California Sea Lion Observations at La Jolla Cove
Initial Investigation of Abundance and Behavior
with Recommendations/Options

Final Report

by
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EXECUTIVE SUMMARY

Hanan & Associates, Inc. performed California sea lion counts and enumeration by age and sex in the La Jolla Cove area during the period March 11, 2015 to March 19, 2016. Behavioral observations were made at all hours of the day and night. On the United States west coast, these pinnipeds are abundant and not listed as endangered or threatened, and as a result, the population is expanding and occupying new territory. This expansion has increased interactions with people and property. The current El Niño event has impacted their general health and reproductive capacity, but is not likely to cause a long-term population decline.

California sea lions haul out and occupy at least ten different areas in and around La Jolla Cove near San Diego, California. They haul out year round and at all times of day and night in locations that are heavily utilized by the La Jolla community, visitors, and tourists. We observed all sea lion age and sex classes in the La Jolla Cove vicinity at all ten hauling areas. People and sea lions have caused or are starting to cause erosional issues along the bluff and cliff areas, which with continued use is likely to cause further damage to the natural and managed landscapes around La Jolla Cove. Sea lions have shown some aggression towards swimmers and beach users and to people that have tried to interact too closely with them (petting, selfies, pictures). Sea lions have been documented above and inland from beach areas near streets and in the park which creates health and safety issues for both the sea lions and the public. Sea lions urinate, defecate, and spew (coughing or regurgitating) while hauled out, resulting in strong odors from the waste which are offensive to some people.

Further research and management options are presented to address sea lion presence, interactions, and potential issues.

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1.0 INTRODUCTION

La Jolla Cove, California (LJC) is a picturesque beach community destination and a nationally recognized tourist attraction with its unique landscape of small pockets of beaches, coves, sea cliffs, caves, and wildlife. The location is heavily utilized for recreational purposes and hosts numerous annual community events. Human foot traffic on the beaches and rocky areas is constant throughout the year and at all times of the day and night.

In recent years, California sea lions (CSL) have expanded use of the rocky terraces and beaches at LJC resulting in increased interaction with the public and significant animal waste build up. The accumulation of animal waste in close proximity to urbanized and frequently used space raises concerns for public health and welfare, and for the safety of people and wild animals in close proximity to one another.

Hanan & Associates, Inc. (H&A) was contracted by the City of San Diego to observe California sea lions (*Zalophus californianus*) in the vicinity of LJC. The project estimated numbers of California sea lions by age and sex during a one-year period. H&A also monitored CSL behavior and interactions with humans and was asked to identify management options that might reduce or eliminate direct and indirect interactions. In the La Jolla vicinity, previous CSL research has focused on sport and commercial fisheries interactions (Miller et al. 1983; Hanan et al. 1989; Hanan and Fluharty, 1997; Jefferson and Curry, 1994; NMFS-PSMFC, 1997), but has neither considered nor investigated CSL hauling (climbing or jumping out of the ocean) behavior because there have not been any significant mainland hauling sites along the southern California bight. Previously, CSL have only hauled out on buoys, docks, boats, bait barges, exposed rocks and pinnacles. These LJC mainland hauling sites are the first in recent history to be documented in San Diego County or along the southern California mainland. CSL occupy hauling sites at all the offshore islands of the southern California bight (SCB) (San Clemente, San Nicolas, Santa Barbara, Santa Catalina, Anacapa, Santa Cruz, Santa Rosa, and San Miquel), as well as many rocks and pinnacles both offshore and along the mainland. In 2003, Mark Lowry (National Marine Fisheries Service (NMFS)) and Octavio Maravilla-Chavez (Instituto

Nacional de Ecologia) estimated the CSL population in the Republic of Mexico and the United States to be 344,000 to 359,000 CSL with 9% in the Gulf of California, 22-24% in western Baja California, and 67-69% on the U.S. west coast (Lowry and Maravilla-Chavez, 2003).

1.1 Regulatory Aspects

California sea lions are managed under the Marine Mammal Protection Act of 1972, as amended (MMPA) and they are protected from all forms of harassment and take (MMPA defines "**take**" to mean "to hunt, harass, capture, or kill" any **marine mammal** or attempt to do so). CSL are not listed as Endangered or threatened under the Endangered Species Act, nor as depleted under the MMPA (Lowry, et. al. 1992; Carretta et al. 2015). They are not considered a strategic stock under the MMPA because total human-caused mortality (331 fishery-related mortalities plus 291 from other sources) is less than Potential Biological Removal (9,200 CSL) a value similar to a sustainable removal level.

The MMPA preempted all state and local authority to manage marine mammals and placed that authority with NMFS and the US Fish and Wildlife Service. NMFS has management authority for all pinnipeds. Although not required, the City may perform certain actions under authority of the federal MMPA:

The Marine Mammal Protection Act of 1972 as Amended
Findings and Declaration of Policy
16 U.S.C. 1361

Sec. 109. (h) [TAKING OF MARINE MAMMALS AS PART OF OFFICIAL DUTIES.] —

(1) Nothing in this title or title IV shall prevent a Federal, State, or local government official or employee or a person designated under section 112(c) from taking, in the course of his or her duties as an official, employee, or designee, a marine mammal in a humane manner (including euthanasia) if such taking is for—

(A) the protection or welfare of the mammal,
(B) the protection of the public health and welfare, or
(C) the nonlethal removal of nuisance animals.

Because the City is concerned for the well-being of the public and CSL, the City commissioned this study to identify problems and understand options available regarding CSL at LJC with the full understanding that management authority rests with NMFS. However, certain aspects of CSL biology and behavior are not and likely will not be

addressed by NMFS, therefor this action to obtain available options, review public recommendations, and possibly to address specific problems at LJC using NMFS approved methods.

1.2 Initial Assessment

CSL haul out of the Pacific Ocean by going ashore on beaches, rocks, and pinnacles or climbing onto man-made objects large enough to support their weight. CSL haul out individually or in large groups for a variety of reasons including rest, sleep, sub-adult males mock fighting, females nursing their pups, and in some cases because they are ill or injured. CSL urinate, defecate, and spew (coughing and throwing up) while hauled out. This is a potential health and safety problem when these sites are also used by the public, as these areas can become dangerous because of CSL biting, and waste becoming a slipping hazard, exposure to the bacteria *Escherichia coli* (abbreviated *E. coli*), and additional health-related issues, along with the aesthetic issue of the offensive smell.

H&A observed LJC areas where CSL haul out and CSL behavior associated with various hauling activities. Since that documentation in the spring of 2015 and through date of this report, the eastern Pacific Ocean has experienced a major El Niño event, which has had significant impacts on the local environment including higher ocean temperatures, movements of fish, birds, and squid out of the area with influxes of fish and bird species normally found much further south, off Mexico and beyond. Those changes appear to have impacted CSL in that they likely could not find normal prey items or could not find sufficient quantity (market squid, anchovy, mackerel, sardine, and other fish). Squid fishermen and bait haulers have reported a diminished availability of these fish and squid during the last two years. Female CSL have been in poor physical condition with marine mammal rehabilitation centers reporting unusual numbers of female CSL being taken in for care and treatment. H&A observed a number of females having still births of pups in various developmental stages during the spring of 2015 and 2016, presumably because of their poor physical condition (Dr. Robert DeLong, NMFS sea lion expert, 2015 pers. comm. April 13). CSL young-of-the-year/pups have also been in very poor physical condition during 2015-16 and they too have been captured for rehabilitation in numbers far

greater than previous years. These conditions likely have greatly influenced the number of CSL, health and behavior around La Jolla during this project, but we expect our study represents a reasonable view of hauling behavior, and is a reasonable portrayal of CSL use of the LJC area.

1.2.1 Initial Assessment — Goals

The goals of the Phase 1 initial assessment were:

1. To document CSL hauling sites;
2. To designate hauling sites for observations;

1.3 Monitoring Sea Lion Numbers & Behavior

H&A documented CSL numbers by age and sex class in the LJC areas to better understand the dynamics of CSL behavior and interactions with humans. Since federal protection started with the MMPA in 1972, the west coast CSL population has increased about 4 - 6% per year (Carretta et al. 2015), and in turn, CSL that previously used LJC area as a temporary resting location are now present year round. They are represented by all age and sex classes demonstrating some typical behaviors including: resting and sleeping, sub-adult males mock fighting, females nursing pups, and two documentations of viable births (nursing for a few days with the second birth) as well as, a few other nursing pups assumed born on the offshore islands. With continued presence, there have been increasing conflicts with the public beach users and swimmers. Those conflicts are two-fold and have included aggressive CSL actions towards humans trying to cross the beach; while CSL have been harassed by humans as they try to rest or sleep on the beach or rocks. Another source of contention has been the odor from CSL feces, urine, and spewing. These odors are frequently very strong, eliciting revulsion or nauseous sensations in some people. Hotel and restaurant owners near LJC report loss of business due to CSL noise and smell.

1.3.1 Monitoring Sea Lion Numbers & Behavior — Goals

The goals of the second phase of initial assessment were:

1. To document CSL numbers by age, sex, and season;
2. To observe CSL behaviors and interactions, as well as, human behaviors with CSL;
3. To subjectively assess smells on a relative scale at each monitoring area.

2.0 PHYSICAL LOCATIONS

For monitoring, we divided LJC into ten observation or monitoring areas based on location and substrate (Figure 1). The areas were not of equal size but did reflect CSL usage as hauling sites:

Figure 1. La Jolla Cove Sea Lion Monitoring Areas (shown with yellow pins).

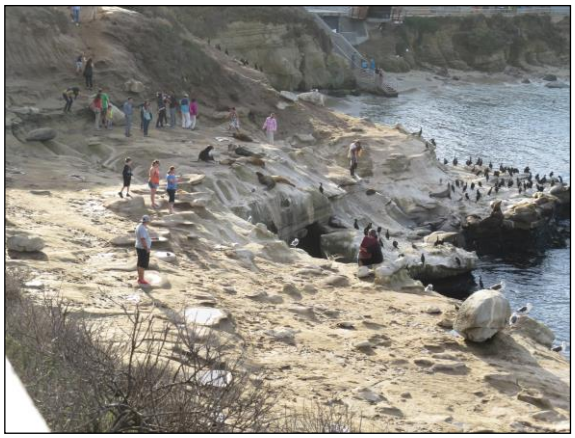
1) Area One is north of the LJC Bridge Club from the green gazebo to the eastern edge of Point La Jolla and is made up of a sand and boulder beach (Boomer's) and a sandstone shelf. There is public access including cement and wood steps from the sidewalk down to the sandstone shelf.

2) Area Two, extends southward to LJC swimmer's beach and includes the boulders at the north end of the beach where people can access at low tide.

3) Area Three, La Jolla Cove Beach includes all of the sand beach. There is direct public access to the sand beach via two cement stair cases on the southwest side and north end of the beach.

4) Area Four represents the top of the sand stone shelf adjacent to the vegetation, the white fence, and the sidewalk next to Coast Boulevard and includes a pathway down to the sandstone shelf areas below. The white gate is a spring loaded, latch gate that can be opened by hand and serves as the entrance for the public to Areas 4, 5, and 6.

5) Area Five is the wash rock rubble and boulders at water's edge below the sandstone shelf south east of the LJC beach and below Area 6.



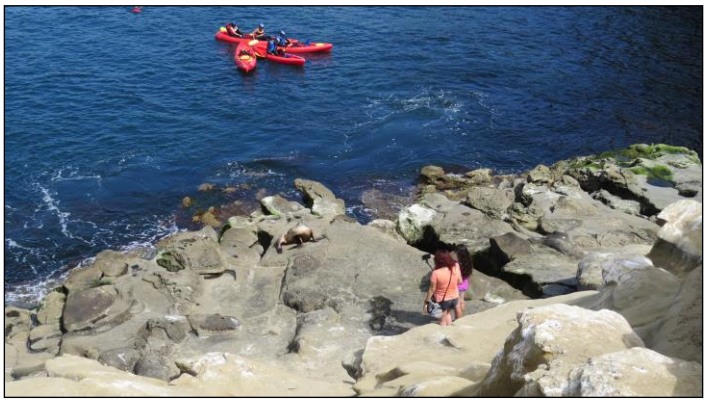
6) Area Six is a large sandstone shelf and boulder section below the wooden white fence and sidewalk of Coast Boulevard it is where the largest concentrations of sea lions haul out and sea birds roost. It is also the area sprayed by the City to reduce CSL waste build up and associated smell.

7) Area Seven is a very steep cliff east of Area 6 just beyond the fencing with rock shelving and boulders at the base and water's edge. It extends southward above a small embayment. There is limited public access to this area due to the sheerness of the cliff; however the public does access the area by climbing over the white fence. This cliff is mainly occupied

by large numbers of western sea gulls, brown pelicans, and Brant's cormorants, with a few sea lions at the base of the cliff.

8) Area Eight is the boulder beach below the Cave Store; it is at the end of the embayment (known as Emerald Cove) and includes the cave on the east side. A sheer sandstone cliff encompasses the rock beach from the top of Coast Boulevard; therefore, only allowing public entry from the ocean; there is no land based public access to this area.

9) Area Nine is a cliff and lower rocky area which extends from the mouth of the cave to Gold Fish Point (referred to as The Clam). The public can enter the area off the Costal Scenic Trail (near the Cave Store) by following a series of maintained natural wood and dirt stairs to a latched gate entrance at the base of the stairs. Note the sea lions, pelicans, and sea gulls on the side of the cliff. This area is frequented by people climbing down from pathways above.



10) Area Ten is a small boulder and rock shelf on the east side of Goldfish Point. There are a few eroded trails on the top of the cliff Area 9 leading to the rocky shelf and Area 10 at the base of the cliff.

3.0 METHODS

The project commenced March 11, 2015 with observations randomized by day and time of day. There were one to four observation/monitoring periods during any observation day and time to complete a set of observations was one to four hours. Observations were conducted during day (ten power binoculars) and night (night-vision binoculars). Starting and ending location varied by day, location, and weather conditions. We used a two-page data sheet to record observations (Appendix A). The first sheet was for CSL counts and observations and the second sheet was for seabird counts and observations. Environmental and weather conditions were recorded on the second sheet.

At each area, we counted total CSL and then counted by age and sex class when it could be determined. At night using night vision binoculars, we were only able to count total animals and generally could not identify all age or sex classes, but CSL pups and juveniles could usually be distinguished from adults. Also at night, we could not count at areas which were far from the observation point (Areas 7, 8, 9, or 10).

Behavior (i.e. moving to or from the water, sleeping, fighting, nursing, flushing or fleeing, etc.) was noted, photographed, and some video was taken. We also noted any observed health issues such as wounds, weight or body condition, tags, brands, and shave marks.

We observed, recorded, photographed, and videoed interactions with other animals and humans. Counts and behavior observations were entered from the data sheets into a spreadsheet with which we did all analysis and graphing.

We made a subjective assessment of offensive smells at each area (Figure 2) based on a scale of 0-3 (zero representing no detectible smell, 1 detectible smell, 2 detectible offensive smell and 3 offensive smell causing a physical reaction) and tried to identify the smell source (CSL, birds, plant material, sewage, etc.).

4.0 RESULTS

4.1 Pinniped and Seabird Counts

We conducted 3,737 counts and observations of pinnipeds (seal and sea lion) and sea birds during March 11, 2015 through March 19, 2016 at LJC areas and vicinity. Data collected after March 19, 2016 were not included in our analysis nor in this report. In addition to CSL, we recorded 91 instances of northern elephant seals (*Mirounga angustrirostris*) hauling out on LJC beach (Area 3), 48 Pacific harbor seals (*Phoca vitulina richardsii*) at Areas 2, 3, and 6, and one northern fur seal pup (*Callorhinus ursinus*) at Area 10. The elephant seals were usually one or two juvenile animals and often the same seals were observed on multiple days.

Juvenile Elephant Seal

Fur Seal pup

Harbor Seal

4.1.1 Sea Lion Counts by Area

We counted CSL at each of the ten monitoring locations. Each of the areas we delineated had specific characteristics such as substrate which effected how the CSL used the area (see Table 1) and our ability to observe the animals. We do not believe there were any locations where we could not observe the animals during daylight hours. All counts were recorded and analyzed on a per observation basis. Totals for all areas averaged 10 CSL per area. We further enumerated CSL by age and sex class by area (Figure 2).

Table 1. Descriptive Statistics for Counts of Sea Lions by Observation Area
(Mean is the average of all counts for an area, SD is standard deviation of the mean, and n is total number of counts for that area)

Area	1	2	3	4	5	6	7	8	9	10
Mean	10.5	6	12.1	2.1	10.7	38.7	3.4	4.1	8.4	1.2
SD	12.9	7.7	14.8	5.5	13.5	36.7	4.6	5.2	7.5	1.9
n	392	392	395	391	396	396	344	343	349	340

4.1.2 Sea Lion Counts by Age/Sex

We recorded total CSL at each area and then recorded CSL numbers by age and sex. Summaries of those data are presented in Table 2 and Figure 3. Because we could not always identify age/sex class but could count total animals, we converted actual counts by

age/sex class to ratios of total counted to sums of age/sex class counted during a count at a particular station. For example, if we counted a total of 10 CSL at a station but could only identify 5 by age/sex, then each number by age/sex was factored up by two at that station to account for the total by age/sex. Sometimes they were factored down. The sum of total counted was 37,582 and the sum of age classes counted was 31,462 for a 1.19 overall ratio.

Since we did not have equal monthly counts by area, we used average CSL per count, per area for analysis and comparative purposes by age/sex class (Figure 2). We used the following abbreviations for age/sex class throughout the document: AM: Adult Male, SAM: Sub-adult Male, AF: Adult Female, SAF: Sub-adult Female, SA (UK): Sub-adult undetermined sex, JUV: Yearling to Sub-adult, Pup: less than 1 year, Still: born dead.

Table 2. Averages of Ratio Counts by Month, March 2015-March 2016
(See abbreviations above).

Month	AM	SAM	AF	SAF	SA(UK)	Juv	Pup	Still
Jan	4.8	5.2	5.6	1.8	4.0	3.3	6.0	0.0
Feb	3.3	4.2	5.5	1.8	3.7	4.5	1.8	1.1
Mar	2.3	2.3	6.2	2.5	4.2	3.1	2.2	1.4
Apr	2.2	3.2	5.7	2.2	3.6	2.9	2.2	1.2
May	2.7	4.4	8.9	2.3	4.6	4.0	1.0	1.1
Jun	3.5	7.3	7.8	2.4	2.7	4.4	1.0	1.0
Jul	2.3	5.7	9.3	2.8	4.2	5.5	0.0	0.0
Aug	4.2	5.0	6.0	2.9	1.7	3.2	0.9	0.0
Sep	3.1	4.9	4.1	2.0	1.5	4.0	1.3	0.0
Oct	5.2	4.4	4.3	2.2	1.7	3.3	0.0	0.0
Nov	3.4	4.0	3.1	1.7	1.5	2.5	1.5	3.0
Dec	3.2	3.6	2.8	1.7	2.4	2.4	1.3	0.0

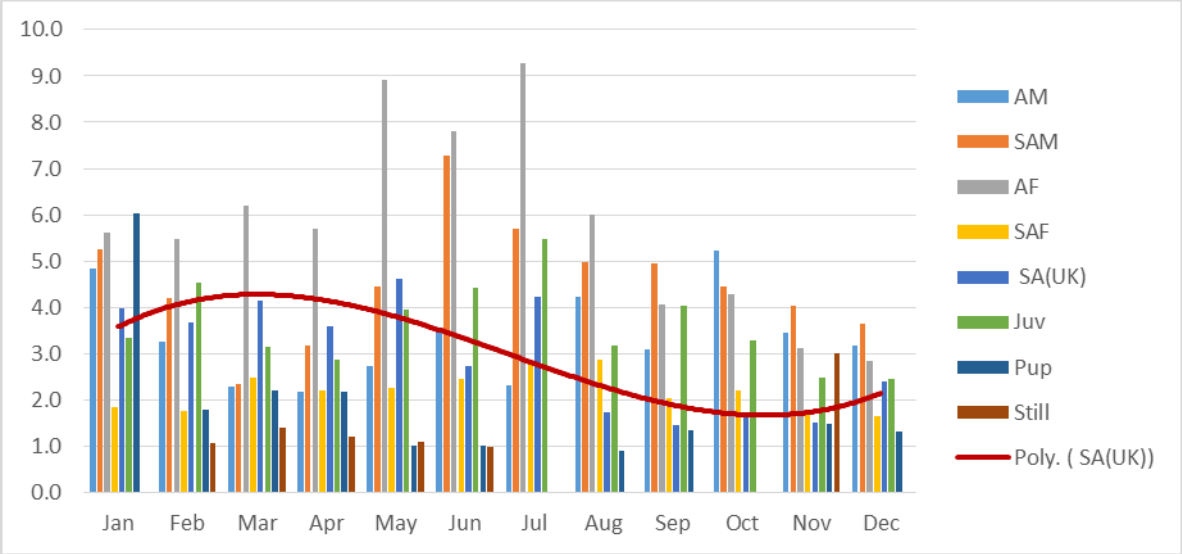
4.2 Sea Lion Hauling Behavior

Our observations of CSL revealed several generalized 24 hour patterns at LJC which seem to reflect patterns we have observed at the offshore islands; however they haul out to land or go to sea at all times of the day and night. They also respond to weather, sea, and surf conditions by moving higher or lower on the shore or leaving into the water.

4.2.1 Daily Hauling Behavior

Each morning about an hour before sunrise, a few CSL wake and start moving towards the water. We observed this on all substrates, whether they are on the shelf, cliff, or beach areas. This activity wakes others, some of which, also start moving towards the water and this activity continues into mid-morning. Usually not all animals leave the hauling areas. But human presence can cause or accelerate the process and many more to leave (e.g. swimmers at the cove beach of Area 3, people going through the gate at Area 4, and people going onto the rock shelf below the Bridge Club in Area 1), the City spraying to breakdown fecal matter and reduce smell, or SeaWorld rescuing sick/injured animals. Some of these CSL move to other areas where there are no or fewer people and many others go out to sea. Those who don't leave appear to rest or sleep for varying periods of time and may or may not leave later in the day.

Figure 2. La Jolla Cove Monthly Average of California Sea Lions by Age/Sex Class March 2015 - 2016. On this chart January, February, and part of March were recorded in 2016 while the other months were recorded in 2015. Counts were adjusted by ratio estimator to reflect total counted to counts by age/sex class. The trend line represents total CSL counted by month.



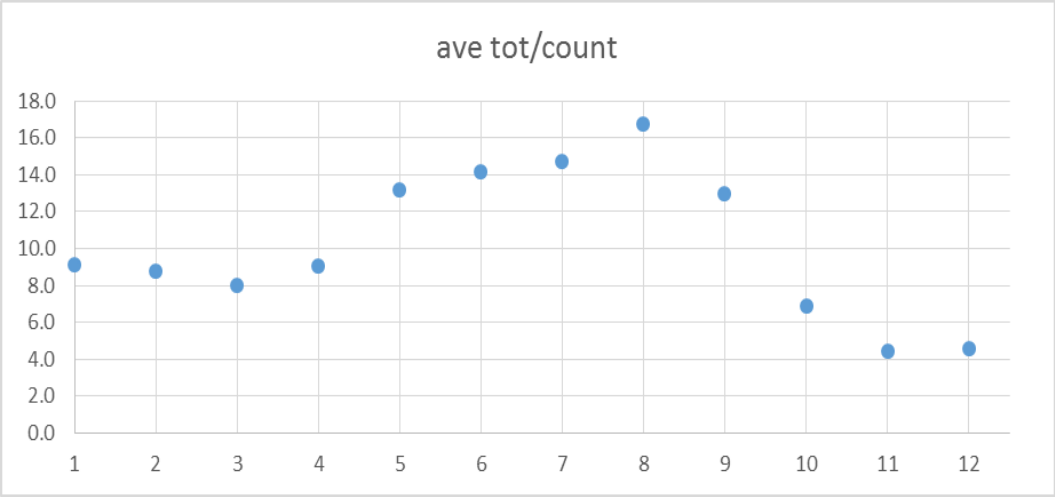
In the evening just after dark, a large number of CSL can be seen in the surf or just offshore before they proceed to haul out on all substrates and areas especially the LJC beach and areas 5 and 6. This pattern does not appear to specifically reflect age or sex, but often the first to haul out are adult or sub adult males. Once ashore, they tend to move up the beach or rocks to the base of the cliffs and a few go up the cliffs. They tend to settle in groups of varying size and start sleeping. They sometimes will move during the night, but generally stay in the same group and as more animals haulout, the groups blend together. Crowding may cause some animals to move up the cliffs.

4.2.2 Seasonal Hauling Behavior

We observed a noticeable change in numbers of animals by season, age, and sex. Total CSL hauled out by month reflected the arrival of males and females passing through LJC to offshore islands and departure of reproductive animals to the offshore islands during May through July (Figure 3). In the spring of 2015, there was an increase in pregnant females who birthed still born pups. Although this may happen to some degree during most years,

we assume this observed level was due to the El Niño event and the emaciated condition of many of the females.

Figure 3. Average California Sea Lion Count by Month, All La Jolla Cove Stations.



4.3 Sea Lion Interactions

4.3.1 Justification for Action, What Are the Problems

In and near LJC, CSL haul out on rocks, rock shelves, and beaches. This presence would normally be acceptable, however these hauling areas are close to businesses (thus smell from CSL) and people want to access the beaches; while at the same time, there is a large contingent of people who want to be near to or observe these wild animals in a natural setting.

There are additional concerns regarding the interactions between the public and sea lions, especially as CSL expand in LJC. The City, in response to public input, installed a latched gate on December 31, 2013 through the wooden fence next to the sidewalk and Coast Boulevard at Area 4. This allowed public access through the heavily vegetated Area 4 to Areas 5 and 6 below. The gate has been heavily used by the public to experience CSL very close up and as a result the public created an accessible path down to Areas 5 and 6. Daily and during large swells and storm events,

CSL use or retreat to this area to rest and sleep away from the wave action. Consequently they have expanded the resting spot laterally onto the vegetation, crushing plants and enhancing bluff erosion in this location. CSL have also started coming up the cliff in several other places above Area 6 creating paths, crushing vegetation, thus causing more erosion. We are now seeing similar results of CSL increasing presence in Area 1 below the Bridge Club with more and more crushing of vegetation and more erosion.

CSL have started to come up the three stairways, mainly at night, when numbers of CSL ashore are at the highest level; they are coming into the park and onto the sidewalks even out along Coast Boulevard. There is increased possibility of interactions with cars on Coast Boulevard and increased possibility of interactions with people and dogs in the park. These interactions are not only potential physical interactions (hit by car, fighting and biting people and dogs) but potential passage of disease from dogs to CSL or CSL to dogs. We have also observed sea lions preventing swimmers from entering or exiting the water and from going up or down the cement stairs.

A primary concern is the close proximity of the visitors to the CSL. On the beach in Area 3, on the cliff and shelf Areas 4, 5, 6, and 9 and on the sandstone shelf at Area 1 people try to get as close as they can to get photographs, clap at

the animals to get a response, and even pet the animals. We have observed the CSL bark, lunge, or move when people get too close. We have witnessed and have reports

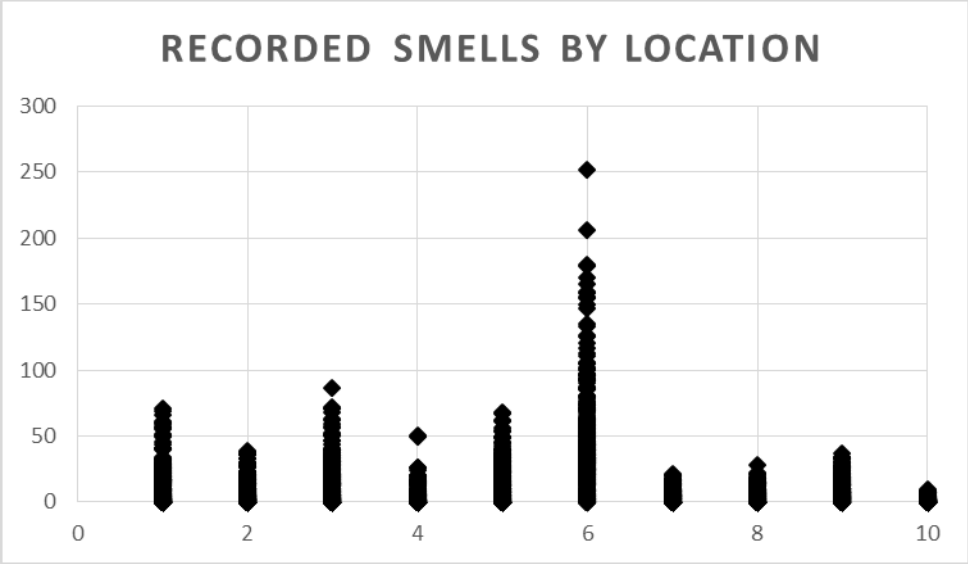
of a few people getting bitten, but overall the animals are becoming habituated to the presence of people and responding less.

4.3.2 Assessment of Odor

We recorded 2,673 instances of noticeable sea lion feces and urine smell with an average score 0.95 (scale 0-3) and 244 instances of a score 3. These smells were most noticeable at Area 6 (average 2.2).

We recorded 358 instances of noticeable bird guano smell with an average score 1.3 and ten recordings with a score of 3. These bird smells were most noticeable at areas six and seven (see Figure 1).

Figure 4. Number of Recordings of Noticeable Offensive CSL Smell by Monitored Area.



4.3.3 Reducing Sea Lion Impacts

Little has been done to reduce CSL presence at LJC. Some people assumed that putting the gate in the white wooden fence between Coast Boulevard and the upper haul out area southeast of LJC beach (Area 4) and human presence in that area would cause CSL to abandon the area. To date, that has not happened; in fact CSL use of Area 4 has increased. It is also possible that increased human use of this area could cause increased number of

animals utilizing the beach (Area 3) and La Jolla Point (Area 1). Some local members of the public have tried making noise by banging pans, buckets, swim flippers, and shoes to drive CSL off the LJC beach. This works occasionally but the CSL return in a short time (Hanan and Curry, 2009; DeAngelis, Hanan, and Curry, 2008). Lifeguards have on rare occasions used crowder boards and rescue boards to move the CSL from various areas for the purpose of public safety and the safety of the animals. This method has worked to move the animals to another location of the beach but not off the beach and if moved out of an area, the animals tend to return overnight.

5.0 CONCLUSIONS

With the CSL population increasing about 5-6% per year (Carretta et al. 2015), it is likely that CSL presence and interactions at LJC will increase proportionately. Continual harassment of CSL off haul-out areas may temporarily reduce CSL presence and may temporarily reduce CSL interactions in the LJC area, but they are not likely to abandon the area. Considering that CSL are not likely to leave the La Jolla area, the City is in the position to develop strategies of how to best live with them and hopefully take advantage of their presence. Perhaps setting up interpretive learning centers at La Jolla Cove and Children's Pool, which already are large tourist attractions, would add to the City's allure as an ecotourism location.

We do not address reducing or eliminating bird smell. If CSL are moved off Area 6, the City will need to address bird issues and possibly bird deterrents for this area. In doing so, the City will need to pay particular attention to the Migratory Bird Treaty and its regulations regarding nesting sea birds. As with CSL, there are people who want to

be near to or observe sea birds in a natural setting and there are avian photographers that travel from all over the world to photograph resident and nesting birds.

5.1 Harassment/Deterrent Testing

NOAA/NMFS has an approved list of harassment techniques (Appendix B). We have reviewed these techniques and observed or tested many of them in other areas and especially as related to fishing operations and landings. Our experience is that each technique seems to work at first, but continued use dampens its ability to reduce CSL presence or interactions.

5.2 Existing or Previous City Efforts to Reduce Pinniped Interactions

The City has hired two park rangers and assigned them to the La Jolla vicinity. The City listened to concerned citizens and put a gate in the fence next to Coast Boulevard (Area 4). This gave the public more direct access to the cliff area (Area 6) and the CSL. Some citizens thought this might keep the CSL out of the area. It may have attracted more tourists to the area and CSL seem to be staying. The City has also commissioned the development of a coastal marine mammal management plan which is in the development process.

6.0 RECOMMENDATIONS and OPTIONS

6.1 Further Research

Each of the following recommendations for further research could and should be done in cooperation with NMFS, local universities, and marine mammal rehabilitation centers. Considering that this is the first mainland southern California CSL hauling area, the City is in a unique position to lead in this changing environment of wild animals living in close proximity to a large metropolitan area. It would be beneficial for the City to appoint one of its biologists to focus on this program or retain a marine mammal specialist to collaborate on these topics and ensure the City's and the animals' best interests are represented.

1. To better understand CSL abundance and behavior, perform observations similar to this study over multiple years (5-10). Long-term studies would obtain non-El Niño counts and behavioral data during La Niña (cold ocean waters) as well as "normal" ocean temperature years which improves our predictive ability for population trends.

2. Consider multiple year tagging and/or branding CSL that appear to be resident or possibly nuisance animals. With long-term observations of individual animals we could have a much better understanding of CSL behavior in this urban setting and make better recommendations for managing and thus make better informed decisions improving CSL and human use of the La Jolla shoreline.

3. Knowledge of feeding and foraging habits are important for understanding CSL usage of the La Jolla area (indications are that market squid is a prime attractant for CSL to the La Jolla area). Use time and depth of dive satellite tags on some CSL to develop forage profiles for resident animals by location at sea and onshore. To obtain finer detail of feeding habits, perform comparative scat studies to investigate food and feeding of resident and transient CSL.

6.2 Interactions- Separating Humans from California Sea Lions

1. Tourists who come to view CSL at La Jolla Cove are usually not aware of proper viewing techniques nor are they aware of federal marine mammal laws covering interactions with CSL and other pinnipeds. To inform them, provide official City, NOAA/NMFS, and educational signage in strategic locations from the top of Coast Boulevard starting at Areas 9 and 10 (Goldfish Point) to Area 1 (Point La Jolla). Signage can contain information regarding federal protection of marine mammals, safety hazards concerning wild animals, and educational information about wildlife and ecology at each location. Signage can be simple with pictures that can be understood in several languages to help separate people and CSL for the health and safety of both.

Drawbacks to consider: Vandalism to signage and what City entity would be responsible for clean-up if vandalism (such as tagging) occurs.

2. Consider adding City resources to the LJ coastal area. Adding additional City resources will help provide information to community and hopefully reduce interactions through increased public education. Lifeguards can and occasionally now do make intermittent announcements for people to stay back from the animals specifically on the beach in Area 3 where the new lifeguard station is located. Again tourists are not well informed that CSL are wild, unpredictable animals and they may be putting themselves or family in danger. This increased effort by City staff could help decrease negative interactions with CSL.

   Drawbacks to consider: These activities may take more time than lifeguards can spare to make announcements regarding land based safety issues when their focus is on the safety of the public on the water. Additional staff resources could help but would require additional funding.

3. Sponsor a volunteer or provide an educational docent program to educate the public on animal and human safety in relation to pinnipeds, the MMPA, wildlife and natural resources around LJC. Educational docents can help separate people and animals just by informing the public. Docent programs are very popular in other areas of the state providing tourists with environmental, biological, historical information and many other aspects of having wild animals close at hand.

   Drawbacks to consider: Docents must be educators and not activists. The program would require oversight to ensure proper handling of information given to the public.

6.3 Options for Moving and/or Excluding California Sea Lions from Certain Areas

There is likely to be opposition from segments of the public to each of these available options: some people won't want to lose direct access to the animals, some want to see the

animals in the most natural setting without interference from man, and some don't want any interference with the animals and where they choose to go. The City should keep in mind that excluding CSL from one area will likely cause them to haul out in other areas (e.g. from Area 6 to Area 3 (LJC beach) and Area 1 (below and north of the Bridge Club), or other locations around La Jolla). They are not likely to abandon the LJC area entirely considering the expanding west-coast CSL population and their need to occupy more hauling space. Therefore, we have presented these recommendations in increasing levels of City action and involvement with the sea lions utilizing the La Jolla area. Each of the techniques would be allowed under section 109(h) of the MMPA as shown in Appendix B: NMFS Approved Harassment Techniques:

Option 1) Consider setting up an ongoing program or selection of a firm to assist in the use of NOAA approved deterrence methods at LJC beach and/or other problem interaction sites using NOAA approved crowder boards, poles (blunt tip), brooms, and other approved techniques. These harassment techniques may help temporarily move CSL that are blocking pathways, stairs, or move them off sidewalks and park areas. These techniques should not be considered long-term answers to managing CSL or living with CSL, as these animals tend to get aggressive the more frequently these techniques are used. Anyone using these techniques should be trained for safe, effective application.

Potential drawbacks: 1) risk of injury to CSL or people if improperly used, 2) with time CSL may get aggressive, and 3) interference from animal rights groups.

Option 2) To protect CSL from getting onto Coast Boulevard and encountering cars, to protect CSL from interacting with people and dogs in the park area, and to protect people from CSL, install gates and latches (similar to the one at Area 4) at

the base of each cement stairway to/from the LJC beach (Area 3) and at Point La Jolla stairway below the Bridge Room (Area 1).

Potential drawbacks: 1) may require Coastal Commission permit, but under 109 h of the MMPA, it should be allowed and as an emergency situation to protect the public and CSL; 2) people may block or leave the gate open during the night allowing CSL access up the stairs; and 3) gates would require maintenance to ensure functionality.

Option 3) Fencing has proven to be the most successful technique at a number of locations along the coastal mainland to keep CSL from occupying areas where their presence is not desired (i.e. docks and landings, ramps, walkways, piers, bait receivers, and boats). Fencing must be strong enough that large 800 pound CSL bulls cannot crash against it to bend or break the fence and the fencing must be tall enough (4-6 feet) that these large bulls cannot climb over. PVC rollers over piping on the top rail has been effective to enhance effectiveness of the fencing as CSL can't get traction to climb over. Any opening in the fencing whether horizontal or vertical must be small enough that CSL pups cannot squeeze through the opening. The fencing must be deployed so that CSL cannot go around it; they are excellent climbers over very steep cliffs and rocks. There would likely need to be gates for emergency access to/from the water. Fencing could be used to keep CSL off the upper shelf areas (Areas 1 and 6) which are not frequently washed by wave or surf action, where waste matter tends to collect and emit foul odors; and fencing would keep CSL off the cliff face to reduce erosion.

Potential drawbacks: 1) because the fencing must be so strong and tall it will be expensive to install and maintain, 2) it would be a permanent structure requiring drilling deep into the sandstone which will eventually break out and erode the rock structure, 3) the fencing would likely obscure the natural appearance of the area, possibly detracting from the natural beauty of the landscape, 4) sea lions excluded from one area are likely to relocate to other areas which may have unintended consequences to create new problems in the new areas, and 5) it likely will require a

Coastal Commission permit and perhaps a California Environmental Quality Act environment report.

There is currently a proposal from a community group supporting (KPBS, 2016) the use of large freely rotating rubber cylinders at certain sea lion entrance and egress locations for Area 6 and possibly other areas. These devices are essentially large fences that build on the concept of fencing with PVC rollers on the top rung as used for CSL, deer, coyotes, and other animals. As with other fencing, I also believe they would require a good deal of maintenance, would be highly subject to large surf action, would not blend with the environment, and likely would require California Coastal Commission approval and perhaps a California Environmental Quality Act environment report. After careful consideration, I believe that CSL would find ways to go around them if positioned and used as proposed.

<u>Option 4)</u> Another NOAA approved technique is low voltage livestock fencing. This safe and effective technique has worked to keep CSL off bait receivers and docks and would be suited for the areas at base of Coast Boulevard cliff (Areas 4 and 6). The strategy employs operant learning/training theory and has been used over a hundred years in the cattle industry, with horses, sheep, and pigs, and now extensively with dogs and cats, as well as, many other animals. The technique is

enhanced by employing the concept of paired stimulus technique using visual, auditory, and tactile stimuli. First, there is a visible wire which can be enhanced with streamers; second the wire makes a humming sound; and third the wire delivers a mild electric shock if touched; once experienced, animals avoid repetition of this non-lethal, startle response.

Equipment for this technique is relatively inexpensive ($200-$500) with off-the-shelf components readily available. The sending unit can be powered by available household current, rechargeable 12 volt battery, or solar power. Rubber street maintenance posts could be used as posts to support the wire (thus not posts driven into the substrate), they would be temporary, and could be moved or removed for spring tides or storm surf. We would suggest first deploying it at the base of the cliff to keep CSL off the cliff (Areas 4 and 6). Once the CSL have recognized the presence of the system and have learned to avoid it, the posts and wire could then gradually be moved further away from the cliff to the shelf edge to exclude CSL from the dry rocky shelf area (Area 6). These are the areas where CSL now haul out and deposit feces and urine and where we detected the most offensive odors. To reduce the odor problem, we would suggest first excluding CSL from area 4 with the wire at the cliff base on area 6, then expand those areas until the CSL are fully excluded from

the upper shelf of Area 6. They would then haul out on the lower rocks, ledges, and pools which naturally wash with the daily tides to remove CSL waste. The shelf area could then be sprayed to eliminate the waste matter and offensive sea lion smells.

Potential drawbacks: 1) because of a potential tripping hazard, we would suggest closing the area to people as is now done when spraying bacteria solution to reduce odors, 2) there may be vandalism to the equipment or to the wire if not properly protected, 3) the wire should be moved for storm surf thus requiring attention from City personnel or a contractor, 4) sea lions excluded from the area are likely to relocate to other areas which may create unintended consequences and additional problems in the new areas, and 5) all of the fencing components would need proper maintenance, requiring City personnel or a contractor to check regularly that it is functioning, 6) the fencing may require a Coastal Commission permit and perhaps a California Environmental Quality Act environment report, although neither is required for domestic application of this technique.

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Appendix A: Monitoring Form

Date			La Jolla Cove Sea Lion Observations						Observer
Total	AM	SAM	AF	SAF	SA(UK)	Juvenile	Pup	Still born	Condition/Comments/Rate Odor (1, 2 or 3)

Date			La Jolla Cove Sea Lion Observations					Observer		
Time	Location	Sea Gulls	Cormorants	Pelicans	People	Wind (kts)	Beaufort	Tide	Temp	Comments

Appendix B: NMFS Approved Harassment Techniques

Potential Deterrence Methods for Pacific Harbor Seals & California Sea Lions May 2006

The following list of "potential methods" and "deterrents to avoid" is not an exhaustive list of non-lethal methods or techniques. If you have questions about protecting your property and/or fishing gear and catch from nuisance Pacific harbor seals and California seal lions, please contact our marine mammal specialists: Brent Norberg, 206-526-6733; Garth Griffin, 503-231-2005; Lynne Barre, 206-526-4745.

Note: Some of the methods listed (such as loud noise or pyrotechnics) may not be appropriate for use in some areas, or are subject to prohibition under federal, state or local ordinances. The presence of Endangered Species Act-listed species in some areas may advise against the use of certain methods. Please consult with appropriate authorities to determine if such prohibitions exist in your area, or if ESA-listed species may be encountered.

Potential methods for use by private property owners to deter Pacific harbor seals and California seal lions from damaging property *(developed waterfront, decks, docks, floats, piers, bait receivers, vessels at anchor, etc.)***.**

Barriers & Exclusion Devices:

- fencing (e.g., plastic construction/snow fence, chain link)
- closely spaced posts
- bull rails
- electric livestock fencing
- netting
- swim step protector

Visual Repellents:

- flags, pinwheels, or streamers
- flashing lights or strobes
- balloons
- human attendants/monitors

Noise Makers:

- horns, whistles, bells
- electronic acoustic devices (Acoustic Harassment Devices)

- clapping, banging on pots, pans, drums; empty aluminum cans on a string banging together
- music
- starter pistols
- pyrotechnics (e.g., bird screamers, bangers, firecrackers, propane canons)

Physical Contact:

- high or low pressure water hoses
- sprinklers
- crowder boards
- bull poles (blunt tip), brooms
- cattle prod *(these products produce only a mild electric shock designed for handling livestock and are in no way related to "stun guns" designed for self-defense)*
- toy water guns (e.g., "Super Soaker©")
- paint ball or air soft guns
- sling shot
- chemical irritants (e.g., non-toxic pepper spray, mace) used for animal control *(there are many municipal and state ordinances controlling the use and possession of these irritants)*

Note: Guard dogs are not included on the list of suggested measures because of risks to both dogs and marine mammals, including the potential risk of disease transmission between them.

Potential methods for use by fishers to deter Pacific harbor seals and California seal lions from damaging gear or catch *(anglers must be actively fishing with gear deployed).*

Visual Repellents/Noise Makers:

- boat hazing, circling
- pounding on hull
- pyrotechnics (e.g., bird screamers, bangers, underwater firecrackers, cracker shells)
- starter pistols
- horns, bells, whistles

Physical Contact:

- sling shots
- paint ball guns
- non-lethal ammunition (e.g., rubber bullets, sabot rounds, game stingers)

Methods to Avoid *– The following methods and techniques have an increased likelihood of causing injury or death and should be avoided.*

- No Firearms with "live" (lethal) ammunition
- No Devices with Injurious Projectiles (e.g., archery gear, crossbows, spear guns,

bangsticks)

- No Sharp/Pointed Objects (e.g., harpoons, spears, gaffs, nail studded bats/poles/clubs)
- No Entangling Devices (e.g., loose webbing, snares, concertina wire)
- No Aggressive Tactile Methods (e.g., striking animals with bats, hammers etc., impact with vehicles or boats)
- No Tainted Baits or Poisons

Act Responsibly and Use Common Sense! - Regardless of method or intent, the property owner or fisher may be subject to prosecution should a marine mammal be seriously injured or killed as a result of deterrence efforts for the protection of property, gear or catch.

Remember Personal Safety! - Attempts by property owners and/or fishers to deter nuisance animals from engaging in unwanted behaviors using non-lethal means is a personal choice and not without risk (to the person doing the deterring and anyone around them). Sea lions and seals are wild animals that may react unpredictably to non-lethal deterrence measures, resulting in personal injury or additional damage to property. Sea lions are large and powerful animals that can move as quickly as a person on land.

Be Aware of People around You and be Courteous! - The safe use of some of the above-listed potential methods (e.g., cracker shells, non-lethal ammunition) requires considerable skill and experience. The use of some of these methods may precipitate undesirable social interactions. If you are in possession of a firearm, law enforcement officers approaching your property or vessel will assume that your firearm is loaded with lethal ammunition.

Individuals attempting to deter nuisance sea lions and seals, using the above- listed potential methods or similar techniques, do so at their own risk.