site
0 125 250 500 Meters


Shell Beach (SB)
West End Island
SB Rocks
Great Arch
Drunk Uncle Islet
Pelican Bowl
Drunk Uncle Islets
Southeast Farallon Island
SB Corral
SB Terrace
Phil's Hill
West End Cove
Maintop
Breaker Cove
Weather Service Peninsula
Raven's Cliff (RC)
Northern Fur Seal Haul-Out Location
RC Beach
Raven's Cliff
Little Maintop
IH Water
Indian Head (IH)
Contour intervals in feet
Grey interval = -10 feet
0 20 40 80 Meters