NATIONAL MARINE SANCTUARIES

Request for Incidental Take Authorization
Pursuant to the Marine Mammal Protection Act

Submitted to:

Permits, Conservation, and Education Division
Office of Protected Resources
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
Silver Spring, Maryland

Submitted by:

Monterey Bay National Marine Sanctuary
Office of National Marine Sanctuaries
National Ocean Service
National Oceanic and Atmospheric Administration
Monterey, California

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EXECUTIVE SUMMARY

The Monterey Bay National Marine Sanctuary (MBNMS) requests that the National Marine Fisheries Service (NMFS) issue an Incidental Harassment Authorization (IHA) for potential harassment of individuals of two marine mammal species during fireworks displays permitted by MBNMS, from July 4, 2011 through July 3, 2012, with subsequent five-year regulations governing the issuance of Letters of Authorization (LOA) for the same activity, from July 4, 2012 through July 3, 2017. This request is pursuant to Sections 101 (a)(5)(A) and (D) of the Marine Mammal Protection Act (MMPA), 16 USC 1361 et seq.; 50 CFR Part 216, Subpart I.

Small numbers of harbor seals (*Phoca vitulina*) and California sea lions (*Zalophus californianus*) may be incidentally and unintentionally taken by Level B harassment only as a result of fireworks displays. Potential incidental harassment of individuals of these species is associated with noise from fireworks displays or from associated human activity. Any Level B harassment that may occur will be short in duration, and is not expected to result in injury, serious injury, or mortality, or have long-term negative consequences for pinniped populations, their habitat, or prey species.

Each of the fourteen specific items of information required for an Incidental Take Authorization request, pursuant to Sections 101 (a)(5)(A) and (D) of the MMPA, are addressed in Section B.

A. INTRODUCTION

The MBNMS was designated as the ninth national marine sanctuary (NMS) in the United States on September 18, 1992. Managed by the Office of National Marine Sanctuaries (ONMS) within the National Oceanic and Atmospheric Administration (NOAA), the MBNMS adjoins 276 miles (444 km) of central California's outer coastline (overlaying 25 percent of state coastal waters), and encompasses 6,094 square miles of ocean waters from mean high tide to an average of 25 miles (40 km) offshore between Rocky Point in Marin County and Cambria in San Luis Obispo County.

Federal regulations governing activities within the MBNMS became effective on January 1, 1993. The MBNMS was the first NMS to be designated along urban shorelines and, when first designated, became the largest marine sanctuary in the United States, equal in area to 77 percent of all other federal marine sanctuaries in existence at the time. As a result of its large size and near proximity to urban areas, the MBNMS has addressed many regulatory issues not previously encountered by the NMS program. Authorization of professional fireworks displays is one such issue that has required a steady refinement of policies and procedures to limit the location, timing, and composition of professional fireworks events as more has been learned about impacts to the sanctuary and effects on the environment. The sanctuary has monitored individual displays over the years to improve its understanding of their characteristics and potential impacts to sanctuary resources.

Fireworks displays have been conducted over current sanctuary waters for many years as part of national and community celebrations (e.g., Independence Day, municipal anniversaries), and to foster public use and enjoyment of the marine environment. Marine venues are the preferred

setting for fireworks in central California, in order to optimize public access and avoid the fire hazard associated with terrestrial display sites. Many fireworks displays occur at the height of the dry season in central California, when area vegetation is particularly prone to ignition from sparks or embers. The MBNMS has worked diligently to balance these needs with its primary mandate for marine resource protection.

Authorizing fireworks displays above the MBNMS may potentially disturb marine mammals. Accordingly, in 2002 MBNMS submitted an application requesting an IHA under section 101(a)(5)(D) of the MMPA and, subsequently, the issuance of regulations governing authorizations for a five-year period under section 101(a)(5)(A) of the MMPA. On July 4, 2005, NMFS issued an IHA to MBNMS (70 FR 39235; July 7, 2005), which was valid for a period of one year. Subsequent regulations governing the taking of small numbers of marine mammals, by Level B harassment only, became effective on July 4, 2006, and remain in effect until July 3, 2011 (71 FR 40928; July 19, 2006). These regulations include mitigation, monitoring, and reporting requirements for the incidental taking of marine mammals during fireworks displays within the sanctuary boundaries. MBNMS requests that an IHA be issued upon expiration of the regulations, governing the period July 4, 2011-July 3, 2012, and that new regulations governing the taking of small numbers of marine mammals, incidental to permitted fireworks displays, be issued for the period July 4, 2012-July 3, 2017. The promulgation of regulations is an inherently lengthy process, and internal prioritization processes at MBNMS precluded preparation of application materials in time to support a July 4, 2011 effective date, thus prompting the current request for an IHA followed by new regulations.

In March 2001, the MBNMS published a report entitled *Assessment of Pyrotechnic Displays and Impacts within the Monterey Bay National Marine Sanctuary 1993-2001* (Fireworks Assessment Report 2001). In addition, as required by previous incidental take authorizations, MBNMS has submitted annual monitoring reports to NMFS since 2005. These reports comprise the sum of the information the MBNMS has assembled on the nature and impact of fireworks displays within the sanctuary and contains most of the information required by NMFS for an incidental take request. The sanctuary has also crafted permit conditions for minimizing impacts from fireworks within the sanctuary. The permit conditions have been refined over time in cooperation with the U.S. Fish and Wildlife Service (USFWS) and NMFS, and most were incorporated into the previous five-year incidental take rule (71 FR 40928; July 19, 2006).

B. INFORMATION

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

The activity to be conducted is the display of commercial-grade fireworks in the atmosphere and at ground or sea level. The number of displays will be limited to not more than twenty events per year in four specific areas along 276 miles of coastline.

Debris fallout from fireworks events constitutes a discharge into the sanctuary, and is thus a violation of sanctuary regulations, unless written authorization is secured from the sanctuary superintendent. Therefore, sponsors of fireworks displays conducted in the MBNMS are

required to obtain sanctuary authorization permits due to the discharge of materials (spent pyrotechnic materials) into sanctuary waters (15 CFR 922.132).

Since the sanctuary began issuing permits for fireworks discharge in 1993, it has received a total of 87 requests for professional fireworks displays, the majority of which have been associated with large community events such as Independence Day and municipal festivals. The number of fireworks displays within the sanctuary has remained relatively constant. While the sanctuary has permitted, on average, approximately five fireworks displays per year, it is possible that demand may increase to as many as twenty coastal displays per year in the future.

In considering requests for fireworks displays, the MBNMS has consulted biologists from state and federal agencies and universities, local property managers and residents, environmental sensitivity index maps prepared for the California Department of Fish and Game and NOAA, other environmental maps, and both published and unpublished resources. In addition, the MBNMS has developed a set of permit conditions and terms designed to minimize fireworks impacts on the sanctuary and strictly define the locations, time period, and conditions under which commercial fireworks displays may occur within the sanctuary. These conditions were developed to assure that protected species and habitats are not jeopardized by this activity.

Description of Pyrotechnic Devices

Professional pyrotechnic devices used in firework displays can be grouped into three general categories: aerial shells (paper and cardboard spheres or cylinders ranging from two inches to twelve inches in diameter and filled with incendiary materials), low-level comet and multi-shot devices similar to over-the-counter fireworks such as roman candles, and set piece displays that are mostly static in nature and are mounted on the ground.

Aerial shells are launched from tubes (called mortars), using black powder charges, to altitudes of 200 to 1,000 feet where they explode and ignite internal burst charges and incendiary chemicals. Most of the incendiary elements and shell casings burn up in the atmosphere; however, portions of the casings and some internal structural components and chemical residue fall back to the ground or water, depending on prevailing winds. An aerial shell casing is constructed of paper/cardboard or plastic and may include some plastic or paper internal components used to compartmentalize chemicals within the shell. Within the shell casing is a burst charge (usually black powder) and a recipe of various chemical pellets (stars) that emit colored light when ignited. Table 1 describes a list of chemicals that are commonly used in the manufacturing of pyrotechnic devices. Manufacturers consider the amount and composition of chemicals within a given shell to be proprietary information and only release aggregate descriptions of internal shell components. The arrangement and packing of stars and burst charges within the shell determine the type of effect produced upon detonation.

Attached to the bottom of an aerial shell is a lift charge of black powder. The lift charge and shell are placed at the bottom of a mortar that has been buried in earth/sand or affixed to a wooden rack. A fuse attached to the lift charge is ignited with an electric charge or heat source, the lift charge explodes, and propels the shell through the mortar tube and into the air to a height determined by the amount of powder in the lift charge and the weight of the shell. As the shell

travels skyward, a time-delay secondary fuse is burning that eventually ignites the burst charge within the shell at peak altitude. The burst charge detonates, igniting and scattering the stars, which may, in turn, possess small secondary explosions. Shells can be launched one at a time or in a barrage of simultaneous or quick succession launches. They are designed to detonate between 200 and 1,000 feet above ground level (AGL).

Common Contents of Pyrotechnic Devices		
Potassium Chlorate	Strontium Nitrate	Iron
Potassium Perchlorate	Strontium Carbonate	Titanium
Potassium Nitrate	Sulfur	Shellac
Sodium Benzoate	Charcoal	Dextrine
Sodium Oxalate	Copper Oxide	Phenolic Resin
Ammonium Perchlorate	Polyvinyl Chloride	Aluminum

Table 1. List of chemicals commonly used in manufacture of pyrotechnic devices

In addition to color shells (also known as designer or starburst shells), a typical fireworks show will usually include a number of aerial "salute" shells. The primary purpose of salute shells is to announce the beginning and end of the show and produce a loud percussive audible effect. These shells are typically two to three inches in diameter and packed with black powder to produce a punctuated explosive burst at high altitude. From a distance, these shells sound similar to cannon fire when detonated.

Low-level devices consist of stars packed linearly within a tube, and when ignited, the stars exit the tube in succession producing a fountain effect of single or multi-colored light as the stars incinerate through the course of their flight. Typically, the stars burn rather than explode, thus producing a ball or trail of sparkling light to a prescribed altitude where they simply extinguish. Sometimes they may terminate with a small explosion similar to a firecracker. Other low-level devices emit a projected hail of colored sparks or perform erratic low-level flight while emitting a high-pitched whistle. Some emit a pulsing light pattern or crackling or popping sound effects. In general, low-level launch devices and encasements remain on the ground or attached to a fixed structure and can be removed upon completion of the display. Common low-level devices are multi-shot devices, mines, comets, meteors, candles, strobe pots and gerbs. They are designed to produce effects between 0 and 200 feet AGL.

Set piece or *ground level* fireworks are primarily static in nature and remain close to the ground. They are usually attached to a framework that may be crafted in the design of a logo or familiar shape, illuminated by pyrotechnic devices such as flares, sparklers and strobes. These fireworks typically employ bright flares and sparkling effects that may also emit limited sound effects such as cracking, popping, or whistling. Set pieces are usually used in concert with low-level effects or an aerial show and sometimes act as a centerpiece for the display. It may have some moving parts, but typically does not launch devices into the air. Set piece displays are designed to produce effects between 0 and 50 feet AGL.

Each display is unique according to the type and number of shells, the pace and length of the show, the acoustic qualities of the display site, and the weather and time of day. The vast majority (95 percent) of fireworks displays authorized in the sanctuary are aerial displays that usually include simultaneous low-level displays. An average large display will typically last twenty minutes and includes 700 aerial shells and 750 low-level effects. An average smaller display lasts approximately seven minutes and includes 300 aerial shells and 550 low-level effects. There is a declining trend in the total number of shells used in aerial displays, due to increasing shell costs and/or fixed entertainment budgets. Low-level displays sometimes compensate for the absence of an aerial show by squeezing a larger number of effects into a shorter timeframe. This results in a dramatic and rapid burst of light and sound effects at low level. A large low-level display may expend 4,900 effects within a seven-minute period, and a small display will use an average of 1,800 effects within the same timeframe. Some fireworks displays are synchronized with musical broadcasts over loudspeakers and may incorporate other non-pyrotechnic sound and visual effects. Table 2 provides a comparison of fireworks displays performed within the sanctuary in the past.

Display Types	Duration of Display	Number of Aerial Effects	Number of Low-level Effects	Number of Set-Piece Devices
Aerial, Small	5 Minutes	300	550	0
Aerial, Large	20 Minutes	700	750	1
Aerial, Largest to Date	40 Minutes	1700	1800	0
Low-level, Small	7 Minutes	0	1800	0
Low-level, Large	7 Minutes	0	4900	1

Table 2. Comparison of fireworks displays performed within MBNMS

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

The MBNMS is requesting an IHA for potential harassment of individuals of two marine mammal species during fireworks displays permitted by MBNMS, from July 4, 2011 through July 3, 2012, with subsequent five-year regulations governing the issuance of LOAs for the same activity, from July 4, 2012 through July 3, 2017.

Based upon the past five-year period, fireworks displays in the sanctuary do not exceed thirty minutes in duration and will occur with an average frequency less than or equal to twice per year for each of four traditional display areas. Fireworks will not be authorized during the primary spring breeding season for marine wildlife (March 1 to June 30). See page eight of the Fireworks Assessment Report (2001) for general information on frequency and duration of typical fireworks displays within the sanctuary.

The MBNMS has traditionally limited permitted fireworks to four prescribed areas of the sanctuary, effectively removing 95 percent of sanctuary coastal areas from commercial fireworks impacts. The traditional display areas are located at Half Moon Bay, the Santa Cruz/Soquel area,

the northeastern Monterey Peninsula, and Cambria (Santa Rosa Creek). Detailed descriptions of each display area are available on pages 15-22 and maps B-H and J of the Fireworks Assessment Report (2001). These areas reflect the location of major population centers adjacent to the sanctuary and environments with routinely high levels of human activity.

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

The MBNMS has consulted with the Protected Resources Division of the NMFS SWRO and determined that the only marine mammal species under NMFS' jurisdiction likely to be impacted by fireworks displays within the sanctuary are the California sea lion and the harbor seal. Both are protected under the MMPA, but neither is listed under the Endangered Species Act (ESA). See pages 11-13 of the Fireworks Assessment Report (2001) for a further description of these and other nearshore marine mammal species in the affected area.

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

NMFS conducts regular stock assessments, as mandated by the MMPA, to determine the status of marine mammal stocks in the United States. The majority of the information below was compiled by NMFS and published in annual stock assessment reports (Carretta et al. 2007).

The U.S. stock of California sea lions is robust and growing at a current rate of 6.5 percent per year with an estimated minimum population of 141,842 animals. Actual population level is estimated at 238,000 animals. The most recent stock assessment report indicated that the population reached its Maximum Net Productivity Level (MNPL) in 1997 and has reached carrying capacity. California sea lions in the U.S. are not listed as "endangered" or "threatened" under the ESA or as "depleted" under the MMPA. Even though current total human-caused mortality is unknown (due to a lack of observer coverage in the California set gillnet fishery that historically has been the largest source of human-caused mortalities), California sea lions are not considered a "strategic" stock under the MMPA because total human-caused mortality is still likely to be less than the potential biological removal (PBR) level (8,511). The total fishery mortality and serious injury rate for this stock likely remains above ten percent of the calculated PBR and, therefore, cannot be considered to be insignificant and approaching a zero mortality and serious injury rate. A minimum of 12,000 California sea lions are probably present at any given time in the MBNMS region. Año Nuevo Island is the largest single haul-out site in the sanctuary, hosting as many as 9,000 California sea lions at times (Weise 2000; Lowry 2001). Most individuals of this species breed on the Channel Islands off southern California (100 miles south of the southern boundary of MBNMS) and off Baja and mainland Mexico (Odell 1981), although a few pups have been born on Año Nuevo Island (Keith et al. 1984). Populations peak in the Monterey Bay area in fall and winter and are at their lowest numbers in spring and early summer.

The California stock of harbor seals is healthy and growing at a current rate of 3.5 percent per year with an estimated minimum population of 31,600 animals. Actual population level is

estimated at 34,233 animals. A review of harbor seal dynamics through 1991 concluded that their status relative to OSP could not be determined with certainty (Hanan 1996). They are not listed as "endangered" or "threatened" under the ESA nor as "depleted" under the MMPA. Total fishing mortality cannot be accurately estimated for recent years, but extrapolations from past years indicate that fishing mortality is less than the calculated PBR for this stock (1,896), and thus the California stock of harbor seals would not be considered a "strategic" stock under the MMPA. The average rate of incidental fishery mortality for this stock is likely to be greater than ten percent of the calculated PBR; therefore, fishery mortality cannot be considered insignificant and approaching zero mortality and serious injury rate. The population appears to be stabilizing at what may be carrying capacity and the fishery mortality is declining. There are no known habitat issues that are of particular concern for this stock. Pupping within the sanctuary occurs primarily during March and April followed by a molt during May and June. Harbor seals are residents in the MBNMS throughout the year, occurring mainly near the coast. Although harbor seals off California do not migrate, radio-tagged individuals have moved distances of 480 km from Point Reyes, California (Allen et al. 1987). In the MBNMS, harbor seals often move substantial distances (10-20 km) to foraging areas each night (Oxman 1995; Trumble 1995). An area off Sunset State Beach is used consistently by harbor seals tagged in Elkhorn Slough and off Monterey (Oxman 1995; Trumble 1995).

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

Take will be limited only to the incidental behavioral harassment of California sea lions and harbor seals due to temporary evacuation of usual and accustomed haul-out sites for as little as fifteen minutes and as much as fifteen hours during any fireworks event. The primary causes of disturbance are light flashes and sound effects from exploding fireworks. As a fireworks presentation progresses, most marine mammals and birds generally evacuate the impact area. Increased recreational use (terrestrial and marine) in the fireworks display area during the hours immediately prior to the show may also prompt wildlife to temporarily evacuate the area. See pages 8-12 of the Fireworks Assessment Report (2001), submitted previously to the NMFS Office of Protected Resources, for more details on how exploding fireworks impact marine mammals and how the animals respond.

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

Total number of take events will not exceed twenty per year along the entire sanctuary coastline. Number of animals taken in individual events is expected to vary considerably due to factors such as tidal state, seasonality, shifting prey stocks, climatic phenomenon (e.g., El Niño events), and the number, timing, and location of future displays. Table 3 identifies the average and maximum number of California sea lions and harbor seals expected to be taken by harassment for each location, as well as the maximum number of events that might occur at each location.

Table 3. Estimated Incidental Take by Display Area

Display Location	Time of Year	Estimated maximum number of events per year	Estimated maximum number of animals present per event (total)	
			California sea lions	Harbor seals
HMB	July	4	100 (400)	65 (260)
NMB (Santa Cruz)	October	3	190 (570)	5 (15)
NMB (Aptos)	October	2	5 (10)	50 (100)
NMB (Capitola)	May	1	190	50
SMB (Monterey)	July	4	800 (3200)	60 (240)
SMB (Monterey)	January	1	1500	60
SMB (Pacific Grove)	July	1	150	100
Cambria (high intensity)	July	2	50 (100)	60 (120)
Cambria (low intensity)	July	2	25 (50)	60 (120)
Total		**20**	**6,170**	**1,065**

Total take estimates derived from average and maximum animals expected, per location, multiplied by the estimated maximum number of events at that location per year.

Average and maximum numbers of animals at each location were derived from the following primary data sources:

Half Moon Bay: Lowry 2001; Read and Reynolds 2001
North Monterey Bay: Lowry 2001; Read and Reynolds 2001; Hall 2000; Weise 2000
South Monterey Bay: Lowry 2001; Read and Reynolds 2001; Weise 2000; Nicholson 2000; Nicholson 2002; Hall and Threloff 2001
Cambria: Lowry 2001, 2002; Read and Reynolds 2001

Twenty fireworks events per year would disturb an average of 2,630 California sea lions and a maximum of 6,170 California sea lions within the sanctuary (Table 3). Stage structure of California sea lions within the sanctuary varies by location, but generally, the majority of sea lions present are adult and sub-adult males (Weise 2000).

Twenty fireworks events per year would disturb an average of 302 harbor seals and a maximum of 1,065 harbor seals within the sanctuary. Nicholson (2000) studied the stage structure of harbor seals on the northeast Monterey Peninsula (an area with the largest single concentration of animals within the sanctuary) for two years and reported a stage structure comprising 38% adult females, 15% adult males, 34% sub-adults, and 13% yearlings or juveniles.

Past monitoring of fireworks displays indicates that these take estimates are extremely conservative, in part because actual demand for permits has not matched the estimated maximum number of displays that the MBNMS would permit. Under previous authorizations, from 2006-

2010, only twenty permitted events in total have taken place. Those twenty events combined have resulted in the behavioral harassment (Level B harassment) of only an estimated 89 harbor seals and 821 California sea lions in total. However, the scenario described above remains representative of the maximum number of events, and subsequent takes, that could occur. As such, MBNMS requests take authorization for 6,170 California sea lions and 1,065 harbor seals per year.

7. **The anticipated impact of the activity upon the species or stock**

Past monitoring by the MBNMS has shown that fireworks displays result in only short-term behavioral harassment of animals, at most. Most animals depart affected haul-out areas at the beginning of the display and return to previous levels of abundance within 4-15 hours following the event. This information is based on observations made by sanctuary staff and by volunteer monitors over more than a dozen years of monitoring data from fireworks displays (e.g., Appendices C-I, Fireworks Assessment Report 2001), detailed quantitative surveys in 2001 and 2007, and pre- and post-event monitoring conducted for every event permitted under authorizations issued by NMFS. For a full assessment of fireworks effects within the sanctuary, see pages 5-12, and maps B-H and J, of the Fireworks Assessment Report (2001).

Between 1980 and 1983, an intensive aerial survey effort was commissioned by the U.S. Minerals Management Service to record abundance and distribution of marine mammals throughout California (Bonnell et al. 1983). Over the three year survey, the number of California sea lions present at the Monterey Breakwater in the week preceding July 4 averaged ten animals. Between 1997 and 1998, a graduate researcher from Moss Landing Marine Laboratories conducted air and ground surveys at the Monterey Breakwater during July of each year and recorded a mean population of 270 animals (Weise 2000). Between 1998 and 1999, the NMFS SWRO conducted aerial surveys of major California sea lion haul-out sites in California and recorded a mean July census of 56 sea lions at the Monterey Breakwater (Lowry 2001). Though the sample sizes are low in number, they indicate a significant increase in the July population of sea lions at the Monterey Breakwater between the early 1980 surveys (prior to the commencement of annual fireworks displays by the City of Monterey in 1988) and the late 1990 surveys. This increased sea lion presence at the Monterey Breakwater during the month of July occurred despite the initiation and annual repetition of fireworks displays in the area. Similarly, no long-term decrease in habitat utilization by pinnipeds in MBNMS has been recorded during the continued fireworks displays under the current authorization.

The MBNMS has been unable to find any peer-reviewed research that specifically investigates the response of California sea lions and harbor seals to commercial fireworks displays. However, extensive studies have been conducted at Vandenberg Air Force Base (VAFB) to determine responses by pinnipeds to the effects of periodic rocket launches. The light and sound effects of the launches would be roughly similar to the effects of pyrotechnic displays, but with much greater intensity.

An ongoing scientific research program has been conducted since 1997 to determine the long-term cumulative impacts of space vehicle launches on the haul-out behavior, population dynamics and hearing acuity of harbor seals at VAFB. In addition, pinniped populations were

studied at identified haul-out sites in the northern Channel Islands in order to determine the impact of sonic booms on pinniped behavior.

The response of harbor seals to rocket launch noise depended on the intensity of the noise (dependent on the size of the vehicle and proximity) and the age of the seal. In order to obtain details on the launch noise reaching harbor seals on VAFB, acoustic measurements were collected near the haul-out site. Not surprisingly, the highest noise levels are typically from launch vehicles with launch pads closest to the haul-out sites. When launch noise was below an A-weighted sound exposure level of 100 decibels (re: 20 µPa), not all seals fled the haul-out site, although those that remained were exclusively adults. Given the high degree of site fidelity among harbor seals, it is likely that those seals that remained on the haul-out site during rocket launches had previously been exposed to launches; that is, it is possible that adult seals have become acclimated to the launch noise and react differently than the younger, less experienced seals. Of the twenty seals tagged at VAFB, eight (forty percent) were exposed to at least one launch disturbance but continued to return to the same haul-out site. Three of those seals were exposed to two or more launch disturbances. Of those seals exposed to launch noise, most six (75 percent) appeared to remain in the water adjacent to the haul-out site and then returned to shore within 2-22 minutes after the launch disturbance. Of the two remaining seals that left the haul-out after the launch disturbance, both had been on shore for at least six hours and returned to the haul-out site on the following day.

In order to further determine if harbor seals experience any change in their hearing sensitivity as a result of launch noise, researchers conducted Auditory Brainstem Response (ABR) testing on ten harbor seals prior to and after the launches of three Titan IV rockets (one of the loudest launch vehicles at the south VAFB haul-out site). Detailed analysis of the changes in waveform latency and waveform replication of the ABR measurements showed that there were no detectable changes in the seals' hearing sensitivity as a result of the launch noise (SRS Technologies 2001).

The launches at VAFB do not appear to have had long-term effects on the harbor seal population in this area. The total population of harbor seals at VAFB is estimated to be 1,040 animals and has been increasing at an annual rate of 12.6 percent. Since 1997, there have been 5-7 space vehicle launches per year and there appears to be only short-term disturbance effects to harbor seals as a result of launch noise (SRS Technologies 2001). Harbor seals will temporarily leave their haul-out when exposed to launch noise; however, they generally return to the haul-out within one hour.

There are fewer studies that document disturbances to California sea lions. However, sea lions in general are more tolerant to noise and visual disturbances compared to harbor seals. In addition, pups and juveniles are more likely to be harassed when exposed to disturbance compared to the older animals. Adult sea lions have likely habituated to many sources of disturbance and are therefore much more tolerant to human activities nearby.

On San Miguel Island, when California sea lions and elephant seals were exposed to sonic booms from vehicles launched on VAFB, sea lion pups were observed to enter the water, but usually remained playing in the water for a considerable period of time. Some adults approached

the water, while elephant seals showed little to no reaction. This short-term disturbance to sea lion pups has not caused any long-term effects to the population.

The conclusions of the five-year VAFB study are almost identical to our observations of pinniped response to commercial fireworks displays. Observed impacts have been limited to short-term disturbance only.

In 2001, the MBNMS and USFWS intensively monitored the July 4 Monterey fireworks display. Monitors recorded species abundance before, during, and after the event and measured the decibel level of exploding fireworks. A hand-held decibel meter was located aboard a vessel adjacent to the Monterey Breakwater, approximately one half mile from the fireworks launch site. The highest reading observed on the decibel meter during the fireworks display was 82 decibels, 18 decibels lower than the A-weighted sound exposure level of 100 decibels (re: 20 µPa) measured in the VAFB studies, where only short-term effects were detected. The typical decibel levels for the display ranged from 70-78 decibels, and no salute effects were used in the display. An ambient noise level of 58 decibels was recorded at the survey site thirty minutes following the conclusion of the fireworks display.

In the 2001 Monterey survey, most animals were observed to evacuate haul-out areas upon the initial report from detonated fireworks. Surveys continued for 4.5 hours after the initial disturbance and numbers of returning California sea lions remained at less than one percent of pre-fireworks numbers. When surveys resumed the next morning (thirteen hours after the initial disturbance), sea lion numbers on the breakwater equaled or exceeded pre-fireworks levels. Thus, the sea lions returned within 4-13 hours following the end of the fireworks display.

Only two harbor seals were observed on and near the rocks adjacent to Fisherman's Wharf prior to the display. Neither were observed to haul out after the initial fireworks detonation, but remained in the water around the haul-out. The haul-out site was only surveyed until the conclusion of the fireworks display, therefore, no animal return data is available. However, the behavior of the seals after the initial disturbance and during the fireworks display is similar to the response behavior of seals during the VAFB rocket launches, where they loitered in the water adjacent to their haul-out site during the launch and returned to shore within 2-22 minutes after the launch disturbance.

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

Not applicable. There are no subsistence uses of California sea lions or harbor seals within or adjacent to the MBNMS.

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

Not applicable. Fireworks displays do not alter ocean areas or haul-out sites used by California sea lions and harbor seals, nor do they impact the availability of prey species. See pages 6-10 of

the Fireworks Assessment Report (2001) for a description of the debris and residue resulting from fireworks displays.

10. **The anticipated impact of the loss or modification of the habitat on the marine mammal populations involved**

Not applicable. No impacts to habitat for marine mammals are anticipated.

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

The MBNMS has worked with the USFWS and the NMFS for many years to craft sanctuary permitting terms and conditions that protect sanctuary resources and qualities, while allowing the continuation of traditional coastal fireworks displays. These terms and conditions govern location, timing, types of devices used, limitations on plastic components, prescribed sequencing of audible effects, and clean-up protocols.

The sanctuary will continue to assess displays on a case-by-case basis, using standard permit conditions to address concerns unique to each planned display. These conditions have evolved as the sanctuary has sought to improve its understanding of the potential impacts that fireworks displays have upon marine wildlife and the environment.

Displays are not authorized between March 1 and June 30 of each year, since this period is the primary reproductive season for many marine species. Remote areas and areas where professional fireworks have not traditionally been conducted are typically unacceptable for fireworks approval. MBNMS fireworks permitting protocols are designed to prevent an incremental proliferation of fireworks displays and disturbance throughout the sanctuary and minimize area of impact to primary traditional use areas. Traditional display areas are located adjacent to urban centers where wildlife has been acclimated to human disturbances.

If properly managed, a limited number of fireworks displays conducted in areas already heavily impacted by human activity can occur with sufficient safeguards to prevent any long-term or chronic impacts upon local natural resources.

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

Not applicable.

13. **The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity**

A substantial body of monitoring data exists for fireworks displays in the MBNMS, with more than a dozen years of monitoring effort, as well as in-depth acoustic and visual monitoring that occurred as part of the 2007 City of Monterey July 4th monitoring event. The impacts of fireworks displays, as permitted by MBNMS, are well-understood. As such, MBNMS requests that routine monitoring only, consisting of pre-event censuses and post-event surveys for injured or killed animals, be required in order to record the number of incidentally taken marine mammals and to ensure that no injury, serious injury, or mortality occurs as a result of fireworks displays. More intensive monitoring effort is unlikely to yield new information commensurate with the resources required to undertake such monitoring.

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

The MBNMS will continue to incorporate updated census data from government and academic surveys into its analysis and will make its information available to other marine mammal researchers upon request. The sanctuary coordinates a Research Activities Panel comprised of 25 marine research institutions and organizations adjacent to the sanctuary and receives constant updates of ongoing research within the sanctuary that might be related to this issue. The MBNMS is coordinating with researchers at the NMFS, the USFWS, the California Department of Fish and Game, and various specific research institutions concerning the status and local trends of pinnipeds in the sanctuary. As stated previously, the MBNMS has identified no other directed research or monitoring efforts (within California or elsewhere) that specifically address the impacts of fireworks on pinnipeds.

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