Occurrence, Distribution, and Population Estimates of Marine Mammals Near Silver Strand Training Complex and San Diego Bay from October 2013-September 2014

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Cover Photo: Gray whale (*Eschrichtius robustus*) observed on 28 April 2014, on Silver Strand Photographed by B. Saunders.

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14. ABSTRACT
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Abstract

A Distance based visual line-transect survey was designed to gather baseline data on the occurrence, distribution, and population estimations of marine mammals near Silver Strand Training Complex (SSTC) and San Diego Bay (SDB). The nearshore SSTC survey zone encompassed a 77.6 square kilometer (km^2) area that extended from shore out to 8.98 km, which included 14 Navy boat lanes (utilized as training areas). The heavily utilized northern portion of San Diego Bay was also surveyed within a 17.5 km^2 area that covered the north and north central ecoregions of San Diego Bay.

During the warm and cool season periods between October 2013 and September 2014, seventeen survey days were completed (890.8 km) in SSTC and north San Diego Bay (NSDB). During the course of these efforts, 280 observations were made in the survey areas. Six marine mammal species were sighted, with the predominant species being California sea lions (*Zalophus californianus* [SSTC, *n*=132] and NSDB, *n*=109). Odontocete observations (*n*=26) were largely comprised of *Tursiops truncatus* and *Delphinus* spp.. Mysticete whales (*Eschrichtius robustus*) were sighted in nearshore shallow waters of SSTC during January, February, and April-June.

Conventional distance sampling analyses indicated that there was a greater density estimation of in-water SSTC *Z. californianus* during the cool seasonal period (*n*=51, 1.63 individuals per km^2) when compared to the warm period (*n*=59, 1.26 individuals per km^2). In examining density differences between nearshore (3.45 individuals/km^2) and pooled offshore (5.35 individuals/km^2), there was a greater density found within the offshore region. When comparing differences between in-water nearshore (3.45 individuals/km^2) and in-water offshore (2.17 individuals/km^2), the greater density in the nearshore may be attributed to the rich foraging grounds found in the kelp beds. In-water NSDB *Z. californianus* density estimates were pooled for warm and cool periods (n=19, 13.0 individuals per km^2).

Within SSTC, dolphin species observations were pooled for density estimations (4.55 individuals per km^2). All analyses presented within this report should be considered and interpreted within the context of large-scale known climatic events (El Niño Southern Oscillation, North Pacific Gyre Oscillation) that can drive bottom up marine ecosystem processes that can have broad ranging effects on species growth, recruitment, and migration patterns.

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Table of Contents

Figures

Tables

Acronyms and Abbreviations

°	Degree
AIC	Akaike's Information Criterion
CDS	Conventional Distance Sampling
CPF	Commander, Pacific Fleet
CI	Confidence Interval
CV	Coefficient of Variation
DON	United States Department of Navy
ENSO	El Niño Southern Oscillation
ESA	Endangered Species Act
GIS	Geographic Information System
GPS	Global Positioning System
HSTT	Hawaii Southern California Training and Testing Environmental Impact Statement
km	Kilometer
kts	Knots
m	Meter
MMO	Marine Mammal Observer
MMPA	Marine Mammal Protection Act
NAEMO	Navy Acoustic Effects Model
NAVFAC SW	Naval Facilities Engineering Command, Southwest
NMEA	National Marine Electronics Association
NM	Nautical Mile
NOAA	National Oceanographic Atmospheric Administration
NPGO	North Pacific Gyre Oscillation
NSDB	North San Diego Bay
NTR	Navy Technical Representative
ONI	Oceanic Niño Index
PSD	Port of San Diego
SCB	Southern California Bight
SDB	San Diego Bay
SOCAL	Southern California Range Complex
SSC PAC	Space and Naval Warfare Systems Center, Pacific
SST	Sea Surface Temperature
SSTC	Silver Strand Training Complex
SSTC-N	Silver Strand Training Complex North
SSTC-S	Silver Strand Training Complex South
WILD	Whale Identification Logging and Display

1.0 Introduction

1.1 Background

Bays and estuaries are some of the most dynamic marine environments, which nearshore animals utilize. These highly variable habitats can have great physical and chemical changes over space and time as well as intense anthropogenic inputs. Both top-down and bottom-up ecological controls drive a rich trophic environment, which can support a diversity of species. San Diego Bay (SDB) is the largest naturally occurring marine embayment between San Francisco and Scammon's Lagoon in central Baja California (Allen and Horn 2006). It is a long narrow crescent shaped body of water stretching to a length of 25 kilometers (km) with widths ranging between 1 to 3 km and depths between 1-18 meters (m). Categorized as a low-inflow estuary, its circulation is categorically different between the outer bay's narrow and deep waters and inner bay's wide and shallow areas. Shallow water habitats support seagrass beds (*Zostera marina*) that provide vital spawning, nursery areas, and migration routes for nearshore marine fishes and invertebrates. These seagrass habitats provide food supply, shelter, and suitable physical conditions for development of eggs, larvae, and juvenile fishes and invertebrates (Haedrich and Hall 1976; Cronin and Mansueti 1971).

As a result of this rich feeding environment and numerous human-made structures, California sea lions (*Zalophus californianus*) regularly use SDB as a foraging ground and a haul-out site. However, historical data indicates that a population of bottlenose dolphins (*Tursiops truncatus*) regularly utilized San Diego Bay and its nearshore waters. Norris and Prescott (1961) spent the 1956-57 winter observing cetaceans that inhabited San Diego Bay. From their behavioral observations, they assessed that two populations (inshore and offshore) of *T. truncatus* inhabited the nearshore and embayed (inshore) waters of San Diego. The inshore population was estimated to be between 25-35 individuals that regularly foraged throughout SDB. Approximately 1-4 hours after sunrise, the population appeared at the mouth of SDB and worked their way towards the Coronado Ferry Pier with occasional visits to shallow waters in the south end of SDB. Near dusk, the population would depart SDB at its breakwater entrance. Follow-up observations of the SDB *T. truncatus* population in the fall of 1957 indicated that movements in and out of SDB followed tidal flow. If the tide was coming in (high tide), the population would be moving out of the bay and with the tide going out (low tide), they would be moving into SDB. One could hypothesize that these individuals were following fishes that moved with the jet-like ebb flow found in the mouth of San Diego Bay (Chadwick 1999). In current years, there has been no recorded resident population of cetaceans that regularly inhabit SDB (U.S. Department of Navy [DON] and Port of San Diego [PSD], 2013). It is possible that in the years following the Norris-Prescott study, this population was extirpated as a result of tuna fishing practices and captures for marine parks and aquariums.

Today, San Diego Bay and its nearshore waters are part of a highly urbanized ecosystem with intense coastal and water use, both current and historical. SDB is home to the largest naval complex in the world and California's second largest incorporated city. As an operational user of SDB and its nearshore waters, the Navy requires current marine mammal data to manage their activities. The Navy is responsible for compliance with a suite of Federal environmental laws and regulations that apply to marine mammals and other marine protected species, including the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). Moreover, the final rules in place to govern the unintentional taking of marine mammals incidental to authorized activities conducted on Navy ranges and operating areas require that the Navy, with guidance and support from National Marine Fisheries Service, implement an Integrated Comprehensive Monitoring Program. The Integrated Comprehensive Monitoring Program provides the overarching coordination that

will support compilation of data from project-specific monitoring plans as well as Navy-funded research and development studies. Pursuant to the Final Rules, the Integrated Comprehensive Monitoring Program applies by regulation to those activities on Navy training ranges for which Navy sought and received incidental take authorizations. The Integrated Comprehensive Monitoring Program is intended for use as a planning tool to focus Navy monitoring priorities pursuant to Endangered Species Act and Marine Mammal Protection Act requirements. The Integrated Comprehensive Monitoring Program currently includes specific monitoring plans that have been or are being developed for the Southern California (SOCAL) Range Complex as well as various other ranges in the Atlantic and Pacific.

San Diego Bay and Silver Strand Training Complex (SSTC) are part of the SOCAL Range Complex that is regularly utilized for Navy training activities. This project is designed to specifically support one element of regulatory required monitoring in the SOCAL Range Complex: to collect baseline observations and densities of marine mammals within north San Diego Bay and the Silver Strand Training Complex boat lanes (Figure 1). Boat lanes 1-10 are part of SSTC-N (Silver Strand Training Complex North) and 11-14 are part of SSTC-S (Silver Strand Training Complex South) with each lane measuring 500 yards wide and stretching 4,000 yards seaward.

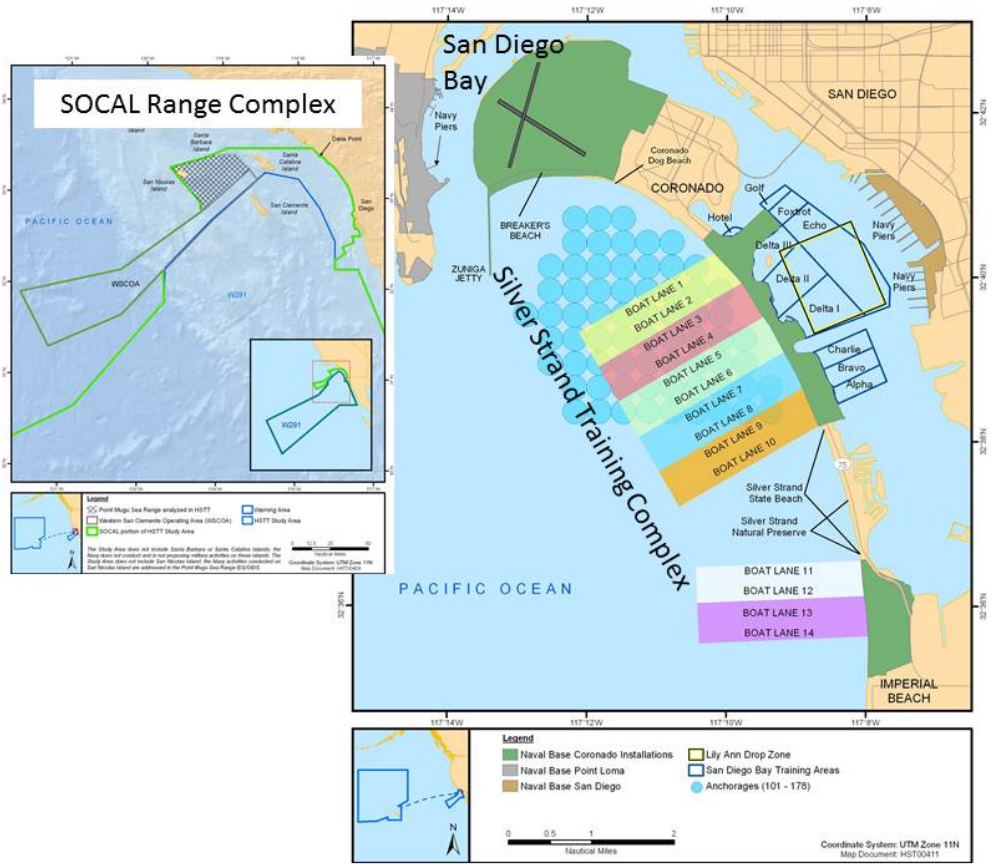


Figure 1: Southern California Range Complex and Silver Strand Training Complex

Project Objective:
Space and Naval Warfare Systems Center, Pacific (SSC PAC) Environmental Readiness Division Team initiated a visual survey effort beginning in October 2013. Under contract with Commander, Pacific Fleet (CPF), surveys were conducted in coastal waters within north San Diego Bay and SSTC-N and SSTC-S boat lanes. The main objective was to provide quantitative data and qualitative analyses associated with the occurrence and distribution of marine mammals and sea turtles near Silver Strand Training Complex and north San Diego Bay. These data can be used to support the Navy's continued updates to marine mammal density information (Navy Acoustic Effects Model) needed for upcoming environmental documents, impact analysis, and associated regulatory compliance authorizations. All data collection efforts took place through collaboration between biologists at SSC PAC Environmental Readiness Division and Naval Facilities Engineering Command, Southwest (NAVFAC SW).

Project Tasks:
Task 1 – Vessel line-transect surveys: monthly line-transect surveys were conducted in north SDB, SSTC-N, and SSTC-S. The study area and zones were determined through coordination with the NAVFAC SW Navy Technical Representative (NTR), Dr. Thomas Jefferson (HDR, Inc.), and SSC PAC Environmental Readiness Division staff

Task 2 – Monthly Data reporting: monthly cruise reports were delivered to CPF that reported general results (number of marine mammals sighted), environmental conditions, and maps of sighted marine mammals

Task 3 – Final Data analysis and reporting: Line-transect survey data were analyzed by survey area (SSTC and north SDB) using the software program Distance 6.2 Release 1 to provide cluster size, density, and abundance estimates for these study areas

2.0 Methods

2.1 Study Area

The Southern California Bight (SCB), an area of the eastern Pacific Ocean, that follows the California coastline from Point Conception (Santa Barbara County, California) to Cabo Colnett (south of Ensenada, Mexico), has subtropical waters flowing nearshore with cooler subarctic waters flowing offshore creating a unique convergence pattern that forms a biological transition zone, which allows for an abundance of marine species to thrive within this area. Within this unique biological regime, some species are living at their most northern range and others at their southern limit. There are numerous baleen and toothed whales, along with pinnipeds, and marine turtles that have been described in this area and both North San Diego Bay (NSDB) and SSTC are located within the SCB. Within the SCB, a yearlong effort of monthly visual surveys for marine mammals and sea turtles occurred within the Silver Strand Training Complex and north San Diego Bay. There were two primary survey areas established (Figure 2 and Figure 3).

Area 1: *SSTC Nearshore/Offshore* – a 77.6 square kilometer (km^2) area extending from shore out to 8.98 km (4.80 nautical miles [NM]). The nearshore/offshore area includes the 14 Navy boat-training lanes within the Silver Strand waters

Area 2: *North San Diego Bay* – a 17.5 km^2 area covering the north and north central ecoregions of San Diego Bay

Figure 2: SSTC study area stratified between Nearshore and Offshore regions

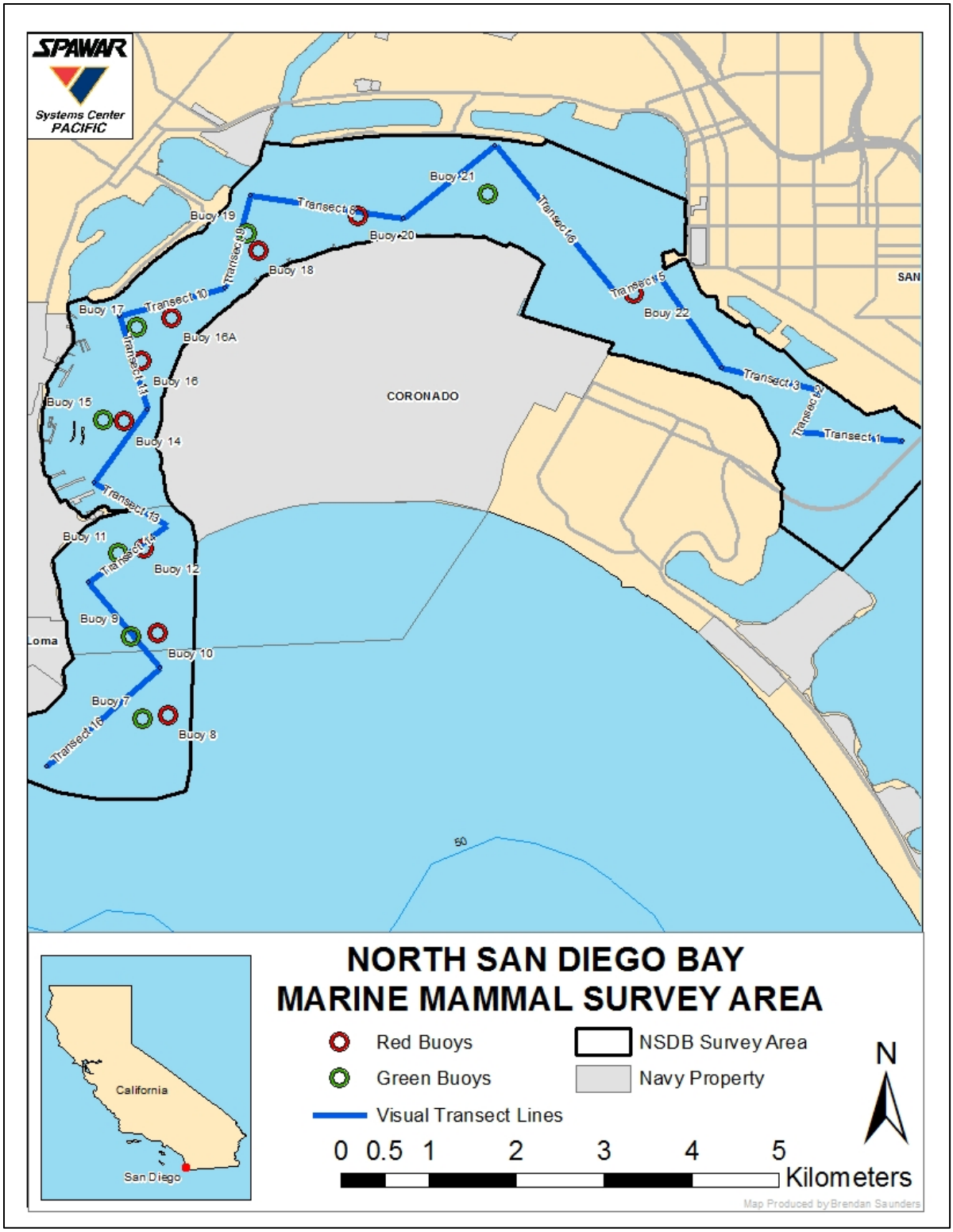


Figure 3: North San Diego Bay study area

2.2 Vessel Line Transect Surveys

Beginning in October 2013, SSTC and NSDB surveys were scheduled for a full day (approximately eight hours) each month. Survey days were chosen to maximize sighting conditions: Beaufort Sea State 0-2, wave height < 1.5 m, and visibility greater than one nautical mile (Wilson *et al*., 1997; Dawson *et al*. 2004; Williams and Thomas 2007). Overall study design was based on Distance methodologies (Buckland *et al.* 2001; Strindberg and Buckland 2004; Buckland *et al*. 2010), primary scientific literature, and consultations with marine mammal subject matter experts (Dr. Thomas Jefferson [HDR, Inc.] and Angela D'Amico [SSC PAC]). SSTC line transect design placed zigzags within equally spaced parallel lines. A zigzag transect line design was chosen as these routes maximized coverage within the survey area and vessel time could primarily be spent "on effort." These transects were designed based on a study region that ran parallel to shore and was stratified between nearshore and offshore waters so that separate density areas could be calculated within SSTC (Figure 2). Nearshore and offshore SSTC transect lines totaled 59.2 km (31.7 NM) in length and were spaced at a distance of 2.75 km (1.5 NM). SSTC nearshore transects efforts totaled 31.9 km and SSTC offshore transects totaled 27.3 km. North San Diego Bay transects were designed with zigzag angles to maximize coverage within this spatially narrow and highly urbanized area. Transect lengths for NSDB totaled 17.4 km.

Platform and Observers

A 17-foot Penetrator with a single 115 horsepower outboard engine was used as the survey vessel platform for 2013-2014 efforts. Survey transect lines were uploaded to a Garmin 740s chartplotter for coxswain navigation. An experienced SSC PAC coxswain operated the survey vessel. Vessel speed was between 8-10 knots (kts). The height of the marine mammal observers' (MMO) eyes above the water line was approximately two meters.

The MMO team comprised of trained marine biologists with at-sea experience identifying eastern Pacific Ocean marine mammals and marine turtles within southern California. Additionally, MMOs were trained with universal protocols for Navy marine mammal monitoring. In total, four observers were utilized during each survey. Two observers were positioned at the vessel's bow on the port and starboard sides scanning direct ahead to 90 degrees (°) for marine mammals. A third MMO recorded data and a fourth MMO photographed marine mammals. Each MMO rotated into a different job after 30 minutes of active observation time. The port and starboard MMOs continuously searched for marine mammals with the naked eye and through hand-held FUJINON FMTRC-SX binoculars that contained a 7 x 50 magnification and a built-in compass with reticles. Observations were given in relation to a 360° arc from the bow, which was defined as 0°.

WILD data collection software

The Whale Identification Logging and Display (WILD) system was utilized to collect all observations. This software is an Office of Naval Research developed product that logs marine mammal sightings while displaying them on a real-time mapper. System hardware consisted of a notebook computer and a hand-held global positioning system (GPS), which was configured in a user defined set up that allowed for flexibility specific to the survey need. The WILD software components utilized during this project consisted of the WILD Logger and WILD Mapper and National Marine Electronics Association (NMEA) distributor software.

The WILD Logger component that was utilized consists of a series of tabs that allowed for the input of environmental parameters and survey sighting information. For the SSTC and NSDB surveys,

environmental parameters were collected every 30 minutes. Environmental data collected in WILD included cloud cover, visibility, glare, wind speed and direction and sea state.

The WILD Mapper displayed real-time position of the survey vessel and calculated positions of any marine mammal sightings. Geographic Information System software (ArcGIS 10.0) was used as the mapper display and a National Oceanographic Atmospheric Administration (NOAA) raster nautical chart of San Diego Bay was used as the base map. The NMEA distributor was used to transfer the position of the survey vessel from the GPS to the WILD Logger and WILD Mapper. The distributor was also used to transfer the logged information to the mapper. All data were GPS time and position tagged and archived in a Microsoft Access database.

Upon spotting an animal, sighting information that was input into WILD Mapper consisted of range and bearing to the animal, species, number of animals, aspect of the animal (heading), cue, initial behavior, observer name and any notes required to augment the standard sighting information. For these efforts, notes indicated when an animal was spotted on a buoy, marker, or structure, so that they could be correctly positioned with ArcGIS 10.1 data analysis tools.

2.3 Data Analysis

Conventional distance sampling (CDS) analysis was used to analyze line transect survey data following methods described by Buckland *et al.* (1993, 2001). Cluster size, density and abundance estimates, as well as CV (coefficient of variation) values, CI (confidence intervals), and detection probabilities were calculated in Distance 6.2, release 1 (Buckland *et al.,* 2010). The following formula was used to compute density, abundance, and CV estimates. Data were examined for outliers and removed. Additionally, sightings at the largest observed distance were truncated for perpendicular sighting distance, which improved model fits. Per Buckland *et al*. (2001), when large observation sizes were available for analysis, data were split between warm (May – October) and cool (November – April) periods. These seasonal delineations reflect standard Navy methods for pooling marine mammal data. Additionally, all analyses assumed a *g(0),* which is the probability of detecting an animal on a transect line, equal to 1.0. The SSTC and NSDB survey areas are shallow and common marine mammal species (dolphins and pinnipeds) are unlikely to conduct long dives within the study region. Bias resulting from this assumption will likely be negligible for density, abundance, and cluster size estimates (Dick, 2011; Engelhaupt *et al.,* 2014; Douglas *et al.,* 2014).

$$\hat{D} = \frac{n\,\hat{f}(0)\,\hat{E}(s)}{2\,L\,\hat{g}(0)}$$

$$\hat{N} = \frac{n\,\hat{f}(0)\,\hat{E}(s)\,A}{2\,L\,\hat{g}(0)}$$

$$\hat{CV} = \sqrt{\frac{\hat{\text{var}}\,(n)}{n^2} + \frac{\hat{\text{var}}\,[\hat{f}(0)]}{[\hat{f}(0)]^2} + \frac{\hat{\text{var}}\,[\hat{E}(s)]}{[\hat{E}(s)]^2} + \frac{\hat{\text{var}}\,[\hat{g}(0)]}{[\hat{g}(0)]^2}}$$

D = density (of individuals),
n = number of on-effort sightings,
$f(0)$ = detection function evaluated at zero distance,
$E(s)$ = expected average group size,
L = total length of transect lines
$g(0)$ = transect detection probability,
N = estimated abundance,
A = size of the study area,
CV = coefficient of variations, and var = variance.

Using Distance 6.2, release 1, several standard detection function models in CDS were fitted to the data: half-normal (with hermite polynomial and cosine series expansions), hazard rate (with cosine adjustment), and uniform (with cosine and simple polynomial adjustments) models. A visual examination of the detection function plot occurred and the Kolmogorov-Smirnov goodness of fit test was used to examine the best model fit (Burnham and Anderson 2002; Buckland *et al*., 2004) and estimates with the lowest value for Akaike's Information Criterion (AIC) were selected.

In both SSTC and NSDB individual odontocente species were not present in sufficient clusters to allow for species estimations to be calculated (Buckland *et al*., 2001). In SSTC, multiple dolphin species (*T. truncatus* and *Delphinus* spp.) were pooled, as they have similar surfacing characteristics (Barlow e*t al*., 2001; Douglas *et al.,* 2014). Large *Zalophus californianus* observation values in SSTC allowed for stratified estimates (nearshore and offshore) of cluster size, density, and abundance to be generated for this species. These parameters were also calculated for both warm and cool periods in SSTC and NSDB. Also, *Z. californianus* observation data were separated for further analysis by excluding haul out observations and solely calculating estimations from the in-water observations.

2.4 North San Diego Bay Analysis Area

When preparing the NSDB data for incorporation into NAEMO, it was noted that the geographic area utilized by the Navy model is a different area than what was surveyed during the study. Therefore, NSDB abundance, density, and cluster size estimates were calculated from sightings that only occurred north of Ballast Point. All NSDB analyses did not include observations south of Ballast Point between Point Loma and Zuniga Jetty (Figure 4).

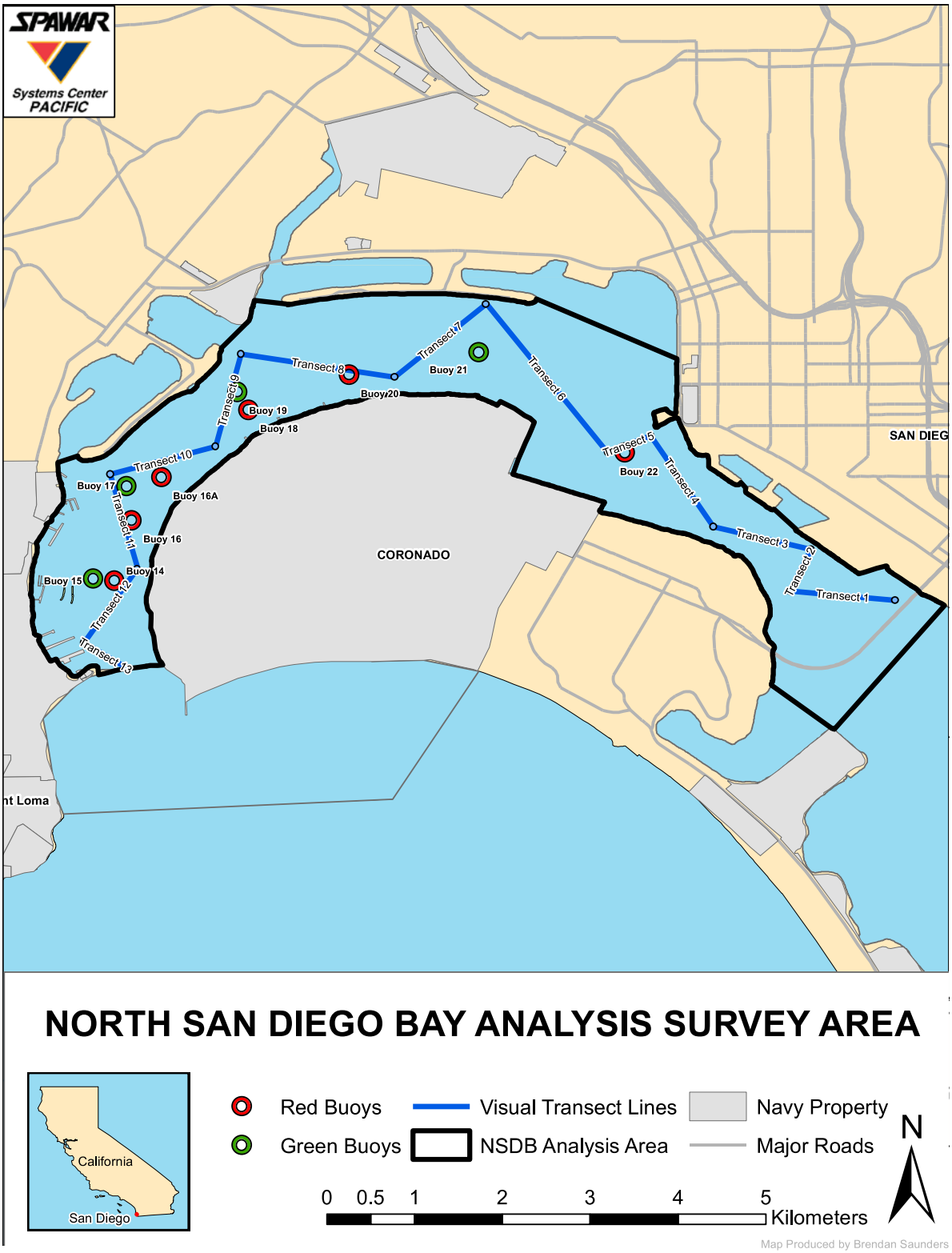


Figure 4: Truncated analysis area for North San Diego Bay

3.0 Results

3.1 Survey Efforts

Seventeen survey days were completed in SSTC and NSDB during the warm and cool periods between October 2013 and September 2014 (Table 1). Six species were found within the study areas (Table 2). The total planned survey effort for SSTC was 710.25 km across 930.58 km^2. Due to inclement weather, some transects were forfeit. The actualized survey effort was 678.38 km of the 888.02 km^2 (approximately 95% of planned effort) for a set of 14 transect lines. Twelve survey sets were completed over 43.8 hours during the warm and cool period of 2013 and 2014. The total planned survey effort for NSDB was 212.53 km across 310.25 km^2 for a set of 16 transect lines. Twelve survey sets were completed over 14.1 hours during the warm and cool period of 2013 and 2014.

Table 1. Summary of SSTC and NSDB line transect survey efforts between October 2013 and September 2014

Date	Sample Period	Transect	Time Start	Time Stop	# of Sightings
25-Nov-13	Cool	SSTC Offshore	12:25 PM	2:06 PM	16
25-Nov-13	Cool	SSTC Nearshore	10:08 AM	12:01 PM	15
21-Nov-13	Cool	NSDB	11:01 AM	1:08 PM	3
17-Dec-13	Cool	SSTC Offshore	11:23 AM	1:26 PM	8
17-Dec-13	Cool	SSTC Nearshore	9:34 AM	11:02 AM	6
17-Dec-13	Cool	NSDB	2:11 PM	3:09 PM	7
17-Jan-14	Cool	SSTC Offshore	1:08 PM	3:19 PM	4
17-Jan-14	Cool	SSTC Nearshore	11:16 AM	12:59 PM	1
23-Jan-14	Cool	NSDB	8:03 AM	9:25 AM	5
25-Feb-14	Cool	SSTC Offshore	10:24 AM	12:45 PM	3
25-Feb-14	Cool	SSTC Nearshore	8:39 AM	10:09 AM	6
12-Feb-14	Cool	NSDB	10:34 AM	11:35 AM	6
20-Mar-14	Cool	SSTC Offshore	8:22 AM	10:37 PM	12
20-Mar-14	Cool	SSTC Nearshore	11:13 AM	1:25 PM	2
20-Mar-14	Cool	NSDB	1:34 PM	2:32 PM	12
28-Apr-14	Cool	SSTC Offshore	10:51 AM	12:22 PM	3
28-Apr-14	Cool	SSTC Nearshore	8:38 AM	10:29 AM	10
28-Apr-14	Cool	NSDB	12:40 PM	1:38 PM	8
23-Oct-13	Warm	SSTC Offshore	9:23 AM	11:40 PM	6
23-Oct-13	Warm	SSTC Nearshore	7:22 AM	8:55 AM	7
23-Oct-13	Warm	NSDB	12:30 PM	1:30 PM	7
22-May-14	Warm	SSTC Offshore	9:03 AM	11:08 AM	6
22-May-14	Warm	SSTC Nearshore	-	-	-
22-May-14	Warm	NSDB	1:32 PM	2:34 PM	9

Date	Sample Period	Transect	Time Start	Time Stop	# of Sightings
20-Jun-14	Warm	SSTC Offshore	8:43 AM	10:39 AM	8
20-Jun-14	Warm	SSTC Nearshore	10:58 AM	1:02 PM	3
30-Jun-14	Warm	NSDB	1:07 PM	2:18 PM	9
21-Jul-14	Warm	SSTC Offshore	7:35 AM	9:48 AM	13
21-Jul-14	Warm	SSTC Nearshore	10:17 AM	11:55 AM	11
21-Jul-14	Warm	NSDB	12:14 PM	1:25 PM	14
25-Aug-14	Warm	SSTC Offshore	8:40 AM	10:52 AM	9
25-Aug-14	Warm	SSTC Nearshore	11:13 AM	12:55 PM	1
18-Aug-14	Warm	NSDB	8:31 AM	9:57 AM	21
30-Sep-14	Warm	SSTC Offshore	10:30 AM	12:08 PM	4
30-Sep-14	Warm	SSTC Nearshore	8:10 AM	10:02 AM	13
30-Sep-14	Warm	NSDB	1:00 PM	1:53 PM	12

Note: warm = (May – October) and cool (November – April)

3.2 Sightings

A total of 280 marine mammals sightings occurred during the 12-month survey (Figures 5-10, Table 2, Appendix A [Sightings Tables and Species Maps], Appendix B [Photography DVD]). No marine turtles were sighted during the effort. Sighting data were transferred from WILD software and mapped used ArcGIS 10.1. The majority of sighted marine mammals were pinnipeds (*Z. californianus*), which comprised 86% (*n*=241 of 280) of all observations between SSTC and NSDB. Cetacean sightings were uncommon in SSTC and NSDB (*n*=39). However, 79% of cetacean sighting occurred during the cool seasonal period (*n*=31). Cetacean species that were sighted include long-beaked and short-beaked common dolphins (*Delphinus* spp.), bottlenose dolphins (*T. truncatus*), gray whale (*Eschrichtius robustus)*, and the false killer whale (*Pseudorca crassidens*). Multispecies sightings of pinnipeds and dolphin species occurred in both SSTC and NSDB.

Table 2: Summary of marine mammal sightings, by species groups and seasonal periods

Survey Area	Seasonal Period	# Cetacean Sightings	# Pinniped Sightings	Total # Sightings
SSTC Nearshore	Warm	2	32	34
SSTC Nearshore	Cool	9	32	41
SSTC Offshore	Warm	5	41	46
SSTC Offshore	Cool	19	27	46
NSDB	Warm	1	71	72
NSDB	Cool	3	38	41
TOTAL		39	241	280

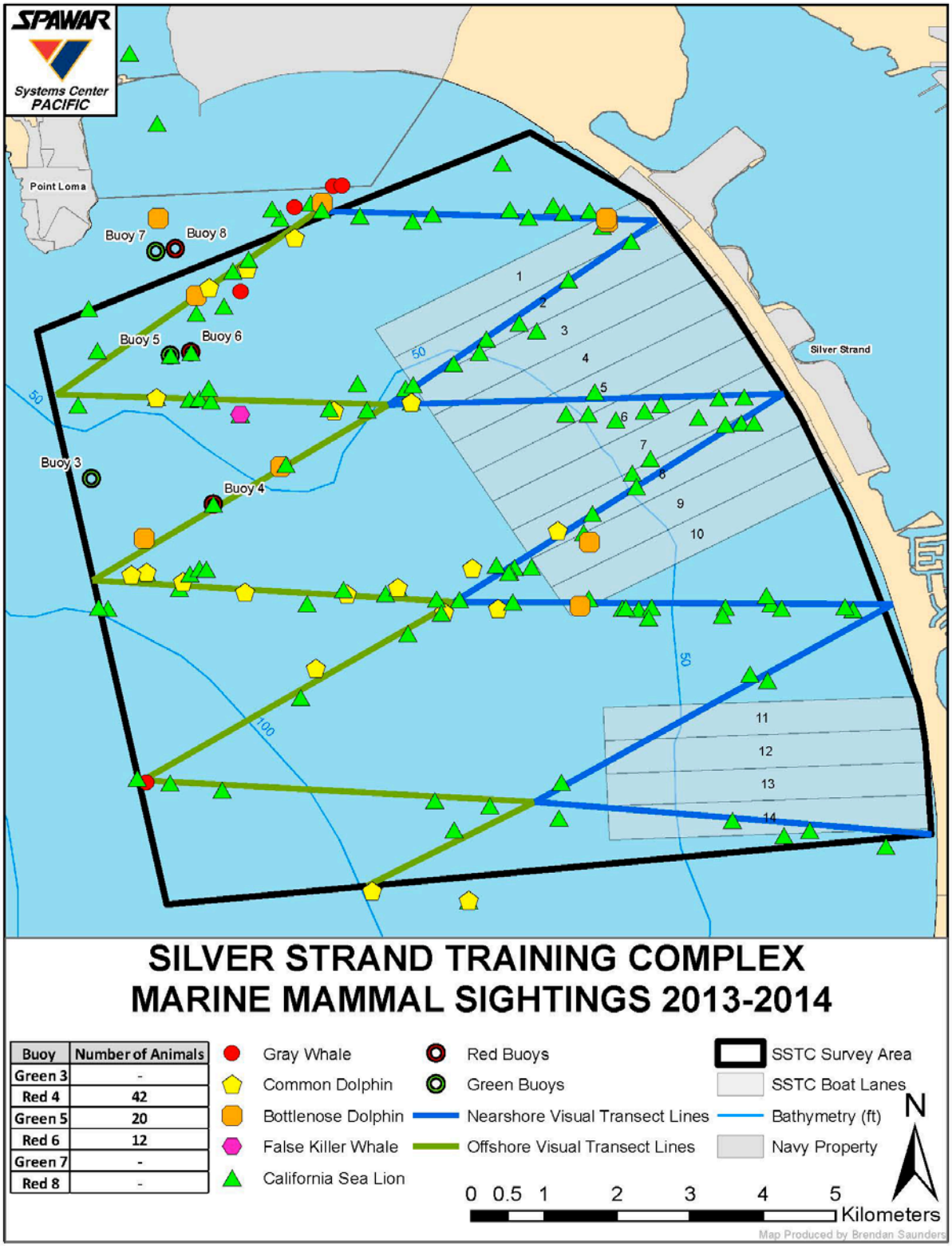


Figure 5: Summary of SSTC marine mammal sightings between October 2013 and September 2014

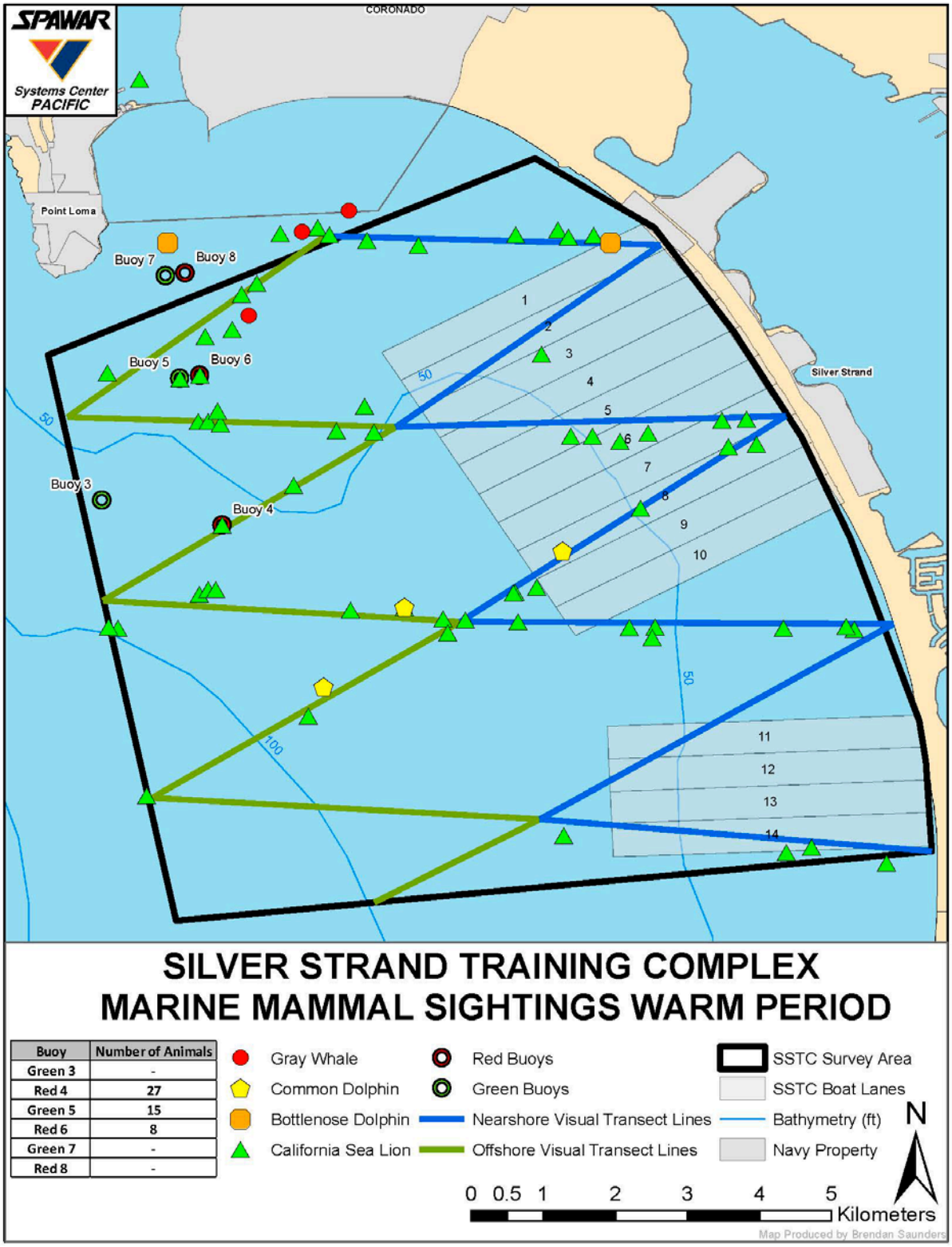


Figure 6: Summary of SSTC marine mammal sightings during the warm seasonal period of October 2013 and May-September 2014

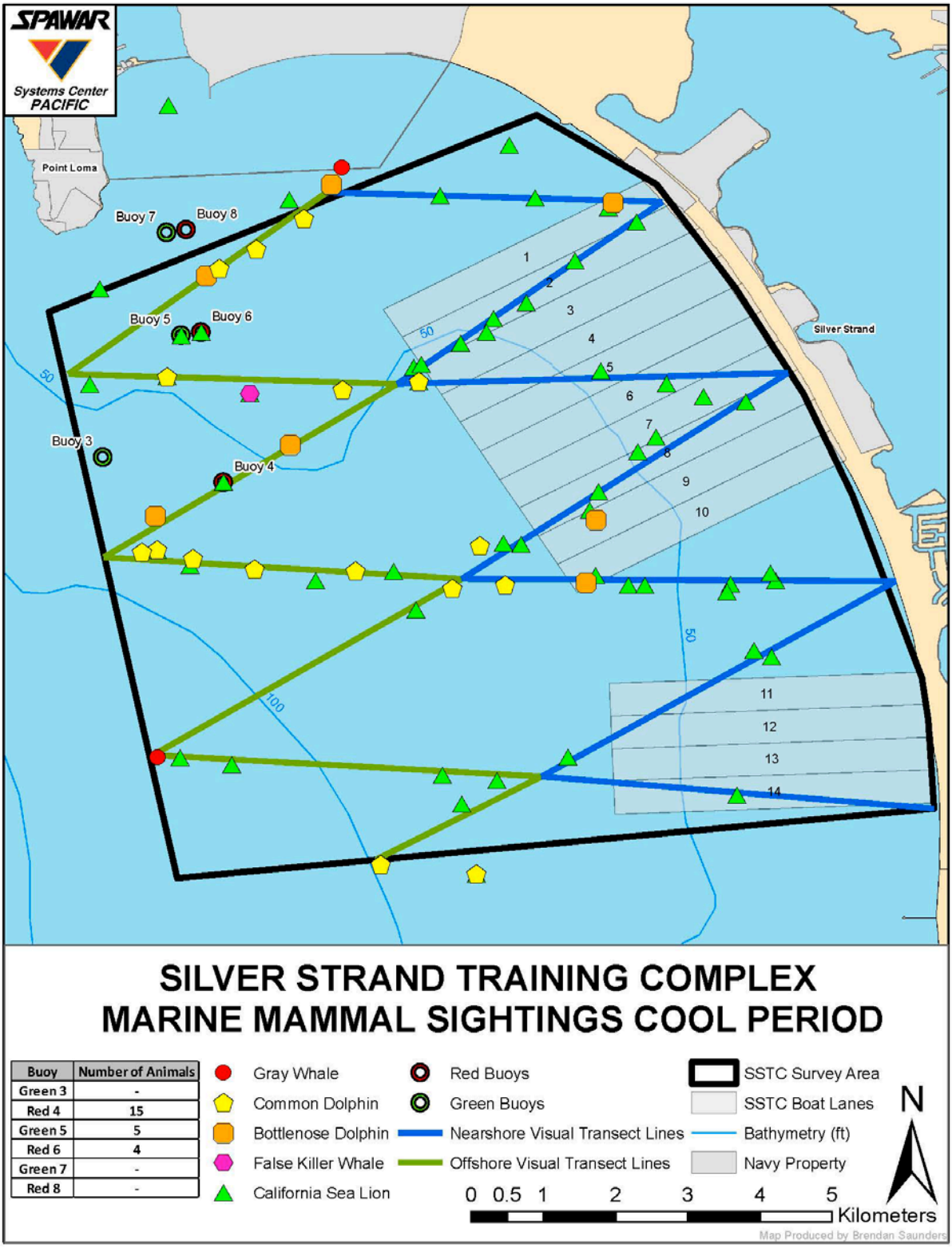
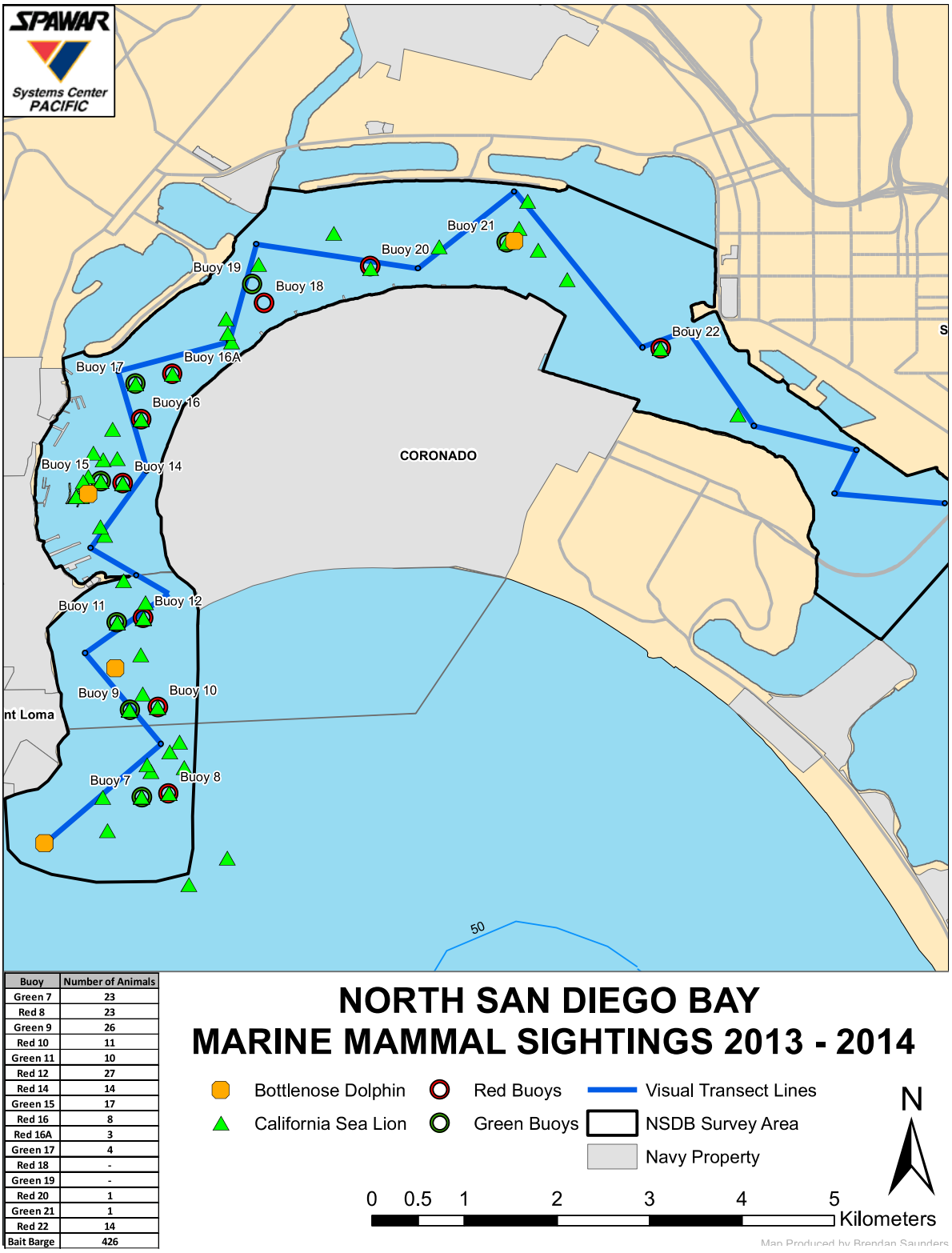
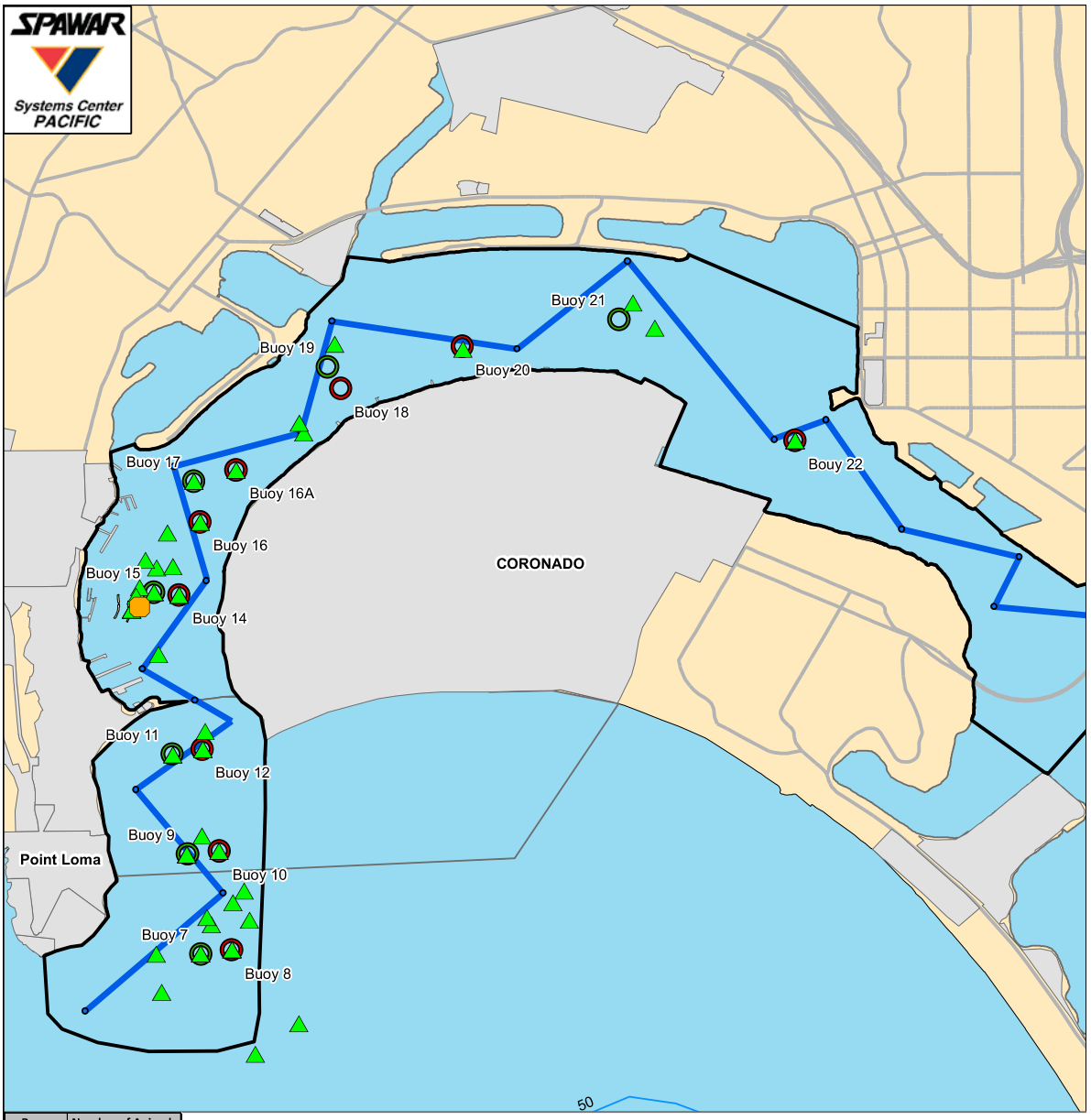


Figure 7: Summary of SSTC marine mammal sightings during the cool seasonal period between November 2013 and April 2014



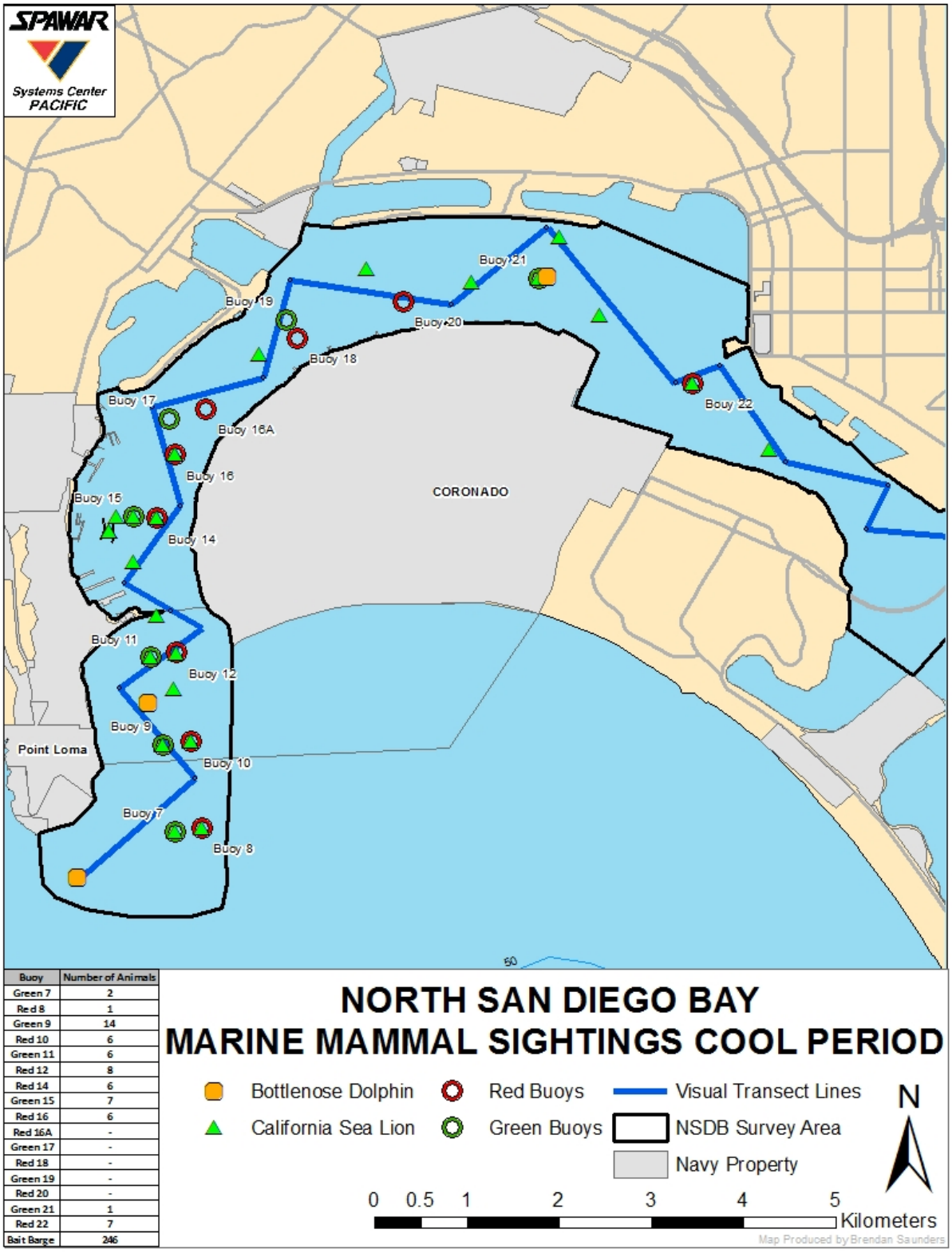
Buoy	Number of Animals
Green 7	23
Red 8	23
Green 9	26
Red 10	11
Green 11	10
Red 12	27
Red 14	14
Green 15	17
Red 16	8
Red 16A	3
Green 17	4
Red 18	-
Green 19	-
Red 20	1
Green 21	1
Red 22	14
Bait Barge	426

Figure 8: Summary of north San Diego Bay marine mammal sightings between October 2013 and September 2014



Buoy	Number of Animals
Green 7	21
Red 8	22
Green 9	12
Red 10	5
Green 11	4
Red 12	19
Red 14	8
Green 15	10
Red 16	2
Red 16A	3
Green 17	4
Red 18	-
Green 19	-
Red 20	1
Green 21	-
Red 22	7
Bait Barge	180

Figure 9: Summary of north San Diego Bay marine mammal sightings during the warm seasonal period of October 2013 and May-September 2014



Buoy	Number of Animals
Green 7	2
Red 8	1
Green 9	14
Red 10	6
Green 11	6
Red 12	8
Red 14	6
Green 15	7
Red 16	6
Red 16A	-
Green 17	-
Red 18	-
Green 19	-
Red 20	-
Green 21	1
Red 22	7
Bait Barge	246

Figure 10: Summary of north San Diego Bay marine mammal sightings during the cool seasonal period between November 2013 and April 2014

3.3 Population Estimates

Abundance, density and cluster size estimates were calculated for California sea lions (*Z. californianus)* in SSTC and NSDB and dolphin species (*Delphinus* spp. and *T. truncatus*) in SSTC (Table 3). Due to limited observations for Gray whales (*n*=6), False killer whales (*n*=1), and dolphin species in NSDB (*n*=3), these species were precluded from population estimations for the study areas. Larger observation values for *Z. californianus* in SSTC allowed for stratified regions (nearshore/offshore) and seasonal period (warm/cool) estimations to be calculated.

Dolphin Species

For dolphin observations in SSTC, estimations were calculated from 26 sightings and 678 km of on-effort line transect data within the combined SSTC nearshore and offshore survey areas. Best fitting plotted detection function are presented in Figure 10. Two observations were truncated for sightings that occurred at 250 and 500 m. Small sample size (*n*=26) prohibited further analyses of stratification by survey area and seasonal period. The best fitting detection function for dolphins was based on the lowest AIC score. These estimates were modeled using the Hazard Rate key with a cosine adjustment (AIC = 256.6). Cluster size ranged from 1-80 animals with a mean cluster size of 20.0 (CV = 22.5%, 95% CI = 13.5-31.2). Most cluster sizes (70.4%) were of dolphins in a group size $\leq$ 20 individuals. Estimated abundance and density for SSTC was 353 dolphins (CV = 46.2%, 95% CI = 146-854) and 4.55 dolphins/km^2 (CV = 46.2%, 95% CI = 1.88-11.0), respectively. A detection probability of 0.32 (CV = 19.8%, 95% CI = 0.21-0.48) occurred within the survey regions.

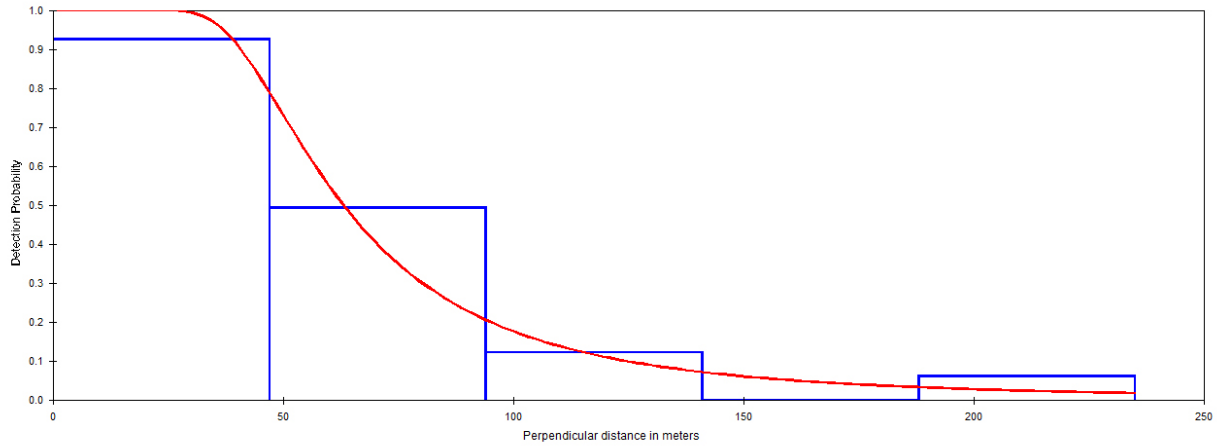


Figure 11: Perpendicular sighting distance histogram (truncated at largest observed distance) and the fitted detection function, Hazard Rate key with a cosine adjustment

California sea lions

For *Z. californianus* in SSTC, estimations were calculated from a pool of 131 observations. Truncation occurred for sightings at the largest observed distance. In-water and hauled out individuals were pooled for analyses in the nearshore (*n*=62) and offshore (*n*=69). When hauled out observations were excluded for analysis, nearshore sightings remained the same (*n*=62) and offshore observations were reduced (*n*=47). There were greater pooled in-water and haul out observation in the warm (*n*=73) than the cool (*n*=59) seasonal period. When excluding hauled out individuals, there were still a greater number of observations during the warm (*n*=59) vs. cool (*n*=51) period.

All SSTC analyses performed optimally using the Hazard Rate key with a cosine adjustment and were selected based on the lowest AIC score (pooled: nearshore-555.9, offshore-597.5, warm-632.1, cool-546.6; in-water only: nearshore-555.9, offshore-409.3, warm-516.8, cool-442.7). Density estimates were greatest for pooled observations in the offshore area (5.35 individuals/km^2) and lowest in the cool period (1.80 individuals/km^2). In looking solely at in-water individuals, density was greatest in SSTC nearshore (3.45 individuals/km^2) and lowest in the warm period (1.26 individuals/km^2). Abundance estimates ranged between 97 (in-water only and warm period) and 200 individuals (pooled and warm period) (Table 3).

For *Z. californianus* in NSDB, estimations were calculated from a pool of 62 observations. Truncation occurred for outliers and sightings at the largest observed distance. When in-water and haul out data were pooled, observations were split between warm (n=38) and cool (n=24) seasonal period clusters. To conduct an analysis of in-water observations, seasonal periods were combined, which resulted in a reduced number of sightings (n=19).

NSDB in-water, warm, and warm/cool pooled analyses performed optimally using the Hazard Rate key with a cosine adjustment (AIC: 140.3, 285.3, and 458.6 respectively). The cool period analysis utilized a half-normal with hermite polynomial expansion (AIC: 173.2). Density estimates were greatest when warm and cool periods were combined, as well as in-water and haul-out individuals were pooled (46.5 individuals/km^2) and lowest for the combined cool and warm seasonal period for in-water individuals (13.0 individuals/km^2). Abundance estimates ranged between 169 (in-water and warm/cool periods) and 607 (pooled and warm/cool periods) individuals (Table 3).

Table 3: Distance estimation summaries for marine mammal populations in SSTC and NSDB

Species	Survey Area	Season	# Sightings used in estimations	Effort (km)	Avg Cluster Size	% CV, 95% CI	Abundance	% CV, 95% CI	Density (km²)	% CV, 95% CI	Detection probability	% CV, 95% CI
Dolphins (*T. truncatus* and *Delphinus* spp.)	**SSTC**	Cool and Warm	26	678	20	22.5%, (13.5-31.2)	353	46.2%, (146-854)	4.55	46.2%, (1.88-11.0)	0.32	19.8%, (0.21-0.48)
Z. californianus	**SSTC Nearshore**[1] (in-water)	Cool and Warm	62	350	2.94	26.8% (1.68-5.14)	147	27.1% (84-257)	3.45	27.1% (1.97-6.04)	0.15	17.1% (0.11-0.21)
Z. californianus	**SSTC Offshore** (in-water)	Cool and Warm	47	328	1.70	30.7% (0.87-3.30)	76	31.7% (39-149)	2.17	31.7% (1.10-4.27)	0.28	45.0% (0.21-0.38)
Z. californianus	**SSTC Offshore** (in-water and haul out)	Cool and Warm	69	328	2.59	27.2%, (1.42-4.72)	187	28.9%, (101-346)	5.35	28.9%, (2.89-9.91)	0.27	12.5%, (0.21-0.35)
Z. californianus	**SSTC** (in-water)	Warm	59	678	1.14	24.7% (0.69-1.87)	97	24.9% (59-161)	1.26	24.9% (0.76-2.08)	0.19	14.3% (0.14-0.25)
Z. californianus	**SSTC** (in-water and haul-out)	Warm	72	678	1.51	23.7%, (0.93-2.45)	200	24.9% (122-330)	2.58	24.9%, (1.57-4.26)	0.18	13.1%, (0.14-0.23)
Z. californianus	**SSTC** (in-water)	Cool	51	678	1.25	24.8% (0.77-2.04)	126	25.4% (77-208)	1.63	25.4% (0.99-2.69)	0.20	49.0% (0.14-0.30)
Z. californianus	**SSTC** (in-water and haul-out)	Cool	59	678	1.25	22.73% (0.80-1.96)	140	24.0% (87-224)	1.80	24.0% (1.12-2.89)	0.17	16.7% (0.13-0.24)
Z. californianus	**NSDB** (in-water)	Cool and Warm	19	157	13.0	54.6% (4.39-38.2)	169	54.6% (57-499)	13.0	54.6% (4.39-38.2)	0.09	49.5% (0.03-0.24)
Z. californianus	**NSDB** (in-water and haul-out)	Cool and Warm	62	157	7.07	47.9% (2.63-19.1)	607	53.5% (212-1738)	46.5	53.5% (16.2-133)	0.47	10.5% (0.38-0.57)
Z. californianus	**NSDB** (in-water and haul-out)	Warm	38	157	4.26	49.2% (1.56-11.6)	276	55.7% (94-814)	21.2	55.7% (7.18-62.3)	0.47	14.7% (0.35-0.64)
Z. californianus	**NSDB** (in-water and haul-out)	Cool	24	157	3.16	51.7% (1.11-8.99)	440	72.2% (118-1641)	33.6	72.2% (9.01-125)	0.60	16.7% (0.423-0.85)

[1] All SSTC Nearshore observational data for *Z. californianus* were in-water sightings.

4.0 Discussion

Marine mammal population estimations for the Silver Strand and north San Diego Bay are of paramount importance for Navy resource managers, environmental planners, and resource management agencies. This project calculated population estimates (cluster sizes, densities, and abundance) for California sea lions and dolphin species. All of these data can be incorporated into the Navy Acoustic Effects Model (NAEMO) for Phase III Hawaii and Southern California Training and Testing (HSTT) Environmental Impact Statement. For the *Z. californianus* analyses, both in-water and pooled in-water results are presented in Table 3.

All analyses indicated that California sea lions are the most common marine mammal in both SSTC and NSDB. During the warm months, California sea lions are engaged in breeding, nursing, and molting, which require more time out of the water (Table 4). The density results from the pooled haul out and in-water analyses are consistent with these behaviors. During the warm period (May-October), the calculated density for pooled observations in SSTC is 2.58 individuals /km^2. Whereas, in the cool period, the density is 1.80 individuals/km^2. During the cool seasonal period, they are predominantly foraging and nursing. These activities require more in-water time, which is reflected in the density results from the in-water analysis. In November-April, in-water density is 1.63 individuals/km^2 and during the warm period it is 1.26 individuals/km^2.

In examining density differences between nearshore (3.45 individuals/km^2) and pooled offshore (5.35 individuals/km^2), there was a greater density found within the offshore region. These differences could be attributed to the availability of multiple offshore channel markers that are used as haul out sites. When comparing differences between in-water nearshore (3.45 individuals/km^2) and in-water offshore (2.17 individuals/km^2), the greater density in the nearshore may be attributed to the rich foraging grounds found in the kelp beds.

Overall, higher abundances of *Z. californianus* were found in NSDB than SSTC. These greater abundances are likely due to the highly urbanized environment of NSDB. Numerous haul out platforms are found throughout NSDB and individuals regularly use them for resting areas. Of particular note is a bait barge found in NSDB. During surveys, up to 85 individuals were found on this structure. Distance estimation summaries for NSDB are intended to provide an initial calculation of *Z. californianus* population densities. These estimates have large confidence intervals that could be a result of small observations used in analyses. Caution should be used when populating models with these density data. Increased survey efforts could improve these results.

Dolphin density estimations were provided from a smaller sample size of observations (n=26) with a calculated value of 4.55 individuals/km^2 and a population abundance of 353 animals. These estimations should be interpreted with caution, as there are large confidence intervals associated with these data and higher CVs. Increased survey efforts currently underway within the SSTC region will provide a more robust cetacean dataset that will better facilitate precision within density and abundance estimates, potential for stratification analyses, and reduced CV. All of these data could build into the NAEMO framework and facilitate Navy training via improved knowledge of cetacean densities within the nearshore waters of SSTC and SDB.

Table 4: *Zalophus californianus* behavioral activity in southern California

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
California sea lion												
Adult males	F	F	F	F		B	B	B	F	F	F	F
Adult females	N					B N	B N	B N	N M	N	N	N
Pups	N					N	N	N	N	N	N	N
Juveniles												

Note: Green Indicates not near SOCAL and foraging (F= Foraging); Yellow indicates commonly found in SOCAL at sea and hauled out periodically, but not engaged in sensitive activities; Red indicates found in SOCAL at sea and hauled out for prolonged periods engaged in sensitive activities on offshore Channel Islands: M= Molting, B= Breeding, N= Nursing

Of particular note, there were multiple sightings (April-June) of a single gray whale foraging in less than 10 m of water in the nearshore waters of SSTC. Photographs were unable to confirm a photo identification of the individual(s), but feeding behavior was noted during off-effort observations. Further investigation of *E. robustus* within the survey areas should be noted. Additionally, MMOs sighted a false killer whale (*Pseudorca crassidens*) pod during 20 March 2014 survey efforts. This species normally prefers warmer tropical waters found outside of southern California. Prior to survey efforts, team members were aware that a *P. crassidens* pod had been spotted in Dana Point on 14 March 2014. It is likely that these were the same individuals transiting throughout the SCB.

Climatic conditions, such as El Niño Southern Oscillation (ENSO) (Figure 11) and North Pacific Gyre Oscillation (NPGO) (Figure 12), can drive bottom-up controls within the marine ecosystem. NPGO conditions can have implications for changes in salinity, nutrients, and chlorophyll-*a* that can drive changes throughout trophic levels (DiLorenzo *et al.* 2008). Additionally, El Niño conditions can have broad ranging effects on species growth, recruitment, and migration patterns (Stenseth *et al.*, 2002). However, NOAA's most recent data suggests ENSO-neutral conditions continue to persist (Table 5, Figure 11). There is approximately 65% chance El Niño conditions will be present during the Northern Hemisphere winter and last into the Northern Hemisphere spring 2015. If the conditions arise, past the +/- 0.5 °Celsius Oceanic Niño Index threshold, it is predicted to be a weak ENSO event. ENSO events can only be categorized if the conditions persist for five consecutive overlapping 3-month seasons (NOAA, 2014). All data collected during these survey efforts should be viewed within the context of broader ongoing oceanographic events.

Table 5: Warm and cold ocean temperature episodes based on Oceanic Niño Index (ONI) as a predictor of El Niño and La Niña oceanographic conditions from 2002-2014. Warm (red) and cold (blue) episodes are based on a threshold of +/- 0.5 °Celsius for the ONI (NOAA 2014).

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2002	-0.2	0	0.1	0.3	**0.5**	**0.7**	**0.8**	**0.8**	**0.9**	**1.2**	**1.3**	**1.3**
2003	**1.1**	**0.8**	0.4	0	-0.2	-0.1	0.2	0.4	0.4	0.4	0.4	0.3
2004	0.3	0.2	0.1	0.1	0.2	0.3	**0.5**	**0.7**	**0.8**	**0.7**	**0.7**	**0.7**
2005	**0.6**	0.4	0.3	0.3	0.3	0.3	0.2	0.1	0	-0.2	**-0.5**	**-0.8**
2006	**-0.9**	**-0.7**	**-0.5**	-0.3	0	0.1	0.2	0.3	**0.5**	**0.8**	**1**	**1**
2007	**0.7**	0.3	-0.1	-0.2	-0.3	-0.3	-0.4	**-0.6**	**-0.8**	**-1.1**	**-1.2**	**-1.4**
2008	**-1.5**	**-1.5**	**-1.2**	**-0.9**	**-0.7**	**-0.5**	-0.3	-0.2	-0.1	-0.2	**-0.5**	**-0.7**

2009	-0.8	-0.7	-0.5	-0.2	0.2	0.4	0.5	0.6	0.8	1.1	1.4	1.6
2010	1.6	1.3	1	0.6	0.1	-0.4	-0.9	-1.2	-1.4	-1.5	-1.5	-1.5
2011	-1.4	-1.2	-0.9	-0.6	-0.3	-0.2	-0.2	-0.4	-0.6	-0.8	-1	-1
2012	-0.9	-0.6	-0.5	-0.3	-0.2	0	0.1	0.4	0.5	0.6	0.2	-0.3
2013	-0.6	-0.6	-0.4	-0.2	-0.2	-0.3	-0.3	-0.3	-0.3	-0.2	-0.3	-0.4
2014	-0.6	-0.6	-0.5	-0.1	0.1	0.1	0	0	0.2	0.5		

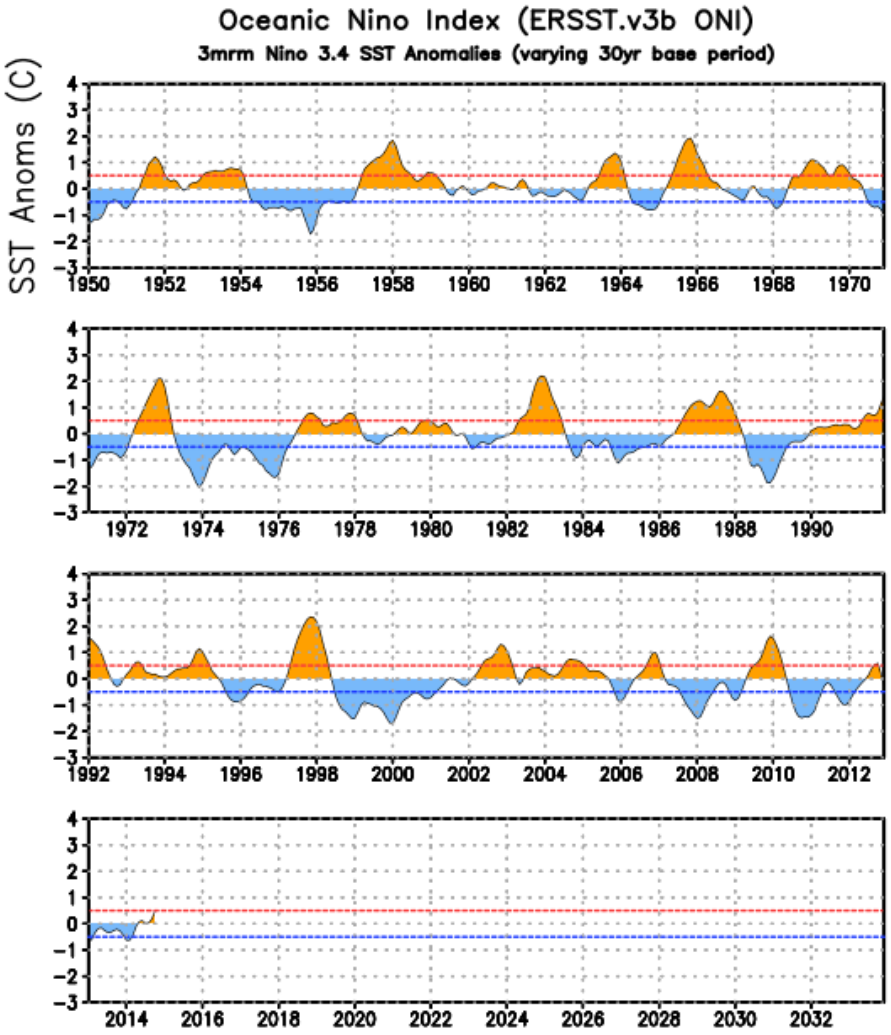


Figure 12: Oceanic Niño Index showing Sea Surface Temperature (SST) anomalies in degrees Celsius from 1950 – 2014. Red dotted line is warm threshold and blue dotted line is cold threshold. Current anomalies remain within the ENSO-neutral threshold, as compared to historical data (NOAA 2014).

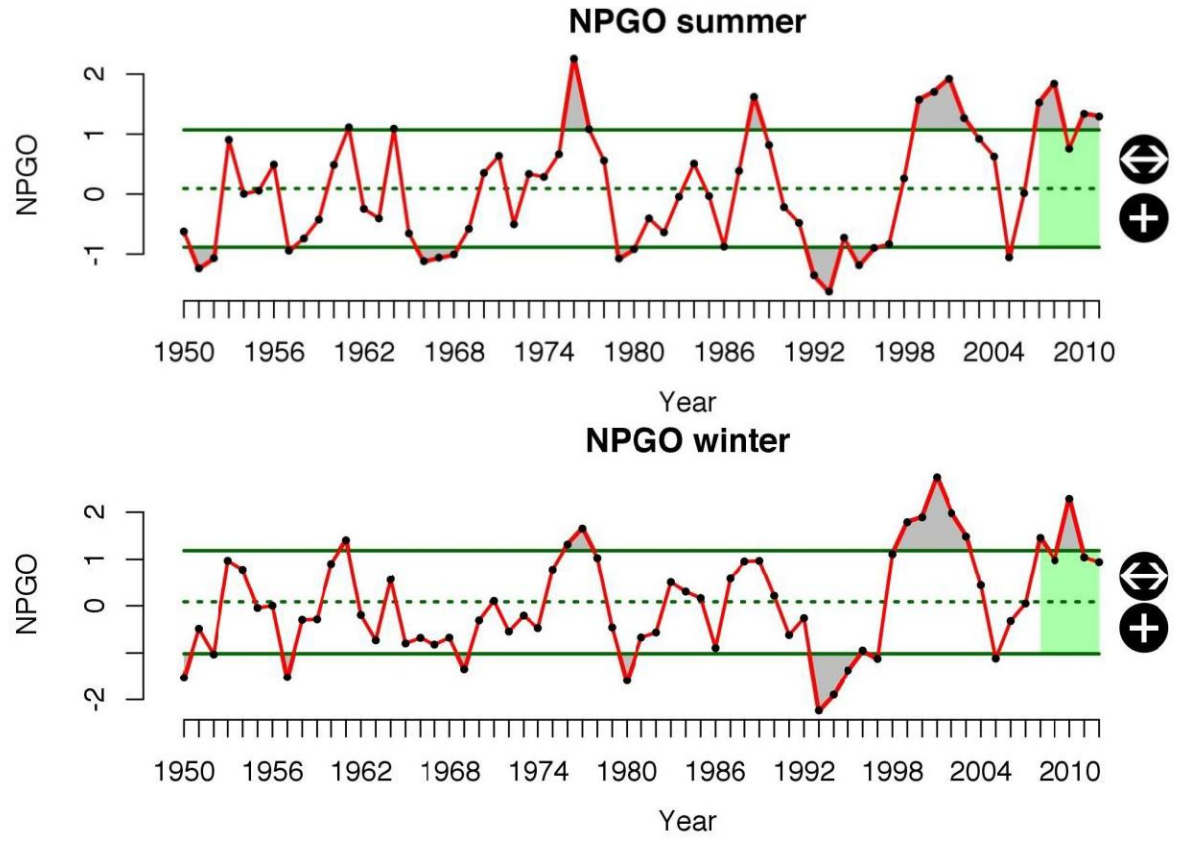


Figure 13: NPGO index for summer and winter from 1950-2012; Positive (negative) values correlated to increased (decreased) surface salinity, nutrients, and chlorophyll-*a* concentration (Hazen *et al.* 2013)

5.0 References

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Appendix A: Sightings Tables and Species Maps of Marine Mammals Near Silver Strand Training Complex and San Diego Bay

Prepared for
Commander, U.S. Pacific Fleet, San Diego, CA

Submitted to
Naval Facilities Engineering Command Southwest
EV5 Environmental, San Diego, CA 92132

Prepared by
Space and Naval Warfare Systems Center, Pacific
Environmental Readiness Division

SPAWAR
Systems Center
PACIFIC

February 2015

Table of Contents

Sightings Data Tables

Table 1:Marine Mammal sighting data from Silver Strand Training Complex (SSTC) offshore transects, including seasonal period, count, and position

Silver Strand Training Complex - Offshore Transect Sighting Data							
Date	**Time**	**Seasonal Period**	**Common Name**	**Scientific Name**	**Count**	**Latitude**	**Longitude**
10/23/2013	10:40	Warm	California Sea Lion	*Zalophus californianus*	5	32.652621	-117.224717
10/23/2013	11:24	Warm	California Sea Lion	*Zalophus californianus*	1	32.68958	-117.23226
10/23/2013	10:04	Warm	California Sea Lion	*Zalophus californianus*	7	32.633895	-117.221933
10/23/2013	9:39	Warm	California Sea Lion	*Zalophus californianus*	1	32.62221	-117.1944
10/23/2013	9:56	Warm	California Sea Lion	*Zalophus californianus*	2	32.62106	-117.23498
10/23/2013	9:57	Warm	California Sea Lion	*Zalophus californianus*	2	32.62124	-117.23611
11/25/2013	13:55	Cold	Common Dolphin	*Delphinus spp.*	3	32.66294	-117.2178
11/25/2013	13:57	Cold	Common Dolphin	*Delphinus spp.*	8	32.66673	-117.21192
11/25/2013	13:32	Cold	Common Dolphin	*Delphinus spp.*	12	32.64547	-117.20708
11/25/2013	13:41	Cold	Common Dolphin	*Delphinus spp.*	15	32.64704	-117.22896
11/25/2013	13:41	Cold	California Sea Lion	*Zalophus californianus*	1	32.64704	-117.22896
11/25/2013	13:17	Cold	Bottlenose Dolphin	*Tursiops truncatus*	5	32.62971	-117.23043
11/25/2013	13:24	Cold	Bottlenose Dolphin	*Tursiops truncatus*	8	32.63859	-117.21364
11/25/2013	13:20	Cold	California Sea Lion	*Zalophus californianus*	1	32.633895	-117.221933
11/25/2013	13:03	Cold	Common Dolphin	*Delphinus spp.*	65	32.62281	-117.2055
11/25/2013	13:11	Cold	Common Dolphin	*Delphinus spp.*	25	32.62437	-117.22572
11/25/2013	13:12	Cold	Common Dolphin	*Delphinus spp.*	20	32.62548	-117.23017
11/25/2013	13:13	Cold	Common Dolphin	*Delphinus spp.*	8	32.62517	-117.23211
11/25/2013	13:01	Cold	California Sea Lion	*Zalophus californianus*	2	32.62285	-117.20069
11/25/2013	13:12	Cold	California Sea Lion	*Zalophus californianus*	2	32.62548	-117.23017
11/25/2013	12:57	Cold	Common Dolphin	*Delphinus spp.*	5	32.62062	-117.19345
11/25/2013	12:26	Cold	California Sea Lion	*Zalophus californianus*	1	32.59673	-117.18782
12/17/2013	13:25	Cold	California Sea Lion	*Zalophus californianus*	1	32.64611	-117.23863

Silver Strand Training Complex - Offshore Transect Sighting Data							
Date	**Time**	**Seasonal Period**	**Common Name**	**Scientific Name**	**Count**	**Latitude**	**Longitude**
12/17/2013	12:57	Cold	California Sea Lion	*Zalophus californianus*	4	32.633895	-117.221933
12/17/2013	12:43	Cold	California Sea Lion	*Zalophus californianus*	1	32.62164	-117.21043
12/17/2013	12:20	Cold	Gray Whale	*Eschrichtius robustus*	1	32.5996	-117.23021
12/17/2013	12:09	Cold	California Sea Lion	*Zalophus californianus*	1	32.59734	-117.19464
12/17/2013	12:18	Cold	California Sea Lion	*Zalophus californianus*	1	32.59868	-117.22088
12/17/2013	12:22	Cold	California Sea Lion	*Zalophus californianus*	1	32.59953	-117.2273
12/17/2013	12:02	Cold	California Sea Lion	*Zalophus californianus*	1	32.59379	-117.19225
1/17/2014	15:07	Cold	California Sea Lion	*Zalophus californianus*	1	32.65807	-117.23736
1/17/2014	15:18	Cold	California Sea Lion	*Zalophus californianus*	3	32.68092	-117.22884
1/17/2014	14:40	Cold	California Sea Lion	*Zalophus californianus*	1	32.652231	-117.227211
1/17/2014	13:10	Cold	California Sea Lion	*Zalophus californianus*	1	32.58621	-117.20238
2/25/2014	12:23	Cold	Bottlenose Dolphin	*Tursiops truncatus*	4	32.65966	-117.22403
2/25/2014	12:23	Cold	Common Dolphin	*Delphinus spp.*	50	32.66058	-117.22244
2/25/2014	12:16	Cold	California Sea Lion	*Zalophus californianus*	2	32.652231	-117.227211
3/20/2014	10:35	Cold	Bottlenose Dolphin	*Tursiops truncatus*	5	32.67106	-117.2085
3/20/2014	10:37	Cold	False Killer Whale	*Pseudorca crassidens*	4	32.64496	-117.21866
3/20/2014	11:02	Cold	Common Dolphin	*Delphinus spp.*	80	32.64645	-117.19756
3/20/2014	9:37	Cold	California Sea Lion	*Zalophus californianus*	1	32.64496	-117.21866
3/20/2014	10:55	Cold	California Sea Lion	*Zalophus californianus*	1	32.65625	-117.18423
3/20/2014	10:57	Cold	California Sea Lion	*Zalophus californianus*	1	32.65265	-117.18915
3/20/2014	11:00	Cold	California Sea Lion	*Zalophus californianus*	1	32.64864	-117.19731
3/20/2014	11:02	Cold	California Sea Lion	*Zalophus californianus*	3	32.64645	-117.19756
3/20/2014	9:21	Cold	California Sea Lion	*Zalophus californianus*	5	32.633895	-117.221933
3/20/2014	9:11	Cold	Common Dolphin	*Delphinus spp.*	1	32.62304	-117.21807
3/20/2014	9:13	Cold	California Sea Lion	*Zalophus californianus*	1	32.6235	-117.2261
3/20/2014	9:00	Cold	California Sea Lion	*Zalophus californianus*	1	32.61794	-117.19798
4/28/2014	10:43	Cold	California Sea Lion	*Zalophus californianus*	4	32.652621	-117.224717
4/28/2014	10:50	Cold	California Sea Lion	*Zalophus californianus*	2	32.652231	-117.227211

Silver Strand Training Complex - Offshore Transect Sighting Data							
Date	**Time**	**Seasonal Period**	**Common Name**	**Scientific Name**	**Count**	**Latitude**	**Longitude**
4/28/2014	10:26	Cold	California Sea Lion	*Zalophus californianus*	5	32.633895	-117.221933
5/22/2014	8:36	Warm	Gray Whale	*Eschrichtius robustus*	1	32.6732	-117.20609
5/22/2014	9:03	Warm	Gray Whale	*Eschrichtius robustus*	1	32.66008	-117.21862
5/22/2014	9:08	Warm	California Sea Lion	*Zalophus californianus*	3	32.652231	-117.227211
5/22/2014	9:23	Warm	California Sea Lion	*Zalophus californianus*	1	32.64572	-117.20768
5/22/2014	9:34	Warm	California Sea Lion	*Zalophus californianus*	3	32.633895	-117.221933
5/22/2014	9:43	Warm	California Sea Lion	*Zalophus californianus*	1	32.62533	-117.2248
6/20/2014	8:45	Warm	Gray Whale	*Eschrichtius robustus*	1	32.67052	-117.21193
6/20/2014	9:10	Warm	California Sea Lion	*Zalophus californianus*	1	32.64686	-117.22493
6/20/2014	9:15	Warm	California Sea Lion	*Zalophus californianus*	1	32.64688	-117.22369
6/20/2014	9:00	Warm	California Sea Lion	*Zalophus californianus*	6	32.652231	-117.227211
6/20/2014	9:25	Warm	California Sea Lion	*Zalophus californianus*	1	32.63886	-117.21301
6/20/2014	9:29	Warm	California Sea Lion	*Zalophus californianus*	7	32.633895	-117.221933
6/20/2014	9:46	Warm	California Sea Lion	*Zalophus californianus*	1	32.62333	-117.20594
6/20/2014	9:54	Warm	California Sea Lion	*Zalophus californianus*	1	32.62051	-117.19384
7/21/2014	7:36	Warm	California Sea Lion	*Zalophus californianus*	3	32.67019	-117.20857
7/21/2014	7:41	Warm	California Sea Lion	*Zalophus californianus*	1	32.66411	-117.21764
7/21/2014	7:41	Warm	California Sea Lion	*Zalophus californianus*	1	32.66272	-117.21955
7/21/2014	7:45	Warm	California Sea Lion	*Zalophus californianus*	2	32.652231	-117.227211
7/21/2014	7:48	Warm	California Sea Lion	*Zalophus californianus*	1	32.65289	-117.23626
7/21/2014	7:57	Warm	California Sea Lion	*Zalophus californianus*	1	32.6466	-117.2222
7/21/2014	8:03	Warm	California Sea Lion	*Zalophus californianus*	1	32.64557	-117.203
7/21/2014	8:11	Warm	California Sea Lion	*Zalophus californianus*	3	32.633895	-117.221933
7/21/2014	8:31	Warm	California Sea Lion	*Zalophus californianus*	2	32.6236	-117.19917
7/21/2014	8:31	Warm	Common Dolphin	*Delphinus spp.*	45	32.6236	-117.19917
7/21/2014	8:46	Warm	Common Dolphin	*Delphinus spp.*	15	32.61368	-117.20929
7/21/2014	8:55	Warm	California Sea Lion	*Zalophus californianus*	1	32.60015	-117.23135
7/21/2014	9:46	Warm	California Sea Lion	*Zalophus californianus*	1	32.59369	-117.14841

Silver Strand Training Complex - Offshore Transect Sighting Data							
Date	**Time**	**Seasonal Period**	**Common Name**	**Scientific Name**	**Count**	**Latitude**	**Longitude**
8/25/2014	8:42	Warm	California Sea Lion	*Zalophus californianus*	1	32.65831	-117.22069
8/25/2014	8:44	Warm	California Sea Lion	*Zalophus californianus*	1	32.65747	-117.22404
8/25/2014	8:53	Warm	California Sea Lion	*Zalophus californianus*	4	32.652231	-117.227211
8/25/2014	8:54	Warm	California Sea Lion	*Zalophus californianus*	1	32.64819	-117.22252
8/25/2014	8:55	Warm	California Sea Lion	*Zalophus californianus*	3	32.652621	-117.224717
8/25/2014	9:02	Warm	California Sea Lion	*Zalophus californianus*	1	32.64877	-117.20417
8/25/2014	9:11	Warm	California Sea Lion	*Zalophus californianus*	7	32.633895	-117.221933
8/25/2014	9:22	Warm	California Sea Lion	*Zalophus californianus*	1	32.62593	-117.2237
8/25/2014	9:22	Warm	California Sea Lion	*Zalophus californianus*	1	32.62589	-117.22279
9/30/2014	11:43	Warm	California Sea Lion	*Zalophus californianus*	3	32.652621	-117.224717
9/30/2014	11:44	Warm	California Sea Lion	*Zalophus californianus*	5	32.652231	-117.227211
9/30/2014	11:25	Warm	California Sea Lion	*Zalophus californianus*	2	32.633895	-117.221933
9/30/2014	10:53	Warm	California Sea Lion	*Zalophus californianus*	1	32.61008	-117.21116

Table 2: Marine Mammal sighting data from Silver Strand Training Complex (SSTC) nearshore transects, including seasonal period, count, and position

Silver Strand Training Complex - Nearshore Transect Sighting Data							
Date	**Time**	**Seasonal Period**	**Common Name**	**Scientific Name**	**Count**	**Latitude**	**Longitude**
11/25/2013	10:11	Cold	California Sea Lion	*Zalophus californianus*	1	32.6697	-117.19493
11/25/2013	10:16	Cold	California Sea Lion	*Zalophus californianus*	1	32.66937	-117.18311
11/25/2013	10:19	Cold	Bottlenose Dolphin	*Tursiops truncatus*	2	32.66879	-117.17334
11/25/2013	10:21	Cold	California Sea Lion	*Zalophus californianus*	1	32.66636	-117.17044
11/25/2013	10:25	Cold	California Sea Lion	*Zalophus californianus*	1	32.66157	-117.17814
11/25/2013	10:30	Cold	California Sea Lion	*Zalophus californianus*	4	32.65431	-117.18831
11/25/2013	10:35	Cold	California Sea Lion	*Zalophus californianus*	1	32.64821	-117.19823
11/25/2013	10:54	Cold	California Sea Lion	*Zalophus californianus*	1	32.64395	-117.15683
11/25/2013	11:03	Cold	Bottlenose Dolphin	*Tursiops truncatus*	5	32.62921	-117.17552
11/25/2013	11:07	Cold	California Sea Lion	*Zalophus californianus*	1	32.62636	-117.18703
11/25/2013	11:14	Cold	Bottlenose Dolphin	*Tursiops truncatus*	5	32.62137	-117.17673
11/25/2013	11:16	Cold	California Sea Lion	*Zalophus californianus*	1	32.62106	-117.17148
11/25/2013	11:21	Cold	California Sea Lion	*Zalophus californianus*	1	32.62124	-117.15876
11/25/2013	11:34	Cold	California Sea Lion	*Zalophus californianus*	1	32.61294	-117.15581
11/25/2013	11:54	Cold	California Sea Lion	*Zalophus californianus*	1	32.59487	-117.15794
12/17/2013	9:34	Cold	California Sea Lion	*Zalophus californianus*	1	32.66913	-117.21373
12/17/2013	10:20	Cold	California Sea Lion	*Zalophus californianus*	1	32.63037	-117.17628
12/17/2013	10:23	Cold	California Sea Lion	*Zalophus californianus*	1	32.62616	-117.18485
12/17/2013	10:31	Cold	California Sea Lion	*Zalophus californianus*	3	32.62231	-117.17562
12/17/2013	10:39	Cold	California Sea Lion	*Zalophus californianus*	1	32.62163	-117.15313
12/17/2013	10:48	Cold	California Sea Lion	*Zalophus californianus*	1	32.61215	-117.1536
1/17/2014	11:40	Cold	Gray Whale	*Eschrichtius robustus*	2	32.64664	-117.28138
2/25/2014	9:03	Cold	California Sea Lion	*Zalophus californianus*	1	32.65124	-117.19236
2/25/2014	9:11	Cold	California Sea Lion	*Zalophus californianus*	2	32.64779	-117.17491
2/25/2014	9:23	Cold	California Sea Lion	*Zalophus californianus*	1	32.63954	-117.16802
2/25/2014	9:24	Cold	California Sea Lion	*Zalophus californianus*	1	32.63775	-117.17029
2/25/2014	9:32	Cold	Common Dolphin	*Delphinus spp.*	20	32.62599	-117.18999

Silver Strand Training Complex - Nearshore Transect Sighting Data							
Date	**Time**	**Seasonal Period**	**Common Name**	**Scientific Name**	**Count**	**Latitude**	**Longitude**
3/20/2014	11:25	Cold	California Sea Lion	*Zalophus californianus*	1	32.63275	-117.17519
3/20/2014	12:02	Cold	California Sea Lion	*Zalophus californianus*	1	32.59962	-117.17903
4/28/2014	7:37	Cold	Gray Whale	*Eschrichtius robustus*	3	32.67312	-117.2072
4/28/2014	7:44	Cold	California Sea Lion	*Zalophus californianus*	1	32.67598	-117.18632
4/28/2014	7:49	Cold	California Sea Lion	*Zalophus californianus*	1	32.66812	-117.174
4/28/2014	8:09	Cold	California Sea Lion	*Zalophus californianus*	1	32.64622	-117.16674
4/28/2014	8:10	Cold	California Sea Lion	*Zalophus californianus*	1	32.64458	-117.1621
4/28/2014	8:26	Cold	Common Dolphin	*Delphinus spp.*	60	32.62106	-117.18685
4/28/2014	8:31	Cold	California Sea Lion	*Zalophus californianus*	1	32.62101	-117.16947
4/28/2014	8:34	Cold	California Sea Lion	*Zalophus californianus*	1	32.62024	-117.15916
4/28/2014	9:34	Cold	California Sea Lion	*Zalophus californianus*	2	32.58501	-117.19042
4/28/2014	9:34	Cold	Common Dolphin	*Delphinus spp.*	40	32.58501	-117.19042
10/23/2013	7:16	Warm	California Sea Lion	*Zalophus californianus*	1	32.67038	-117.21475
10/23/2013	8:03	Warm	California Sea Lion	*Zalophus californianus*	1	32.64397	-117.15528
10/23/2013	8:14	Warm	Common Dolphin	*Delphinus spp.*	50	32.63064	-117.17946
10/23/2013	8:17	Warm	California Sea Lion	*Zalophus californianus*	1	32.62617	-117.18271
10/23/2013	8:18	Warm	California Sea Lion	*Zalophus californianus*	1	32.62553	-117.18539
10/23/2013	8:23	Warm	California Sea Lion	*Zalophus californianus*	1	32.62185	-117.18502
10/23/2013	8:35	Warm	California Sea Lion	*Zalophus californianus*	1	32.62103	-117.1519
6/20/2014	10:52	Warm	California Sea Lion	*Zalophus californianus*	1	32.59306	-117.15155
6/20/2014	11:14	Warm	California Sea Lion	*Zalophus californianus*	1	32.62087	-117.14305
6/20/2014	11:43	Warm	California Sea Lion	*Zalophus californianus*	1	32.62548	-117.18556
7/21/2014	9:59	Warm	California Sea Lion	*Zalophus californianus*	1	32.59522	-117.17936
7/21/2014	10:24	Warm	California Sea Lion	*Zalophus californianus*	1	32.62125	-117.1679
7/21/2014	10:25	Warm	California Sea Lion	*Zalophus californianus*	1	32.62115	-117.17111
7/21/2014	10:32	Warm	California Sea Lion	*Zalophus californianus*	1	32.62212	-117.19161
7/21/2014	10:40	Warm	California Sea Lion	*Zalophus californianus*	1	32.63606	-117.16976
7/21/2014	10:52	Warm	California Sea Lion	*Zalophus californianus*	1	32.64541	-117.16878

Silver Strand Training Complex - Nearshore Transect Sighting Data							
Date	**Time**	**Seasonal Period**	**Common Name**	**Scientific Name**	**Count**	**Latitude**	**Longitude**
7/21/2014	10:53	Warm	California Sea Lion	*Zalophus californianus*	1	32.64436	-117.1723
7/21/2014	10:54	Warm	California Sea Lion	*Zalophus californianus*	1	32.64507	-117.17575
7/21/2014	10:55	Warm	California Sea Lion	*Zalophus californianus*	1	32.64503	-117.17843
7/21/2014	11:23	Warm	California Sea Lion	*Zalophus californianus*	1	32.66883	-117.19742
7/21/2014	11:26	Warm	California Sea Lion	*Zalophus californianus*	1	32.66948	-117.20386
8/25/2014	12:12	Warm	California Sea Lion	*Zalophus californianus*	1	32.65526	-117.18206
9/30/2014	7:45	Warm	Bottlenose Dolphin	*Tursiops truncatus*	3	32.6692	-117.2287
9/30/2014	8:10	Warm	California Sea Lion	*Zalophus californianus*	1	32.67106	-117.21
9/30/2014	8:18	Warm	California Sea Lion	*Zalophus californianus*	1	32.67024	-117.18535
9/30/2014	8:20	Warm	California Sea Lion	*Zalophus californianus*	1	32.67075	-117.18009
9/30/2014	8:21	Warm	California Sea Lion	*Zalophus californianus*	1	32.66991	-117.17878
9/30/2014	8:22	Warm	California Sea Lion	*Zalophus californianus*	2	32.6701	-117.17559
9/30/2014	8:23	Warm	Bottlenose Dolphin	*Tursiops truncatus*	2	32.66921	-117.17347
9/30/2014	8:50	Warm	California Sea Lion	*Zalophus californianus*	1	32.64701	-117.15962
9/30/2014	8:51	Warm	California Sea Lion	*Zalophus californianus*	1	32.64716	-117.15647
9/30/2014	8:53	Warm	California Sea Lion	*Zalophus californianus*	1	32.64374	-117.15877
9/30/2014	9:17	Warm	California Sea Lion	*Zalophus californianus*	2	32.6199	-117.16829
9/30/2014	9:26	Warm	California Sea Lion	*Zalophus californianus*	1	32.6213	-117.1441
9/30/2014	10:02	Warm	California Sea Lion	*Zalophus californianus*	2	32.59173	-117.13903

Table 3: Marine Mammal sighting data from North San Diego Bay (NSDB) transects, including seasonal period, count, and position

North San Diego Bay Transect Sighting Data							
Date	**Time**	**Seasonal Period**	**Common Name**	**Scientific Name**	**Count**	**Latitude**	**Longitude**
10/23/2013	13:00	Warm	California Sea Lion	*Zalophus californianus*	1	32.708687	-117.178699
10/23/2013	12:37	Warm	California Sea Lion	*Zalophus californianus*	1	32.70933	-117.2204
10/23/2013	12:40	Warm	California Sea Lion	*Zalophus californianus*	1	32.71686	-117.21778
10/23/2013	12:29	Warm	California Sea Lion	*Zalophus californianus*	1	32.69786	-117.23289
10/23/2013	12:30	Warm	California Sea Lion	*Zalophus californianus*	1	32.701766	-117.229203
10/23/2013	12:27	Warm	California Sea Lion	*Zalophus californianus*	29	32.694122	-117.23535
10/23/2013	12:28	Warm	California Sea Lion	*Zalophus californianus*	1	32.695568	-117.230985
11/21/2013	12:50	Cold	California Sea Lion	*Zalophus californianus*	1	32.72299	-117.19163
11/21/2013	11:10	Cold	California Sea Lion	*Zalophus californianus*	85	32.694116	-117.235378
11/21/2013	11:03	Cold	California Sea Lion	*Zalophus californianus*	1	32.682014	-117.231528
12/17/2013	14:44	Cold	California Sea Lion	*Zalophus californianus*	1	32.71157	-117.22095
12/17/2013	14:32	Cold	California Sea Lion	*Zalophus californianus*	1	32.695568	-117.230985
12/17/2013	14:35	Cold	California Sea Lion	*Zalophus californianus*	40	32.69412	-117.235365
12/17/2013	14:29	Cold	California Sea Lion	*Zalophus californianus*	1	32.68611	-117.23092
12/17/2013	14:26	Cold	California Sea Lion	*Zalophus californianus*	3	32.682014	-117.231528
12/17/2013	14:22	Cold	California Sea Lion	*Zalophus californianus*	3	32.673523	-117.230343
12/17/2013	14:23	Cold	California Sea Lion	*Zalophus californianus*	4	32.673814	-117.227589
1/23/2014	8:20	Cold	Bottlenose Dolphin	*Tursiops truncatus*	4	32.718984	-117.19365
1/23/2014	8:20	Cold	California Sea Lion	*Zalophus californianus*	1	32.718984	-117.19365
1/23/2014	8:11	Cold	California Sea Lion	*Zalophus californianus*	1	32.701766	-117.229203
1/23/2014	8:03	Cold	California Sea Lion	*Zalophus californianus*	1	32.69134	-117.23318
1/23/2014	8:05	Cold	California Sea Lion	*Zalophus californianus*	43	32.694135	-117.235381
2/12/2014	11:25	Cold	California Sea Lion	*Zalophus californianus*	1	32.70226	-117.17117
2/12/2014	11:20	Cold	California Sea Lion	*Zalophus californianus*	3	32.708687	-117.178699
2/12/2014	10:53	Cold	California Sea Lion	*Zalophus californianus*	38	32.694144	-117.23537
2/12/2014	10:55	Cold	California Sea Lion	*Zalophus californianus*	1	32.69572	-117.23484

North San Diego Bay Transect Sighting Data							
Date	**Time**	**Seasonal Period**	**Common Name**	**Scientific Name**	**Count**	**Latitude**	**Longitude**
2/12/2014	10:39	Cold	California Sea Lion	*Zalophus californianus*	1	32.673814	-117.227589
2/12/2014	10:47	Cold	California Sea Lion	*Zalophus californianus*	1	32.67891	-117.22925
3/20/2014	14:30	Cold	California Sea Lion	*Zalophus californianus*	1	32.71539	-117.18777
3/20/2014	14:23	Cold	California Sea Lion	*Zalophus californianus*	1	32.71987	-117.21049
3/20/2014	13:57	Cold	California Sea Lion	*Zalophus californianus*	2	32.701766	-117.229203
3/20/2014	13:53	Cold	California Sea Lion	*Zalophus californianus*	40	32.694131	-117.235354
3/20/2014	13:55	Cold	California Sea Lion	*Zalophus californianus*	1	32.695568	-117.230985
3/20/2014	13:56	Cold	California Sea Lion	*Zalophus californianus*	2	32.695771	-117.233139
3/20/2014	13:40	Cold	California Sea Lion	*Zalophus californianus*	2	32.673523	-117.230343
3/20/2014	13:42	Cold	California Sea Lion	*Zalophus californianus*	1	32.673814	-117.227589
3/20/2014	13:44	Cold	Bottlenose Dolphin	*Tursiops truncatus*	1	32.67762	-117.23171
3/20/2014	13:34	Cold	Bottlenose Dolphin	*Tursiops truncatus*	4	32.66059	-117.23861
3/20/2014	13:38	Cold	California Sea Lion	*Zalophus californianus*	2	32.665078	-117.229159
3/20/2014	13:39	Cold	California Sea Lion	*Zalophus californianus*	1	32.665422	-117.226509
4/28/2014	13:13	Cold	California Sea Lion	*Zalophus californianus*	4	32.708687	-117.178699
4/28/2014	13:05	Cold	California Sea Lion	*Zalophus californianus*	1	32.71856	-117.20022
4/28/2014	12:52	Cold	California Sea Lion	*Zalophus californianus*	3	32.701766	-117.229203
4/28/2014	12:50	Cold	California Sea Lion	*Zalophus californianus*	5	32.695771	-117.233139
4/28/2014	12:51	Cold	California Sea Lion	*Zalophus californianus*	4	32.695568	-117.230985
4/28/2014	12:45	Cold	California Sea Lion	*Zalophus californianus*	8	32.68245	-117.228976
4/28/2014	12:45	Cold	California Sea Lion	*Zalophus californianus*	2	32.682014	-117.231528
4/28/2014	12:40	Cold	California Sea Lion	*Zalophus californianus*	9	32.673523	-117.230343
5/22/2014	12:48	Warm	California Sea Lion	*Zalophus californianus*	7	32.72038	-117.19248
5/22/2014	13:05	Warm	California Sea Lion	*Zalophus californianus*	1	32.701766	-117.229203
5/22/2014	13:07	Warm	California Sea Lion	*Zalophus californianus*	3	32.695771	-117.233139
5/22/2014	13:08	Warm	California Sea Lion	*Zalophus californianus*	2	32.695568	-117.230985
5/22/2014	13:13	Warm	California Sea Lion	*Zalophus californianus*	3	32.68245	-117.228976
5/22/2014	13:18	Warm	California Sea Lion	*Zalophus californianus*	3	32.673523	-117.230343

North San Diego Bay Transect Sighting Data							
Date	**Time**	**Seasonal Period**	**Common Name**	**Scientific Name**	**Count**	**Latitude**	**Longitude**
5/22/2014	13:23	Warm	California Sea Lion	*Zalophus californianus*	6	32.665078	-117.229159
5/22/2014	13:27	Warm	California Sea Lion	*Zalophus californianus*	4	32.665422	-117.226509
5/22/2014	13:28	Warm	California Sea Lion	*Zalophus californianus*	12	32.66755	-117.22826
6/30/2014	13:51	Warm	California Sea Lion	*Zalophus californianus*	1	32.708687	-117.178699
6/30/2014	13:21	Warm	California Sea Lion	*Zalophus californianus*	1	32.69051	-117.23276
6/30/2014	13:24	Warm	California Sea Lion	*Zalophus californianus*	30	32.694137	-117.235339
6/30/2014	13:25	Warm	California Sea Lion	*Zalophus californianus*	1	32.69621	-117.23434
6/30/2014	13:16	Warm	California Sea Lion	*Zalophus californianus*	4	32.68245	-117.228976
6/30/2014	13:17	Warm	California Sea Lion	*Zalophus californianus*	1	32.68397	-117.22878
6/30/2014	13:07	Warm	California Sea Lion	*Zalophus californianus*	1	32.665078	-117.229159
6/30/2014	13:07	Warm	California Sea Lion	*Zalophus californianus*	3	32.665422	-117.226509
6/30/2014	13:09	Warm	California Sea Lion	*Zalophus californianus*	4	32.66819	-117.22862
7/21/2014	12:53	Warm	California Sea Lion	*Zalophus californianus*	1	32.708687	-117.178699
7/21/2014	12:48	Warm	California Sea Lion	*Zalophus californianus*	1	32.71824	-117.19059
7/21/2014	12:34	Warm	California Sea Lion	*Zalophus californianus*	1	32.706183	-117.22615
7/21/2014	12:33	Warm	California Sea Lion	*Zalophus californianus*	2	32.705238	-117.229745
7/21/2014	12:27	Warm	California Sea Lion	*Zalophus californianus*	20	32.694137	-117.235375
7/21/2014	12:29	Warm	California Sea Lion	*Zalophus californianus*	3	32.695771	-117.233139
7/21/2014	12:20	Warm	California Sea Lion	*Zalophus californianus*	2	32.682014	-117.231528
7/21/2014	12:21	Warm	California Sea Lion	*Zalophus californianus*	3	32.68245	-117.228976
7/21/2014	12:14	Warm	California Sea Lion	*Zalophus californianus*	1	32.673814	-117.227589
7/21/2014	12:15	Warm	California Sea Lion	*Zalophus californianus*	6	32.67041	-117.22546
7/21/2014	12:16	Warm	California Sea Lion	*Zalophus californianus*	2	32.673523	-117.230343
7/21/2014	12:17	Warm	California Sea Lion	*Zalophus californianus*	1	32.6751	-117.22905
7/21/2014	12:11	Warm	California Sea Lion	*Zalophus californianus*	1	32.66504	-117.23293
7/21/2014	12:12	Warm	California Sea Lion	*Zalophus californianus*	3	32.665078	-117.229159
8/18/2014	9:51	Warm	California Sea Lion	*Zalophus californianus*	2	32.708687	-117.178699
8/18/2014	9:32	Warm	California Sea Lion	*Zalophus californianus*	1	32.71018	-117.2208

North San Diego Bay Transect Sighting Data							
Date	**Time**	**Seasonal Period**	**Common Name**	**Scientific Name**	**Count**	**Latitude**	**Longitude**
8/18/2014	9:29	Warm	California Sea Lion	*Zalophus californianus*	2	32.706183	-117.22615
8/18/2014	9:23	Warm	California Sea Lion	*Zalophus californianus*	1	32.69851	-117.23384
8/18/2014	9:24	Warm	California Sea Lion	*Zalophus californianus*	1	32.69798	-117.23152
8/18/2014	9:26	Warm	California Sea Lion	*Zalophus californianus*	1	32.70085	-117.23199
8/18/2014	9:27	Warm	California Sea Lion	*Zalophus californianus*	1	32.705238	-117.229745
8/18/2014	9:19	Warm	California Sea Lion	*Zalophus californianus*	56	32.69412	-117.235368
8/18/2014	9:21	Warm	California Sea Lion	*Zalophus californianus*	1	32.69546	-117.23464
8/18/2014	9:22	Warm	California Sea Lion	*Zalophus californianus*	3	32.695568	-117.230985
8/18/2014	9:23	Warm	California Sea Lion	*Zalophus californianus*	1	32.695771	-117.233139
8/18/2014	9:08	Warm	California Sea Lion	*Zalophus californianus*	5	32.68245	-117.228976
8/18/2014	9:09	Warm	California Sea Lion	*Zalophus californianus*	2	32.682014	-117.231528
8/18/2014	8:54	Warm	California Sea Lion	*Zalophus californianus*	3	32.673523	-117.230343
8/18/2014	8:33	Warm	California Sea Lion	*Zalophus californianus*	1	32.65915	-117.22083
8/18/2014	8:35	Warm	California Sea Lion	*Zalophus californianus*	1	32.65657	-117.22454
8/18/2014	8:44	Warm	California Sea Lion	*Zalophus californianus*	1	32.6618	-117.23249
8/18/2014	8:46	Warm	California Sea Lion	*Zalophus californianus*	6	32.665078	-117.229159
8/18/2014	8:47	Warm	California Sea Lion	*Zalophus californianus*	6	32.665422	-117.226509
8/18/2014	8:48	Warm	California Sea Lion	*Zalophus californianus*	2	32.66945	-117.22642
8/18/2014	8:50	Warm	California Sea Lion	*Zalophus californianus*	5	32.66793	-117.225
9/30/2014	13:46	Warm	California Sea Lion	*Zalophus californianus*	2	32.708687	-117.178699
9/30/2014	13:39	Warm	California Sea Lion	*Zalophus californianus*	1	32.71646	-117.20688
9/30/2014	13:26	Warm	California Sea Lion	*Zalophus californianus*	1	32.705238	-117.229745
9/30/2014	13:16	Warm	California Sea Lion	*Zalophus californianus*	45	32.69413	-117.235369
9/30/2014	13:19	Warm	Bottlenose Dolphin	*Tursiops truncatus*	1	32.69456	-117.23436
9/30/2014	13:21	Warm	California Sea Lion	*Zalophus californianus*	3	32.695771	-117.233139
9/30/2014	13:21	Warm	California Sea Lion	*Zalophus californianus*	2	32.695568	-117.230985
9/30/2014	13:10	Warm	California Sea Lion	*Zalophus californianus*	4	32.68245	-117.228976
9/30/2014	13:04	Warm	California Sea Lion	*Zalophus californianus*	4	32.673814	-117.227589

North San Diego Bay Transect Sighting Data							
Date	**Time**	**Seasonal Period**	**Common Name**	**Scientific Name**	**Count**	**Latitude**	**Longitude**
9/30/2014	13:06	Warm	California Sea Lion	*Zalophus californianus*	4	32.673523	-117.230343
9/30/2014	13:00	Warm	California Sea Lion	*Zalophus californianus*	5	32.665078	-117.229159
9/30/2014	13:00	Warm	California Sea Lion	*Zalophus californianus*	9	32.665422	-117.226509

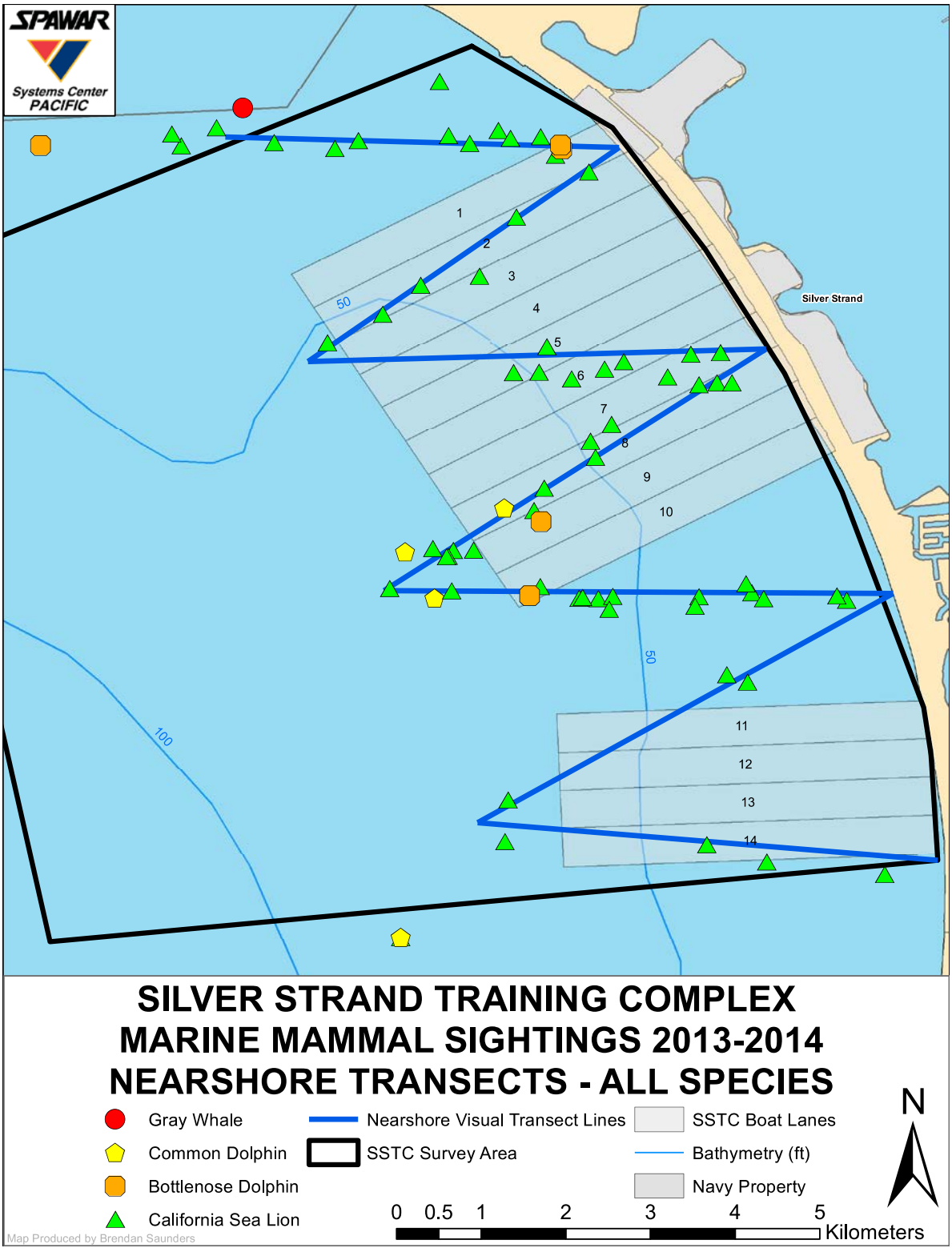

Figure 1: SSTC Nearshore Transects, All Species

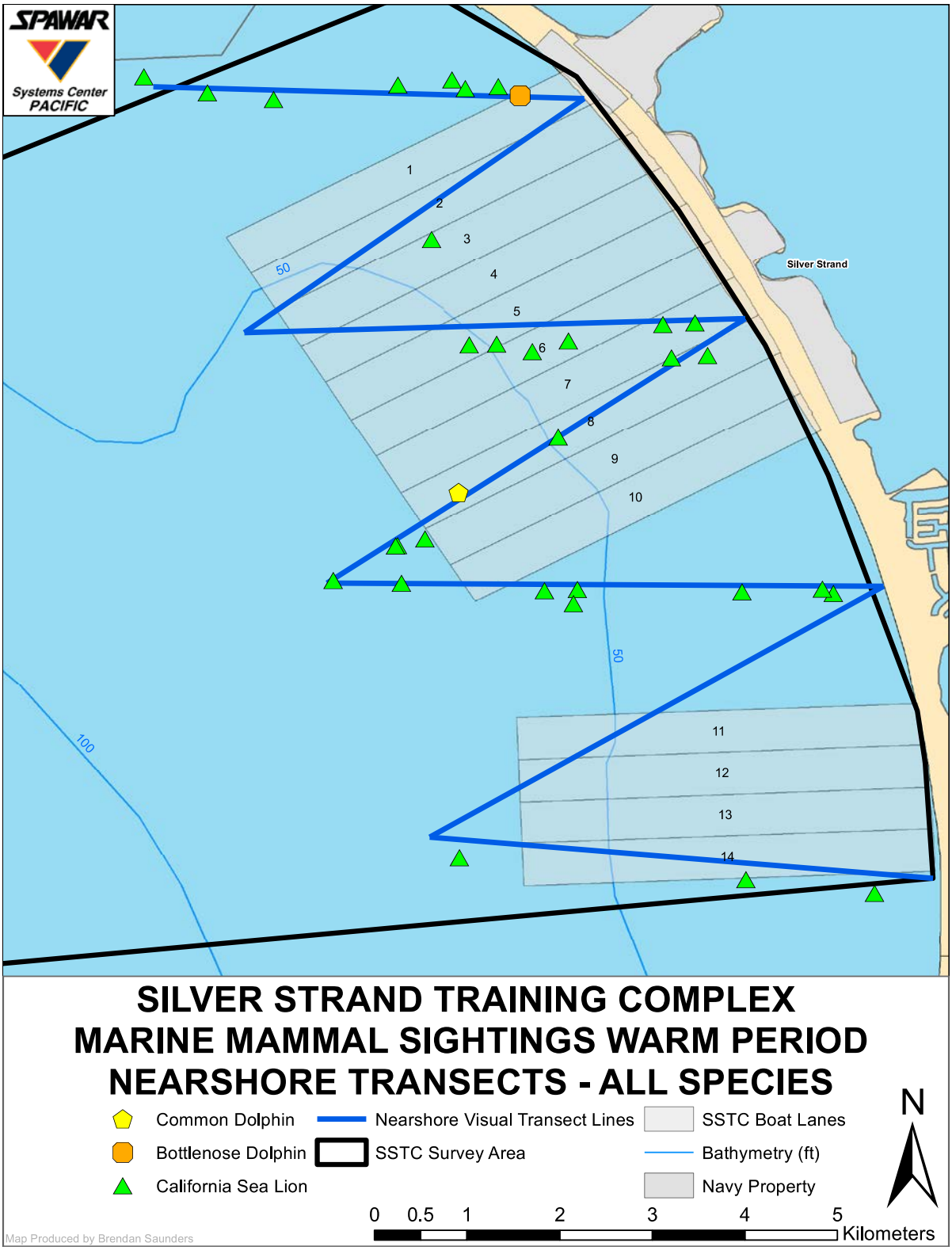

Figure 2: SSTC Warm Period, Nearshore Transects, All Species

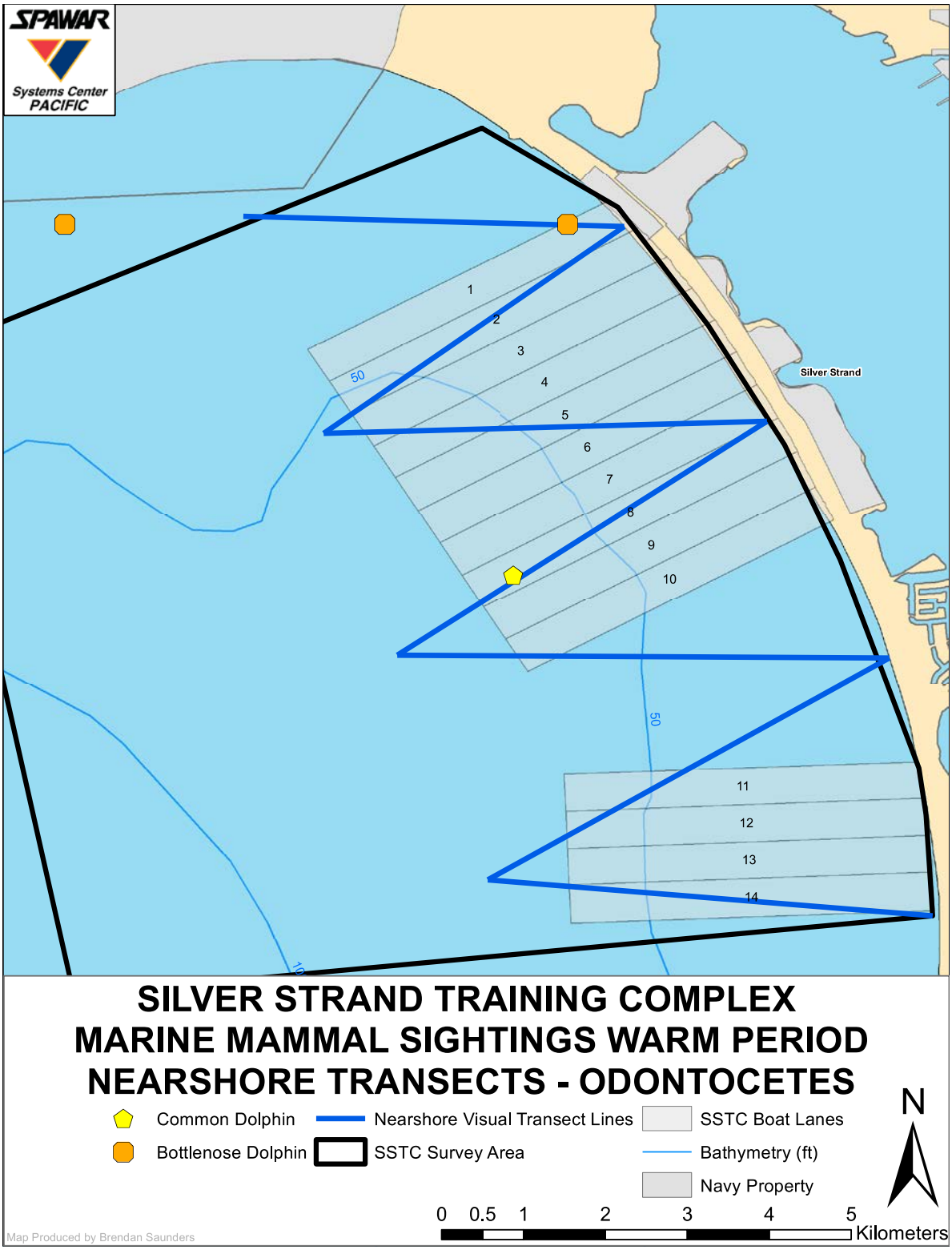

Figure 3: SSTC Warm Period, Nearshore Transects, Odontocetes

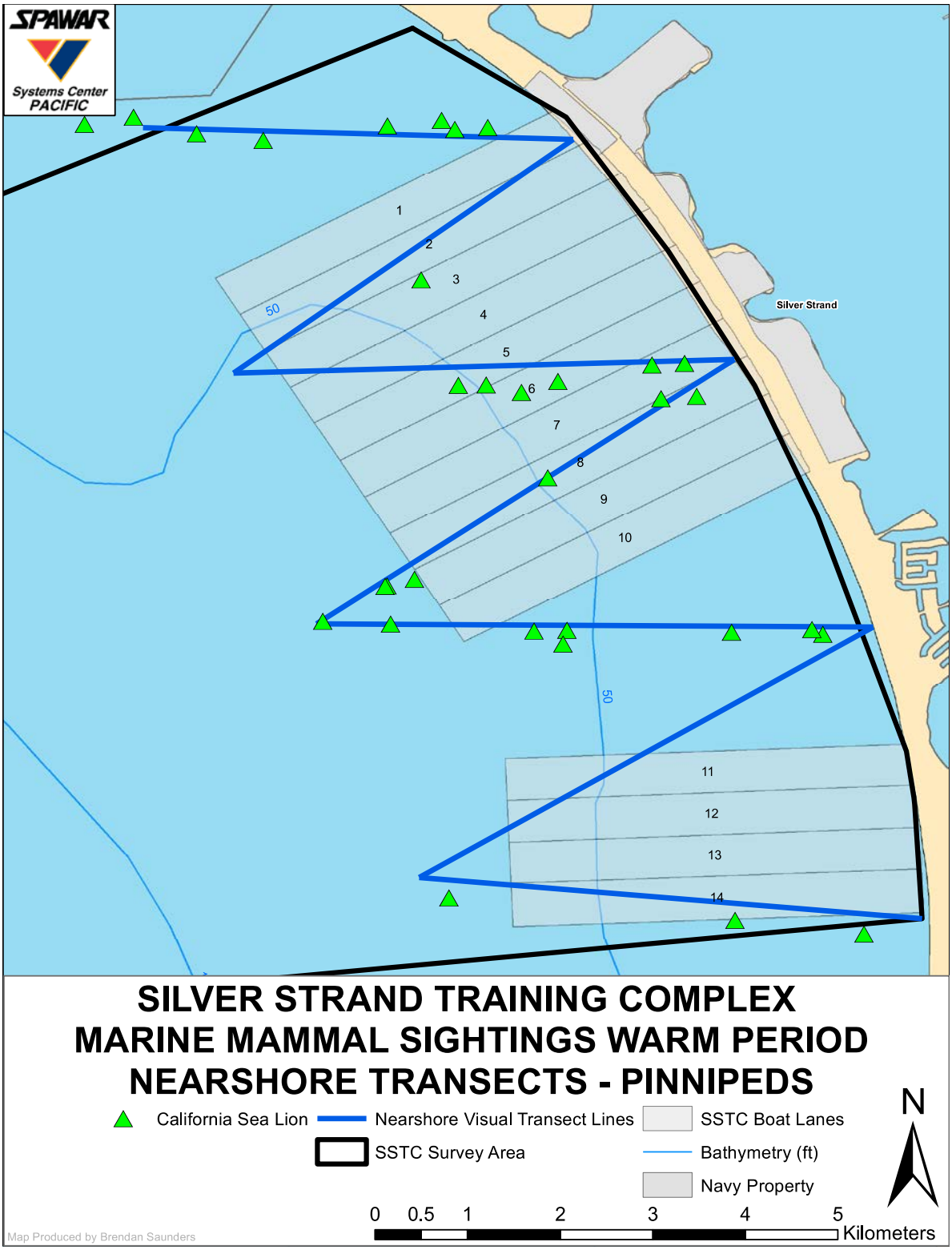

Figure 4: SSTC Warm Period, Nearshore Transects, Pinnipeds

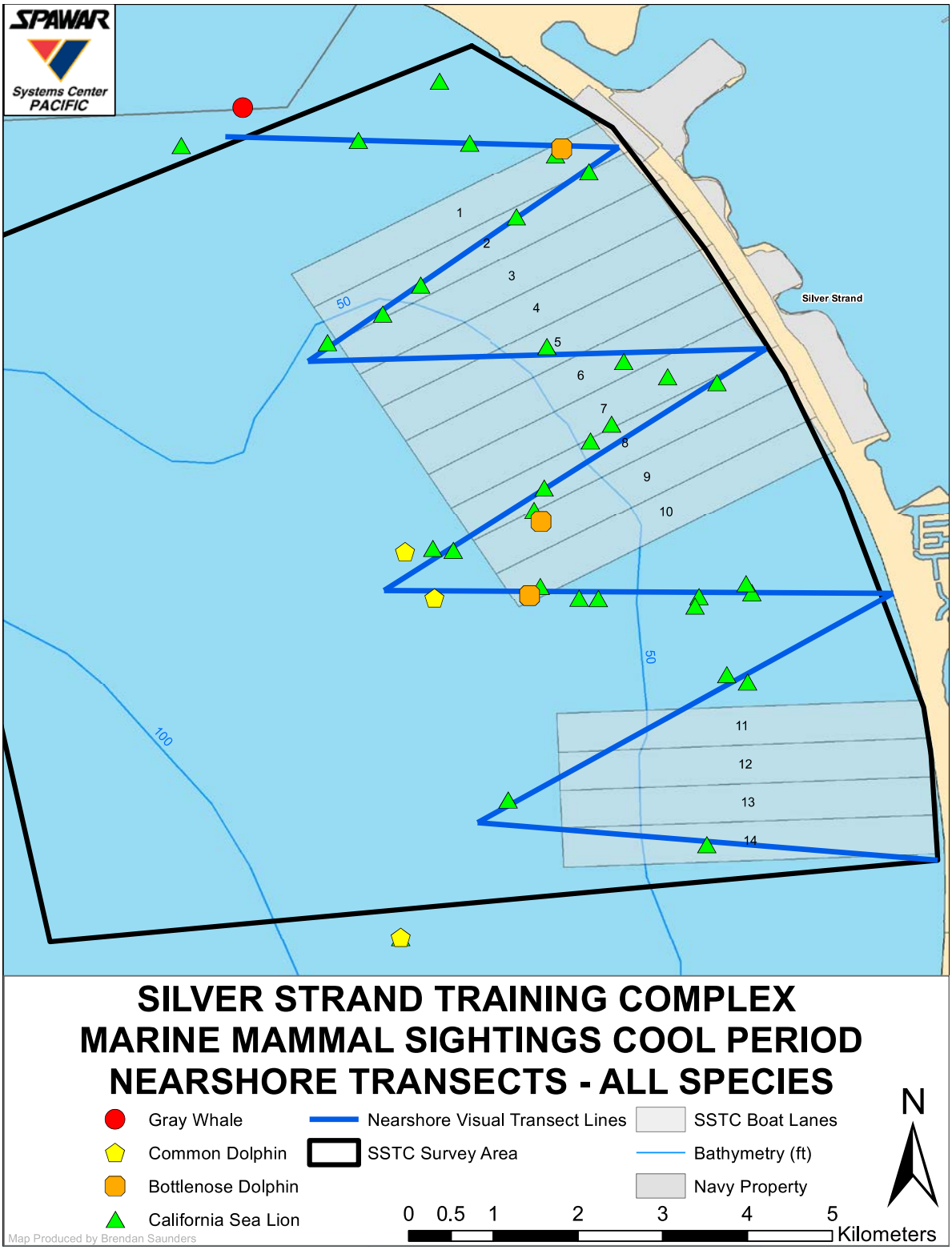

Figure 5: SSTC Cool Period, Nearshore Transects, All Species

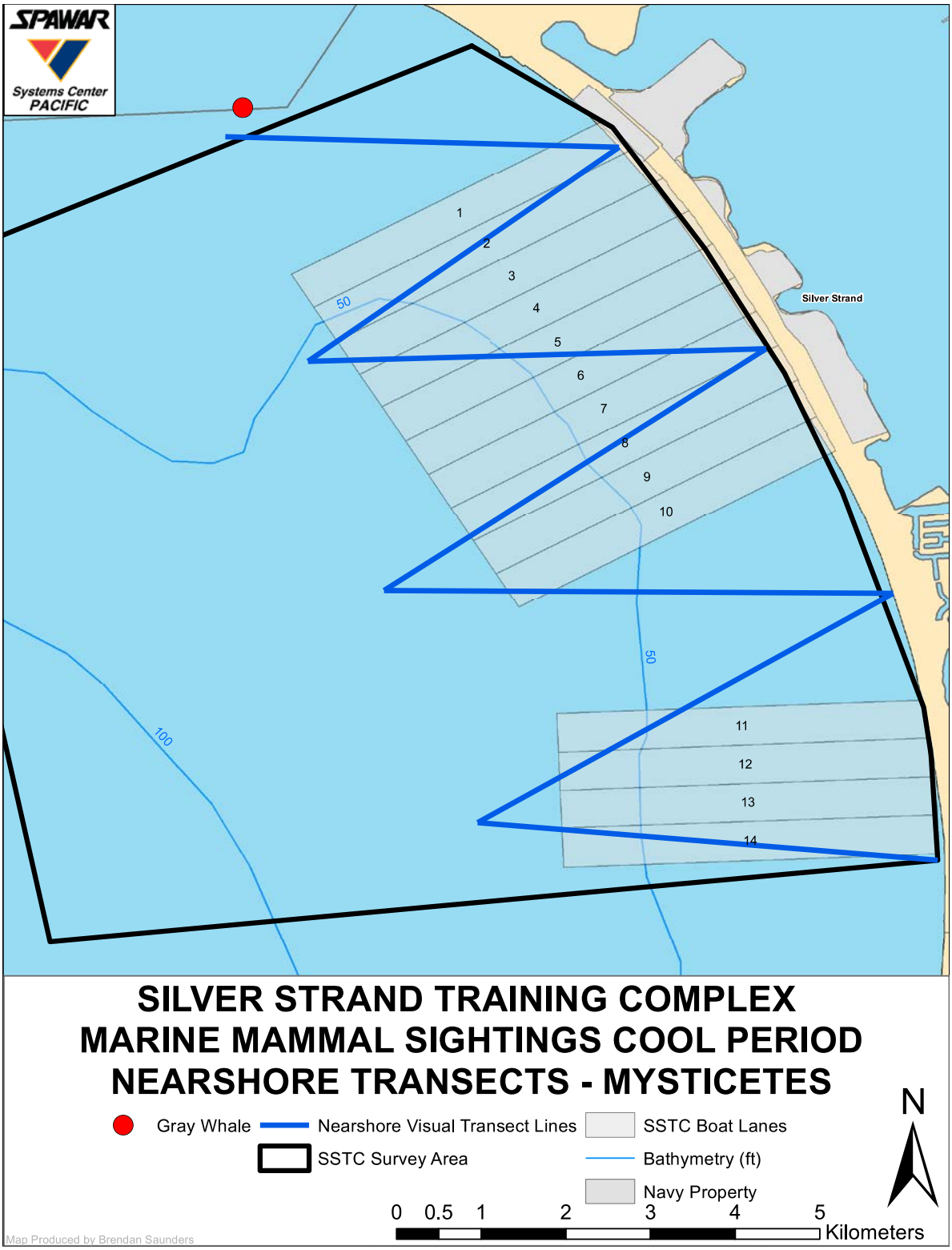

Figure 6: SSTC Cool Period, Nearshore Transects, Mysticetes

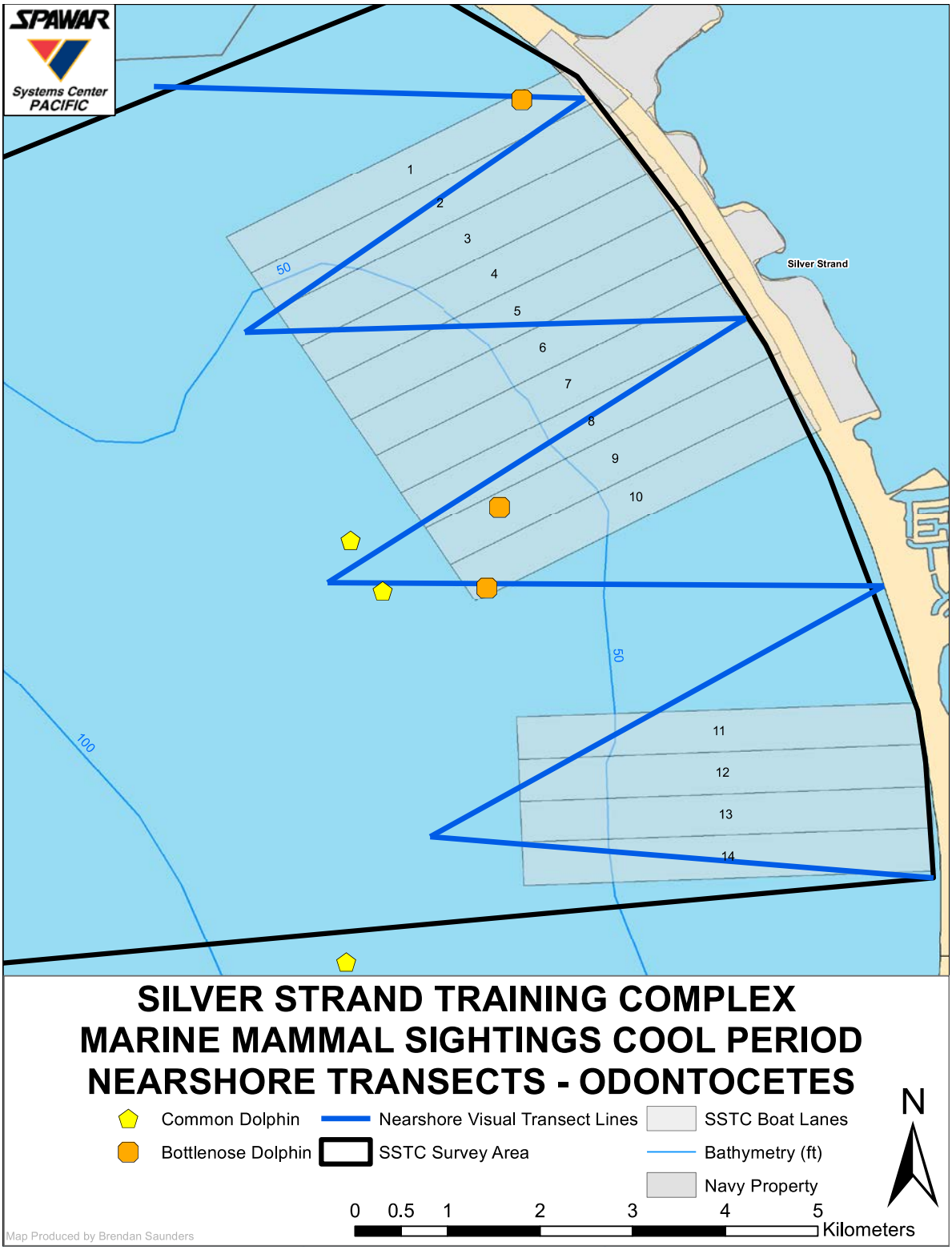

Figure 7: SSTC Cool Period, Nearshore Transects, Odontocetes

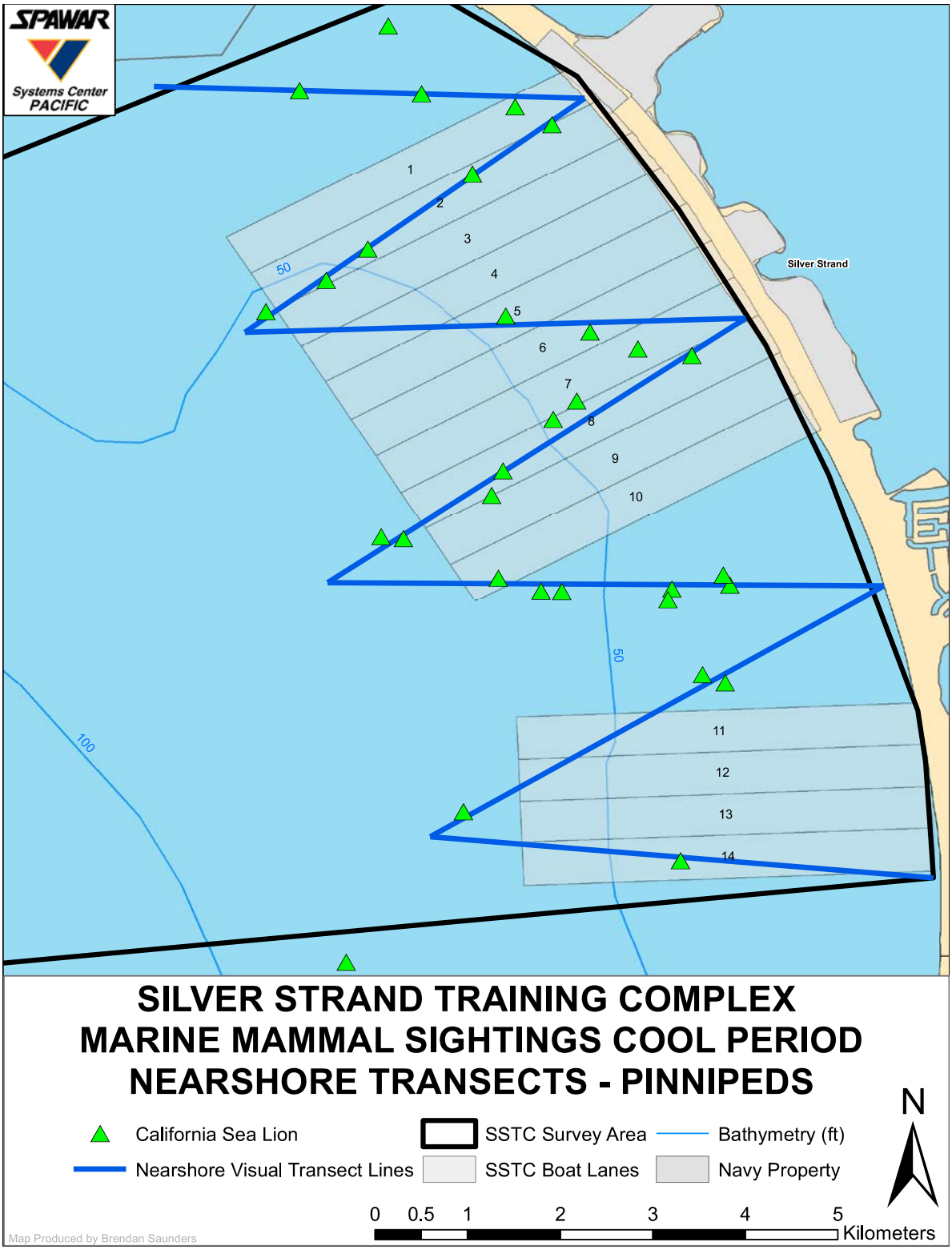

Figure 8: SSTC Cool Period, Nearshore Transects, Pinnipeds

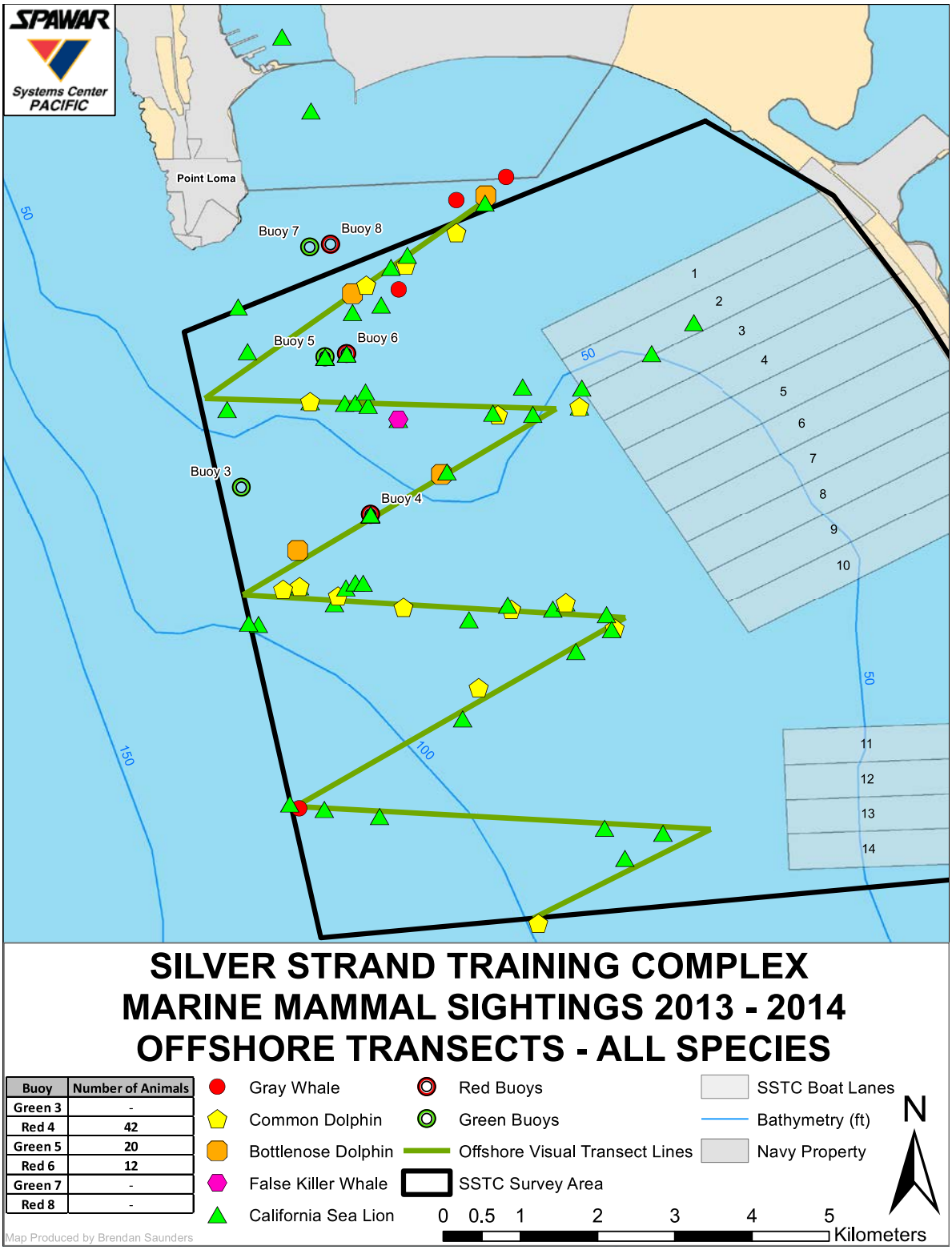

Figure 9: SSTC, Offshore Transects, All Species

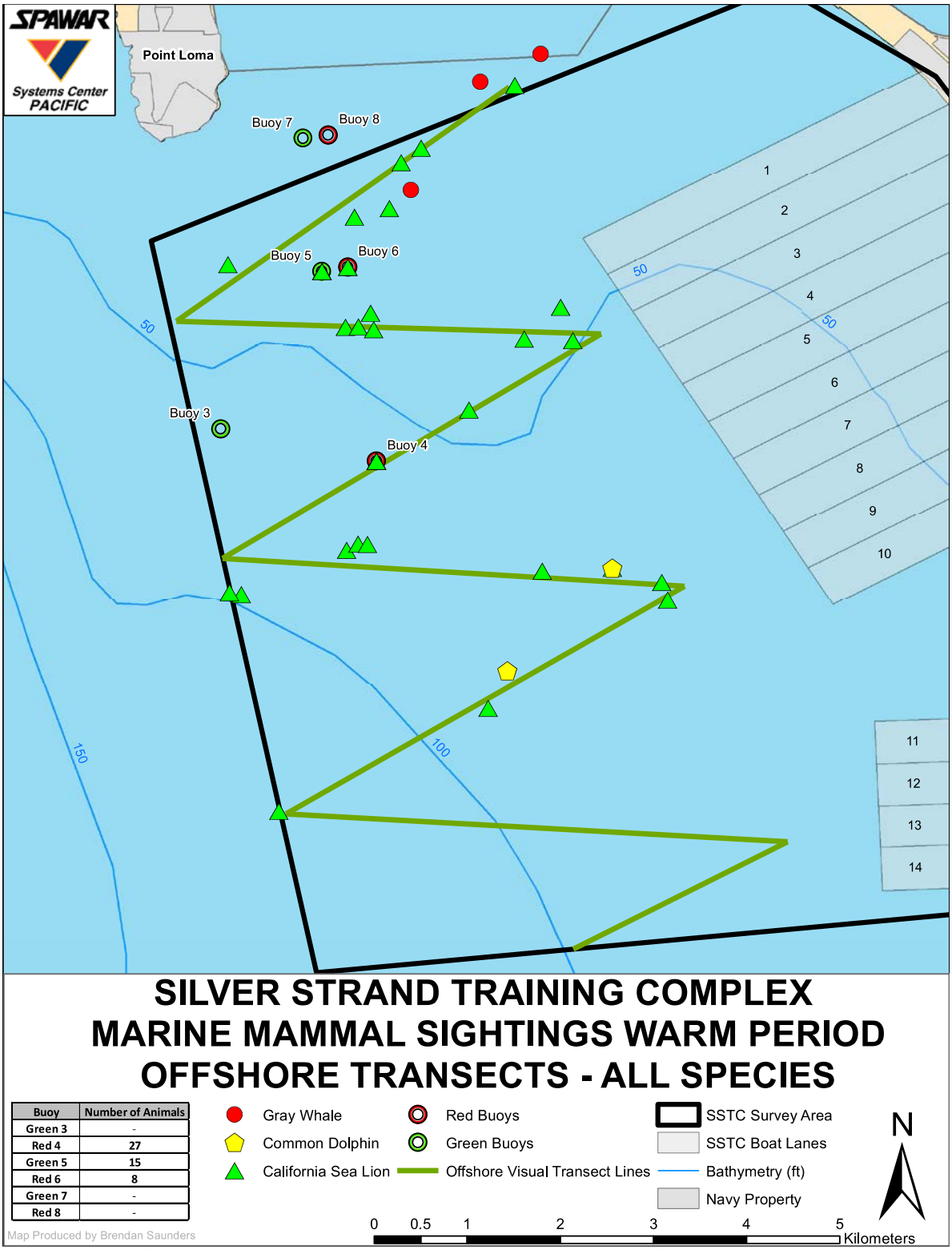

Figure 10: SSTC Warm Period, Offshore Transects, All species

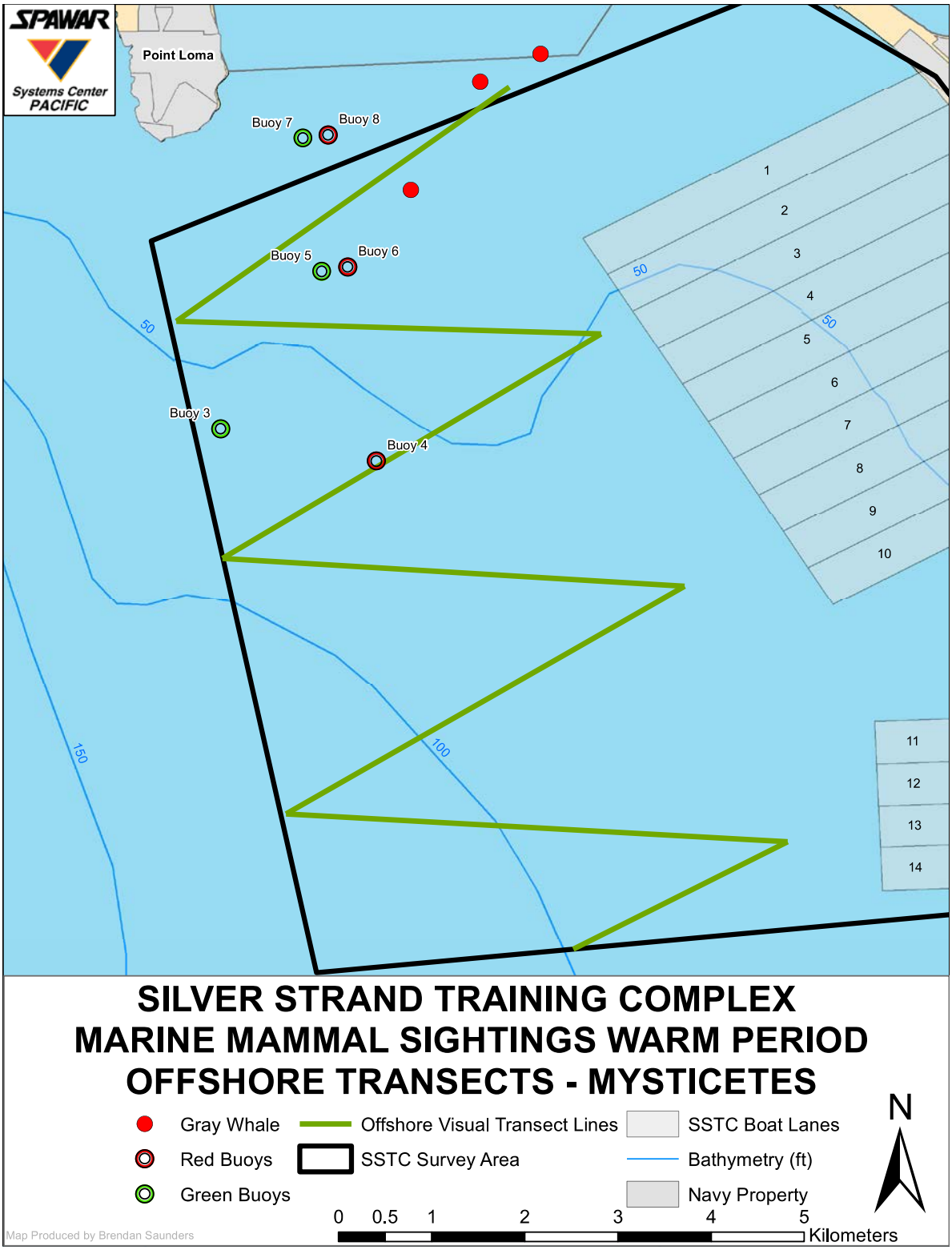

Figure 11: SSTC Warm Period, Offshore Transects, Mysticetes

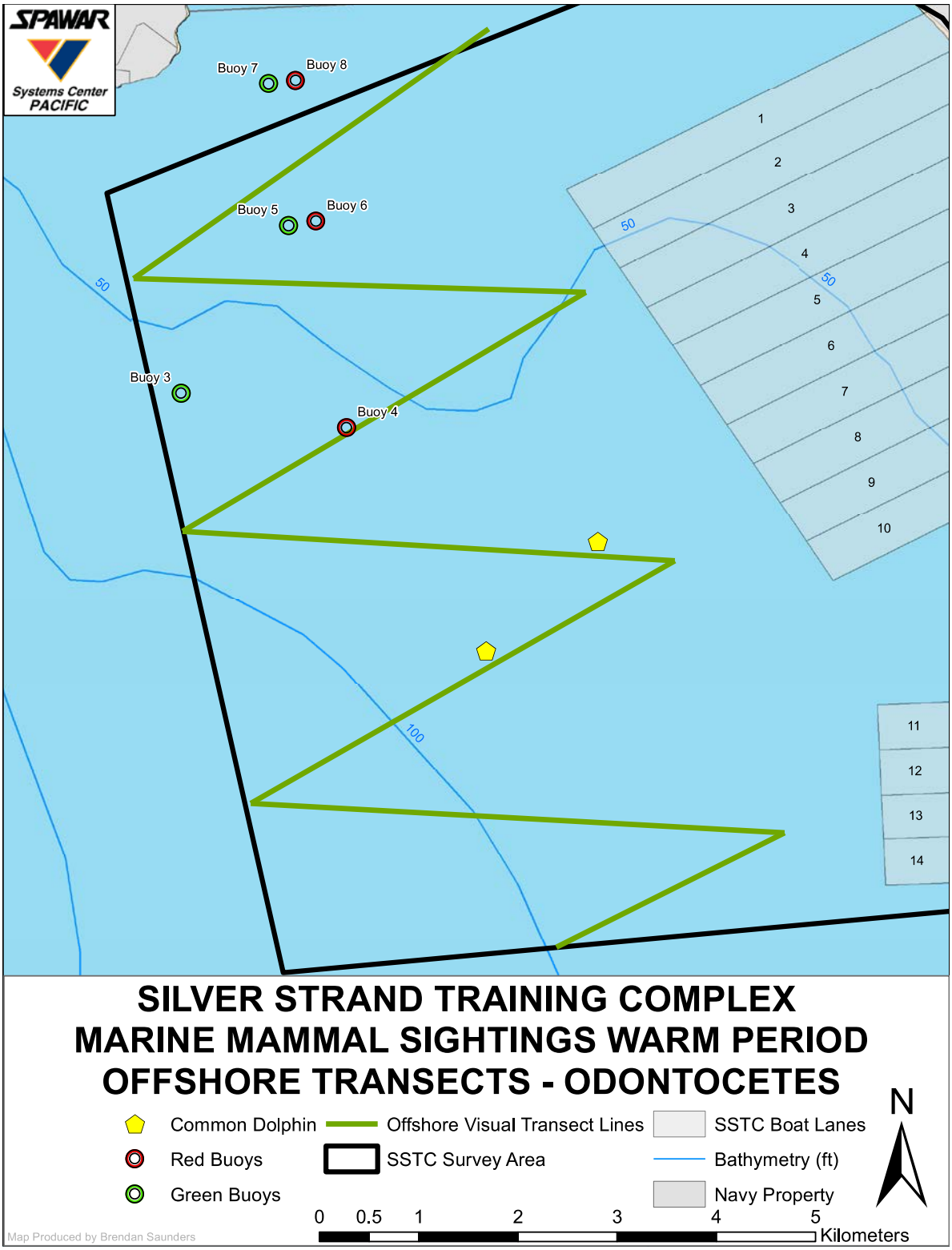

Figure 12: SSTC Warm Period, Offshore Transects, Odontocetes

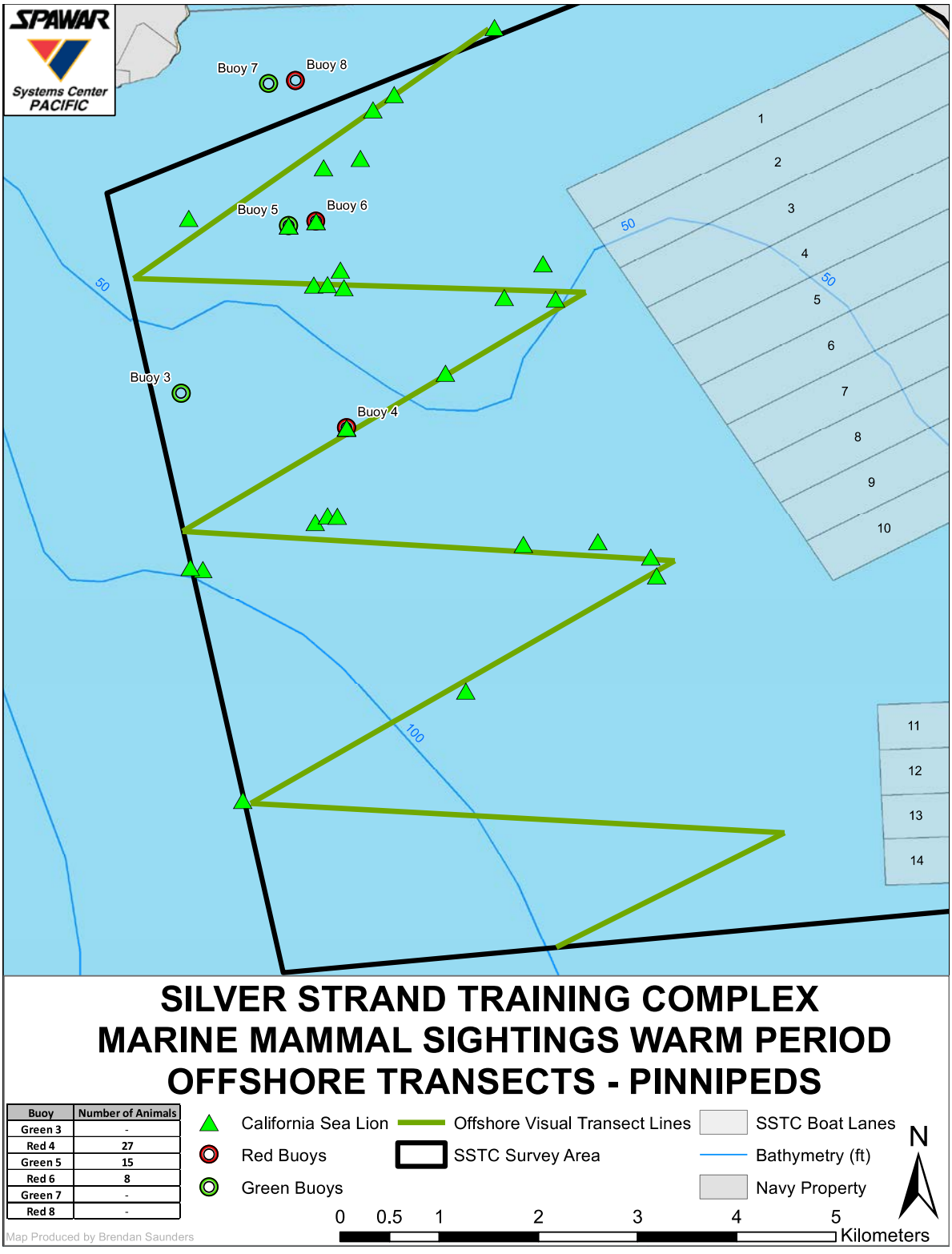

Figure 13: SSTC Warm Period, Offshore Transects, Pinnipeds

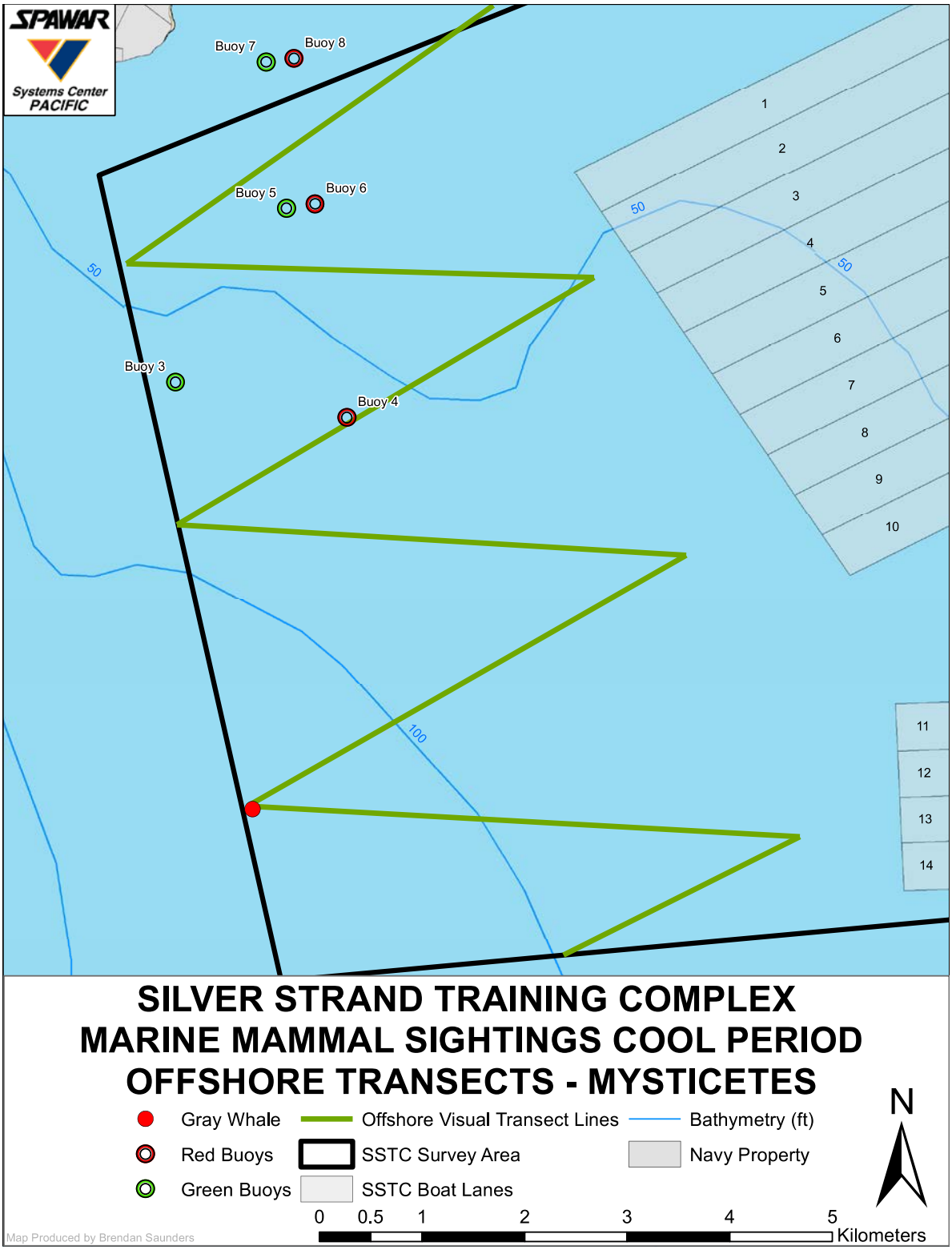

Figure 14: SSTC Cool Period, Offshore Transects, Mysticetes

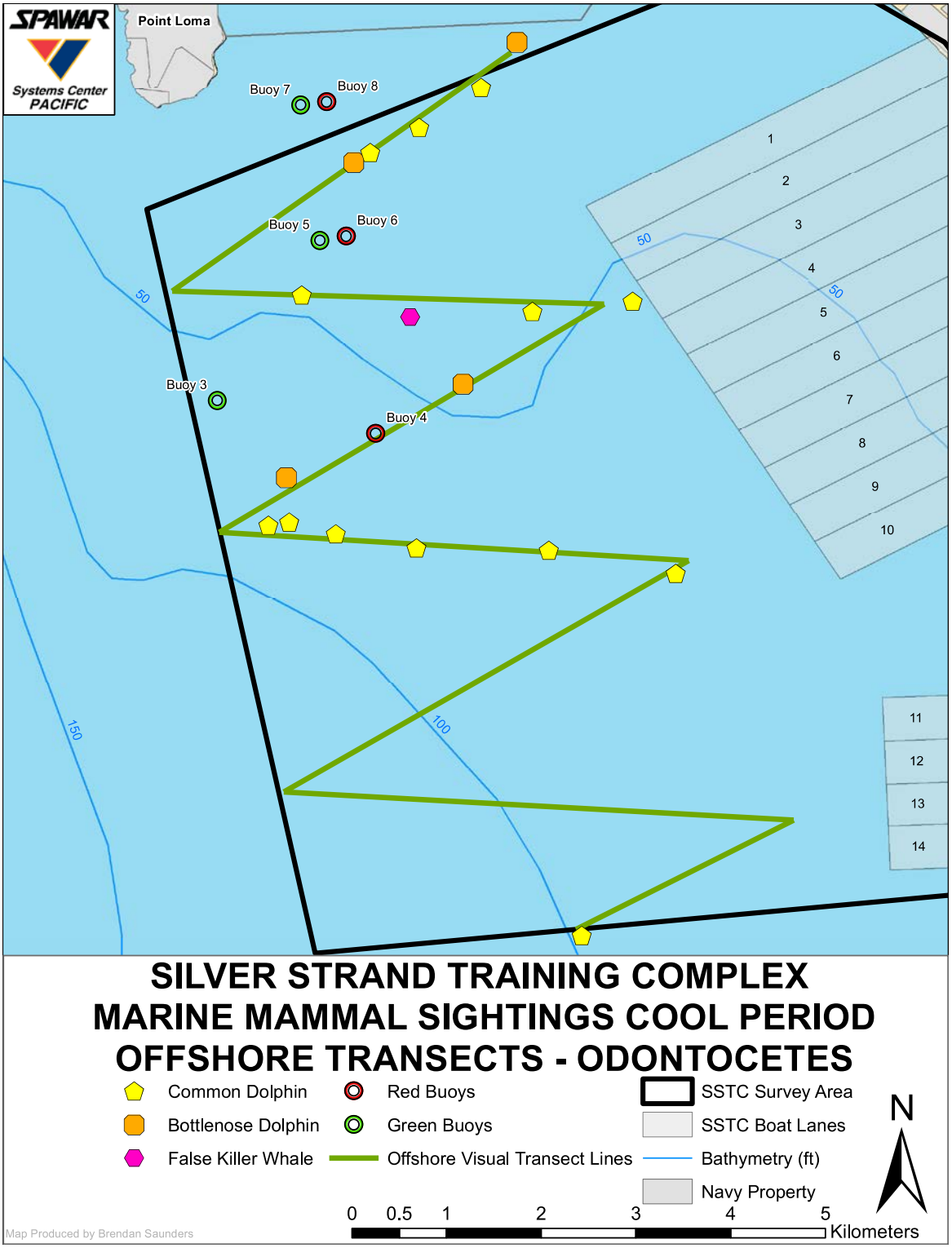

Figure 15: SSTC Cool Period, Offshore Transects, Odontocetes

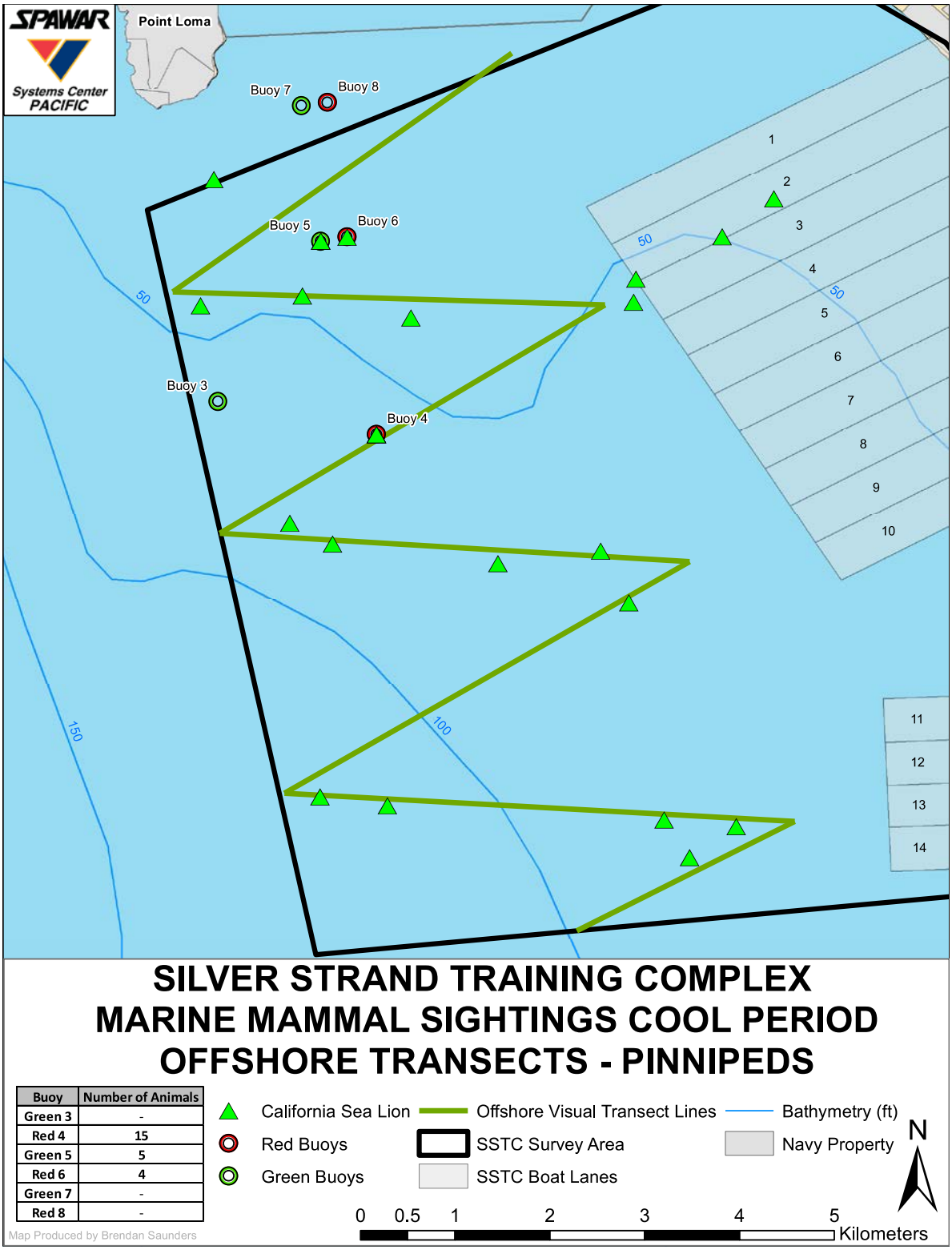

Figure 16: SSTC Cool Period, Offshore Transects, Pinnipeds