

# National Marine Fisheries Service

Request for Rulemaking and Letters of Authorization for  
Incidental Harassment of Marine Mammals

Russian River Estuary Management Project at  
Goat Rock State Beach and the Russian River Estuary



Requested by the Sonoma County Water Agency  
404 Aviation Blvd  
Santa Rosa, CA 95403

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## 1. PROJECT DESCRIPTION

The Russian River estuary (estuary) is located about 97 kilometers (km; 60 miles) northwest of San Francisco in Jenner, Sonoma County, California (Figure 1). The Russian River watershed encompasses 3,847 square kilometers (km) (1,485 square miles) in Sonoma, Mendocino, and Lake counties. The estuary extends from the mouth of the Russian River upstream approximately 10 to 11 km (6 to 7 miles) between Austin Creek and the community of Duncans Mills (Heckel 1994).

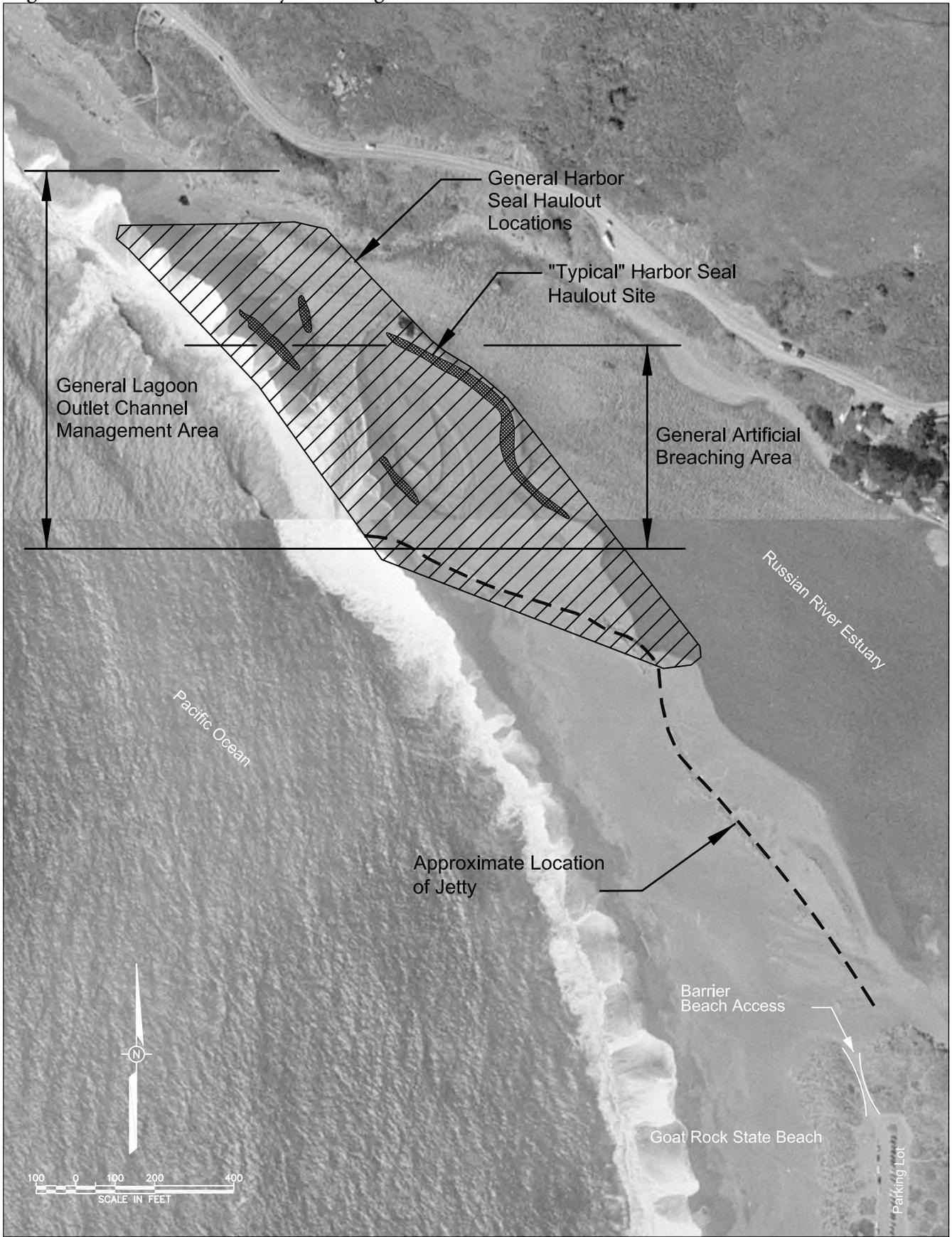
The estuary may close throughout the year as a result of a barrier beach forming across the mouth of the Russian River. The mouth is located at Goat Rock State Beach (California Department of Parks and Recreation). Closures may occur at any time of the year (Heckel 1994; Merritt Smith Consulting 1997, 1998, 1999, 2000; Sonoma County Water Agency [SCWA] and Merritt Smith Consulting 2001; SCWA 2012, 2013, 2014 and 2015). Closures result in formation of a lagoon behind the barrier beach and, as water surface levels rise in the estuary, flooding may occur. Natural breaching events occur when estuary water surface levels exceed the capability of the barrier beach to impound water, causing localized erosion of the barrier beach and creation of a tidal channel that reconnects the Russian River to the Pacific Ocean.

The barrier beach has also been artificially breached for decades; first by local citizens, then the County of Sonoma Public Works Department, and, since 1995, by the Sonoma County Water Agency (Water Agency). The Water Agency's artificial breaching activities are conducted in accordance with the Russian River Estuary Management Plan recommended in the Russian River Estuary Study 1992-1993 (Heckel 1994). The study was completed to evaluate the impacts of artificial breaching and to select a preferred estuary management program. The purpose of artificially breaching the barrier beach is to alleviate potential flooding of low-lying properties along the estuary. The Water Agency accesses the beach from the paved parking lot at Goat Rock State Beach, located at the end of Goat Rock Road off of Highway 1 (Figure 2). Equipment (*e.g.*, a bulldozer, excavator, or similar equipment) is off-loaded in the parking lot and driven onto the beach via an existing access point. A pilot channel in the sandbar is created at a sufficient depth to allow river flows to scour open the mouth of the river and reduce the water surface elevations in the estuary. As the channel is dug, it first remains disconnected from the estuary by maintaining a portion of the barrier beach on the estuary side (as opposed to the ocean side of the beach) to avoid flowing water in the channel. The sand excavated is placed onto the beach adjacent to the pilot channel. After the pilot channel is dug, the last portion of the sandbar adjacent to the estuary is removed, allowing river water to flow to the ocean. The size of the pilot channel varies depending on the height of the barrier beach to be breached, the tide level, and the water surface elevation in the estuary. A typical pilot channel would be approximately 100 feet long, 25 feet wide and 6 feet deep. The amount of sand moved can range from less than 100 cubic yards to up to 2,000 cubic yards. After the last portion of the barrier beach is removed, water begins flowing out of the channel, scouring and enlarging the channel to widths of 50 to 100 feet within one or two tidal cycles. Very rapid enlargement, from approximately 25 feet to over 200 feet, has been observed (Heckel 1994).

From 1996 to 2015, the barrier beach was breached during every month of the year, but the majority of breaching events occurred in the fall (October and November), followed by the spring (May) and winter (December) (Figure 3). The number of artificial breaching events varies each year (Table 1). The lowest number of breaching events occurred in 2011 (no events) and the highest number was 15 attempted breaches (13 successful artificial breaching events) in 2009. There were four artificial breaching events in 2015. It is difficult to predict how many artificial breaching events are required each year, but there have been an average of five artificial breaching events annually over the last 20 years.



Figure 2. Russian River estuary breaching locations.



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Purpose: Russian River Estuary Breaching  
 Datum: 1929 MSL  
 Property Owners Adjacent to Project:

**SONOMA COUNTY WATER AGENCY**  
 404 Aviation Boulevard  
 Santa Rosa, CA. 95403

In: Russian River  
 At: Jenner  
 County Of: Sonoma, CA.  
 Application By: SCWA

Figure 2

### **1.1 Biological Opinion and the Estuary**

The Water Agency and the U.S. Army Corps of Engineers (Corps) consulted with the National Marine Fisheries Service (NMFS) under Section 7 of the Endangered Species Act (ESA) regarding the potential effects of their operations and maintenance activities, including the Water Agency's estuary breaching program, on federally-listed steelhead (*Oncorhynchus mykiss*), coho salmon (*O. kisutch*), and Chinook salmon (*O. tshawytscha*). As a result of this consultation, the NMFS issued the Russian River Biological Opinion (NMFS 2008) finding that artificially elevated inflows to the Russian River estuary during the low flow season (May through October) and historical artificial breaching practices have significant adverse effects on the Russian River's estuarine rearing habitat for steelhead. The historical method of artificial sandbar breaching, which is done in response to rising water levels behind the barrier beach, adversely affects the estuary's water quality and depths.

The historical artificial breaching practices create a tidal marine environment with shallow freshwater depths and high salinity. Salinity stratification contributes to low dissolved oxygen at the bottom in some areas. The Russian River Biological Opinion (NMFS 2008) concludes that the combination of high inflows and breaching practices impact rearing habitat because they interfere with natural processes that cause a freshwater lagoon to form behind the barrier beach. Fresh or brackish water lagoons at the mouths of many streams in central and southern California often provide depths and water quality that are highly favorable to the survival of rearing salmon and steelhead.

The Russian River Biological Opinion's Reasonable and Prudent Alternative (RPA) 2 (NMFS 2008) requires the Water Agency to collaborate with NMFS and to modify estuary water level management in order to reduce marine influence (high salinity and tidal inflow) and promote a higher water surface elevation in the estuary (formation of a fresh or brackish lagoon) for purposes of enhancing the quality of rearing habitat for juvenile (age-0+ and -1+) steelhead from May 15<sup>th</sup> to October 15<sup>th</sup> (referred to hereafter as the "lagoon management period").<sup>1</sup> A program of potential, incremental steps are prescribed to accomplish this, including adaptive management of a lagoon outlet channel on the barrier beach.

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<sup>1</sup> The lagoon management period is May 15<sup>th</sup> to October 15<sup>th</sup>, as described in the Russian River Biological Opinion (NMFS 2008).

Russian River Estuary Management Project at Goat Rock State Beach and the Russian River Estuary

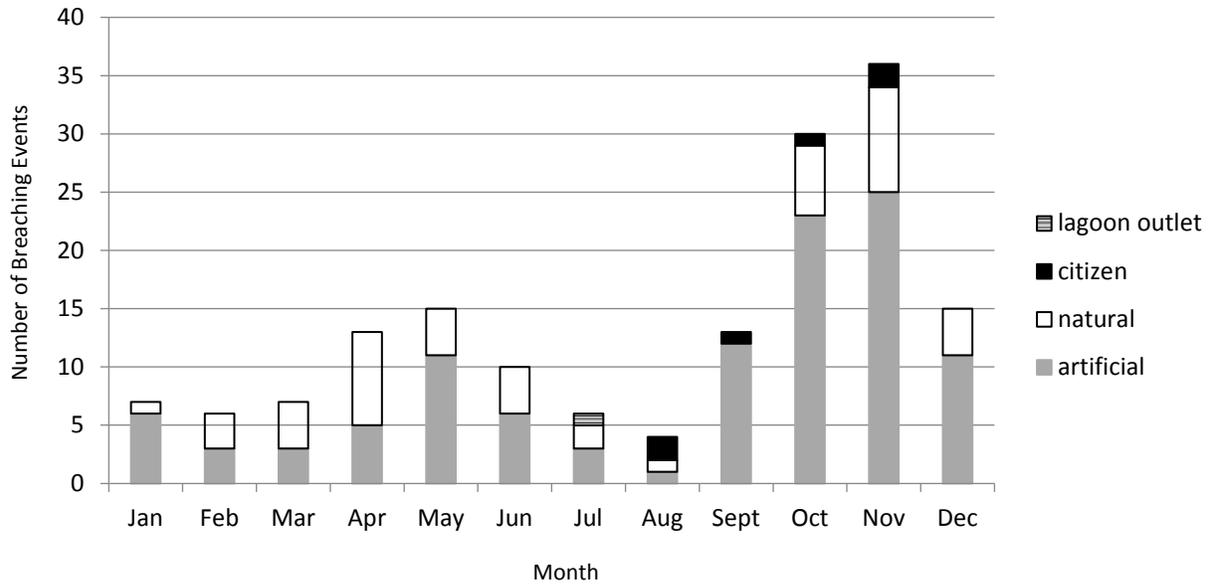


Figure 3. The number of Russian River estuary breaching events from 1996 to 2015, by month. Breaching events include artificial breaching and lagoon outlet channel implementation conducted by the Water Agency, artificial breaching by private citizens and natural breaching of the sand bar.

Table 1. Breaching of the Russian River estuary from 1996 to 2015. Number of times breached by year and month, including artificial breaches by Sonoma County Water Agency, lagoon outlet channel implementation by SCWA (denoted by {#}), natural breaches (denoted by [#]), and breaches conducted by private individuals, (denoted by (#)).

Month	Year																				
	1996	1997	1998*	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
January						1								1, [1]	1		1		2		
February												2							1	[1]	[2]
March		1, [1]						[1]											[2]	1	1
April		[1]			2			[1]			3	[1]	[1]						[1]	[2]	[1]
May		1, [1]			1	3			1				5							[2]	[1]
June		2		1	1		1	[1]						1				[1]	[1]		[1]
July	1			1									1		{1},[1]				[1]		
August	(2)	1							[1]												
September	1, (1)	2	4	1	1					1			1	1							
October	1	1	3	2	2	2	[1]	2	(1)	1	[1]	[1]	1	4	2,[1]		[1]	1	1	[1]	[1]
November	[1]	1	1	1, [1]	4	[1]	3	1	(2)	2	[3]	2	1	4	[1]		[2]	1	1	3	
December					2		1				[1]	2	1, [1]	4					1, [1]		[1]
<b>TOTAL</b>	<b>7</b>	<b>12</b>	<b>8</b>	<b>7</b>	<b>11</b>	<b>9</b>	<b>6</b>	<b>5</b>	<b>6</b>	<b>4</b>	<b>5</b>	<b>10</b>	<b>12</b>	<b>17</b>	<b>6</b>	<b>0</b>	<b>5</b>	<b>10</b>	<b>10</b>	<b>11</b>	
<b>SCWA</b>	<b>3</b>	<b>9</b>	<b>8</b>	<b>6</b>	<b>11</b>	<b>8</b>	<b>5</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>9</b>	<b>10</b>	<b>15</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>5</b>	<b>4</b>	

\* Type of breach was not recorded for 1998. All breaching events for 1998 are treated as done by Sonoma County Water Agency.

Harbor seals (*Phoca vitulina richardsi*) regularly haul out at the mouth of the Russian River (Jenner haul-out) (Figure 1). California sea lions (*Zalophus californianus*) and northern elephant seals (*Mirounga angustirostris*) are occasionally observed at the haul-out. There are also several known river resting areas at logs and rock piles in the Russian River estuary (Figure 1). The Water Agency is applying for rulemaking and letters of authorization for incidental harassment of harbor seals, northern elephant seals, and California sea lions under the Marine Mammal Protection Act (MMPA) for activities associated with the Russian River Estuary Management Project. These activities include:

- excavation and maintenance of a lagoon outlet channel that would facilitate management of a barrier beach at the mouth of the Russian River and creation of a summer lagoon to improve rearing habitat for listed steelhead as required by the Russian River Biological Opinion (NMFS 2008);
- artificially breaching the barrier beach to minimize the potential for flooding of low-lying properties along the estuary;
- monitoring activities associated with the management actions described above; and
- biological and physical monitoring of the Russian River estuary as required by the Russian River Biological Opinion (NMFS 2008).

## **1.2 Lagoon outlet channel management**

To comply with the Russian River Biological Opinion, the Water Agency plans to adaptively manage water surface elevations between May 15<sup>th</sup> and October 15<sup>th</sup> (lagoon management period) after a barrier beach forms and creates a lagoon.<sup>2</sup> Modifications to the barrier beach would be small departures from the existing beach and channel topography at the time of closure, and the new channel would be similar to the channel configurations resulting from previous breaching practices and consistent with natural processes. Any sand excavated from the channel would be placed on the adjacent beach and graded to depths of approximately 1-2 feet higher than the existing grade. The placed sand would be distributed in such a way as to minimize changes to beach topography. If the time available for excavation is limited by uncontrollable factors such as tides, waves, seal use, or days when operations are forbidden, sand placed on the north side of the channel may be left in piles up to 3 feet high and not blended into the existing beach topography. The piles may need to remain un-graded on the north side because equipment access to this side is more difficult and may slow down operations. The outlet channel would be constructed to dimensions that do not significantly depart from channels that have been historically observed at the site.

The adaptive lagoon outlet channel management plan seeks to work with natural processes and site conditions to maintain an outlet channel that reduces tidal inflow of saline water into the estuary (ESA 2015). To avoid tidal inflow and maintain a lagoon system that would not flood properties adjacent to the estuary, the Water Agency would create and maintain a shallow, “perched” outlet channel that would not be excavated as deeply, narrowly, or with as steep a

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<sup>2</sup> The Russian River Biological Opinion (NMFS 2008) establishes the lagoon outlet channel management period as May 15<sup>th</sup> to October 15<sup>th</sup>.

gradient as typical artificial breaching pilot channels, which are designed to allow the current velocities to erode a wider and deeper channel and downcut into the barrier beach.

Active management of estuarine/lagoon water levels would commence when ocean side wave action pushes sand landward to form a natural barrier beach across the river's mouth. When this happens, the Water Agency would monitor lagoon water surface elevation, as river inflow to the newly closed lagoon builds up behind the barrier beach, causing water surface elevation to rise in the lagoon. The goal is to manage lagoon water surface elevations between 4 and 9 feet National Geodetic Vertical Datum (NGVD),<sup>3</sup> which is high enough to enhance fish habitat (NMFS 2008) while also minimizing flood hazard to low-lying structures adjacent to the estuary (Heckel 1994).

The outlet channel would be excavated and maintained with one or two pieces of heavy machinery (*e.g.*, excavator or bulldozer). The outlet channel would be excavated with a bed elevation 0.5 to 2.0 feet below the lagoon water surface elevation along its entire length to allow outflow from the lagoon to pass over the sandbar. The outlet channel dimensions are estimated to be approximately 30-feet wide, based on a wide and short channel alignment that would minimize scour potential and potential constraints of the acceptable excavation volumes under regulatory permits. The outlet channel would be cut into the top of the naturally-formed barrier beach. The outlet channel bed slope would be minimized to reduce the potential for bed scour and unintentional breaching of the sandbar. The outlet channel width and length estimates are consistent with historical river mouth widths and lengths observed within the lagoon management period (Behrens 2008).

The channel's length is estimated to vary from 100 to 400 feet, consistent with historical channel lengths observed within the management period (Behrens 2008). Length would be a function of the channel's planform alignment.<sup>4</sup> Planform alignment of the channel would vary within the region in which the channel has been observed to naturally occur (Figure 2). The southern extent of this region would be the jetty and would extend approximately 1,500 feet to the northwest. Various channel locations may be pursued in an effort to adapt other project variables, such as bed slope, bed elevation and channel width, and to take advantage of site features such as areas of reduced wave energy. For example, alignment at the start of the management period may follow the northward alignment typically observed at this time of year to take advantage of the low berm crest elevation along this alignment. However, the channel may migrate from this initial alignment. If the channel then closes, alternative channel alignments within the region shown in Figure 2 may be implemented to test the relationship of mouth location on channel stability.

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<sup>3</sup> Water surface elevations are measured by the Water Agency's gauge located at the State Parks Visitor Center in Jenner.

<sup>4</sup> Planform alignment is the centerline alignment of the channel in planimetric view.

The strategy for outlet channel configuration and modifications would be an incremental approach that seeks to minimize the risk of uncontrolled breaching, which returns the estuary to tidal conditions. The precise number of outlet channel implementation events would depend on uncontrollable variables such as seasonal ocean wave conditions (*e.g.*, wave heights and lengths), river inflows, and the success of previous excavations (*e.g.*, the success of selected channel widths and meander patterns) in forming an outlet channel that effectively maintains lagoon water surface elevations. It is predicted that up to three successive outlet channel excavations, at increasingly higher beach elevations, may be necessary, with the result being a “perched” lagoon. The goal is to develop an outlet channel that supports a stable “perched” lagoon with water surface elevations at approximately 7 feet NGVD for several months. Stable conditions imply that river inflow into the lagoon would be approximately the same as outflow through the outlet channel and that net sand deposition or erosion does not impair the outlet channel’s function.

In the event that a “perched” outlet channel fails (*i.e.*, erodes the barrier beach and forms a tidal inlet), the Water Agency would resume adaptive management of the outlet channel’s width, slope, and alignment in consultation with NMFS and California Department of Fish and Wildlife (CDFW) after ocean wave action naturally reforms a barrier beach and closes the river’s mouth during the lagoon management period.

Additional details regarding the development of the adaptive lagoon outlet channel management plan may be found in *Russian River Estuary Outlet Channel Adaptive Management Plan 2015* (ESA 2015) attached to this application.

### 1.2.1 Lagoon outlet channel implementation and maintenance

The Water Agency would contact California Department of Parks and Recreation (State Park) lifeguards, as well as State Park District headquarters and the Monte Rio Fire Protection District, within 24 hours prior to excavating and maintaining the lagoon outlet channel to minimize potential hazards to beach visitors. Signs and barriers would be posted 750 feet of each side of the outlet channel for 24 hours prior to and after excavation events to warn beach visitors of the hazards of the area and the presence of pinnipeds on the beach. Notifications for the general public would also be posted at the State Park’s Jenner visitor’s center boat launch and in other locations along the estuary.

The barrier beach would be accessed from the paved parking lot at Goat Rock State Beach, located at the end of Goat Rock Road off of Highway 1 (Figure 2). Equipment would be off-loaded in the parking lot and driven north onto the beach via an existing access point. Water Agency crews would approach the seal haul-out ahead of the heavy equipment to minimize the potential for flushes to result in a stampede, a particular concern during pupping season. Water Agency staff would avoid walking or driving equipment through the seal haul-out. Crews on foot would take caution to approach the haul-out slowly and to make an effort to be seen from a distance, if possible, rather than appearing suddenly at the top of the sandbar. Personnel on the beach would include up to two equipment operators, three safety team members on the beach (one on each side of the channel observing the equipment operators,

and one at the barrier to warn beach visitors away from the activities), and one safety team member at the overlook on Highway 1 above the beach. Occasionally, there would be two or more additional people on the beach (Water Agency staff or regulatory agency staff) on the beach to observe the activities. Water Agency staff would be followed by the equipment, which would then be followed by a Water Agency vehicle (typically a small pickup truck, the vehicle would be parked at the previously posted signs and barriers on the south side of the excavation location). Equipment would be driven slowly on the beach and care would be taken to minimize the number of shut-downs and start-ups when the equipment is on the beach.

Creating and maintaining the outlet channel would probably employ one or two pieces of heavy equipment (*e.g.*, excavator or bulldozer) to move sand on the beach. At the start of the management period (late spring or early summer), when configuring the outlet channel for the first time that year, machinery may operate on up to 2 consecutive working days. As technical staff and maintenance crews gain more experience with implementing the outlet channel and observing its response, it may be possible to reduce the frequency of maintenance during the remainder of the management season. In consideration of the beach environment, effort would be made to minimize the amount and frequency of mechanical intervention, thereby reducing disturbances to seals and other wildlife, as well as State Park's visitors on the beach.

The quantity of sand moved would depend on antecedent beach topography. Excavation volumes would not exceed 2,000 cubic yards. Any sand excavated from the channel would be immediately placed on the adjacent beach within the wave wash zone to promote natural removal to minimize changes to beach topography outside the outlet channel.

The Water Agency anticipates that lagoon outlet channel management activities would occur in accordance with the Russian River Biological Opinion and that they would primarily occur between May 15<sup>th</sup> and October 15<sup>th</sup>. However, if estuary water surface elevations rise above 7.0 feet (at the Jenner gauge) during the lagoon management period, the Water Agency may consult with NMFS and CDFW regarding artificially breaching the sandbar to alleviate potential flooding, as discussed in the Biological Opinion and described below.

### **1.3 Artificial breaching**

Artificial breaching activities occur on the closed sandbar when a barrier beach is formed. The Water Agency mechanically breaches the sandbar to alleviate potential flooding of low-lying shoreline properties near the town of Jenner. For more than a decade, breaching has been performed in accordance with the *Russian River Estuary Study 1992-1993* (Heckel 1994) when the estuary water surface level is between 4.5 and 7.0 feet as read at the Jenner gauge (located at the Jenner Visitor's Center). The Water Agency would contact State Parks lifeguards, as well as State Park District headquarters and the Monte Rio Fire Protection District, within 24 hours prior to breaching activities to minimize potential hazards to beach visitors. Signs and barriers would be posted 750 feet of each side of the pilot channel for 24 hours prior to and after breaching events to warn beach visitors of the hazards of the breaching area and the presence of pinnipeds on the beach. Notifications for the general public would also be posted at the Jenner visitor's center boat launch and in other locations along the estuary.

The barrier beach would be accessed from the paved parking lot at Goat Rock State Beach, located at the end of Goat Rock Road off of Highway 1 (Figure 2). Equipment would be off-loaded in the parking lot and driven north onto the beach via an existing access point. Water Agency crews would approach the seal haul-out ahead of the heavy equipment to minimize the potential for flushes to result in a stampede, a particular concern during pupping season. Water Agency staff would avoid walking or driving equipment through the seal haul-out. Crews on foot would take caution to approach the haul-out slowly and to make an effort to be seen from a distance, if possible, rather than appearing suddenly at the top of the sandbar. Personnel on the beach would include an equipment operator, three safety team members on the beach (one on each side of the channel observing the equipment operators, and one at the barrier to warn beach visitors away from the breaching activities), and one safety team member at the overlook on Highway 1 above the beach. Occasionally, there would be two or more additional people on the beach (Water Agency staff or regulatory agency staff) to observe breaching activities. Water Agency staff would be followed by the equipment, which would then be followed by a Water Agency vehicle (typically a small pickup truck, the vehicle would be parked at the previously posted signs and barriers on the south side of the excavation location). Equipment would be driven slowly on the beach and care would be taken to minimize the number of shut-downs and start-ups when the equipment is on the beach.

Breaching activities would typically be conducted on outgoing tides to maximize the elevation head difference between the estuary water surface and the ocean. A cut in the barrier beach would be created at a sufficient depth to allow river flows to begin transporting sand to the ocean. Excavated sand would be placed onto the beach adjacent to the pilot channel. After the pilot channel is dug, the last upstream portion of the sandbar would be removed, allowing river water to flow to the ocean. The size of the pilot channel varies depending on the height of the sandbar to be breached, the tide level, and the water surface elevation in the estuary. A typical channel would be approximately 100 feet long, 25 feet wide and 6 feet deep. The amount of sand moved would range from less than 100 cubic yards to approximately 2,000 cubic yards.

The Water Agency anticipates that artificial breaching activities would occur in accordance with the Russian River Biological Opinion and that they would primarily occur from October 16<sup>th</sup> to May 14<sup>th</sup>. However, if estuary water surface elevations rise above 7.0 feet (at the Jenner gauge) during the lagoon management period (May 15<sup>th</sup> through October 15<sup>th</sup>), the Water Agency could artificially breach the sandbar to alleviate potential flooding, as discussed in the Biological Opinion. The Biological Opinion incidental take statement estimates that the Water Agency may need to artificially breach the sandbar “twice per year between May 15 and October 15 during the first three years covered by this opinion, and once per year between May 15 and October 15 during years 4-15 covered by this opinion” (NMFS 2008).

#### **1.4 Monitoring**

Implementation of the lagoon outlet channel adaptive management plan would require monitoring to measure changes in the beach and channel elevation, lengths, and widths, as well

as flow velocities and observations of the bed structure (to identify bed forms and depth-dependent grain size distribution indicative of armoring) in the channel. In addition to the activities described for the lagoon outlet channel adaptive management plan, the Water Agency is required by the Russian River Biological Opinion and other state and federal permits to collect biological, water quality, and physical habitat data in conjunction with estuary management. Fisheries sampling, water quality monitoring, invertebrate/sediment sampling, and physical habitat measurements require the use of boats and nets in the estuary. Boating and other monitoring activities occur in the vicinity of river haul-outs (see Figure 1, and Mortenson 2009). Table 2 provides a summary of the monitoring tasks and the frequency of their implementation.

## **2. DATES, DURATION AND SPECIFIED GEOGRAPHIC REGION**

The anticipated marine mammal disturbance from project activity would occur at the mouth of the Russian River (38.450833, -123.129873) in Jenner, California. The Russian River estuary is located about 97 km (60 miles) northwest of San Francisco. The harbor seals primarily haul out on the estuary-side of the beach (Figures 1 and 2) to the north of the concrete-capped portion of the jetty.

The estuary closes throughout the year as a result of a sandbar forming at the mouth of the Russian River. To facilitate summer lagoon management, the Water Agency would construct the lagoon outlet channel after the first natural barrier beach closure, but the lagoon would generally be managed from May 15<sup>th</sup> to October 15<sup>th</sup> (Table 3). It is anticipated that the outlet channel implementation would be a 2-day event with initial construction of the lagoon outlet channel taking one day of work, and subsequent adjustments to the outlet channel on the second day. Subsequent maintenance would occur approximately weekly through October 15<sup>th</sup>. Artificial breaching activities would generally occur between October 16<sup>th</sup> and May 14<sup>th</sup> (Table 3). Biological and physical habitat monitoring can occur at any time of year, but generally occurs from mid-April through December, with the exception of topographic surveys that occur year round (Table 3).

Russian River Estuary Management Project at Goat Rock State Beach and the Russian River Estuary

Table 2. Monitoring tasks associated with Russian River Estuary Management with potential to disturb pinnipeds.

Task	Description	Field Activities	Frequency
<b>Lagoon Outlet Channel Management on the Barrier Beach</b>			
Discharge Measurements	Collected within the outlet channel to verify the channel's conveyance.	2 field staff to complete cross sectional flow velocity surveys using flow meter attached to a wading rod with electronic data logger (beeps); bank pins to be installed on either bank, and fiberglass measuring tape stretched from bank to bank.	Every 2 weeks
Outlet Channel Bed Structure	Observe the bed for bed forms and depth-dependent grain size distribution indicative of armoring. Sediment sampler used.	2 field staff to collect sediment sample from the surface of the channel bed.	Monthly
Outlet channel topography	Collect outlet channel elevation and width	2 field staff would capture outlet channel features using a prism mounted on a survey rod.	Monthly
<b>Biological and Physical Habitat Monitoring in the Estuary</b>			
Fisheries seining	Deploy seine to collect fish at up to 10 locations in the estuary	One or two boats with approximately 6 field staff	Monthly
Invertebrate/salmonid prey study	Collection of benthic invertebrates and zooplankton	Two boats with 5-7 field staff	Monthly
Water quality	Collection of temperature, dissolved oxygen, conductivity, pH, depth, nutrient and bacteriological samples	A boat with 2 or 3 field staff, 6 datasonde arrays submerged in estuary at various locations from mouth to Duncans Mills.	Weekly
SCWA topographic survey of sandbar	Survey of sandbar height and widths	2 field staff on beach equipped with a survey rod.	Monthly
Bodega Marine Lab (BML) flow circulation (under contract w/SCWA)	Survey of cross sectional velocity data in estuary and collection of temperature and salinity profile data at various locations from mouth to Duncans Mills.	A boat with 2 or 3 field staff, collecting cross sectional data from mouth to Duncans Mills.	Weekly

Russian River Estuary Management Project at Goat Rock State Beach and the Russian River Estuary

Table 3. Estimated annual frequency and duration of Russian River estuary management activities with potential to disturb pinnipeds.

Task and Dates	Duration and Frequency	Potential No. of Take Events <sup>a</sup>
<b>Lagoon Outlet Channel Management on the Sandbar (May 15 to October 15)</b>		
Excavation of outlet channel	Up to 3 events estimated; each event completed in 1 to 2 days as necessary	3
Maintenance of outlet channel	1 day per week	May-1; June-4; July-4; Aug-4; Sept-4; Oct-1 (18 total)
Outlet channel discharge & bed structure measurements	Discharge: ½ day every 2 weeks Structure: ½ day per month (taken on same day as discharge measurements)	10 <sup>b</sup>
Outlet channel topography	1 day per month	
<b>Artificial Breaching on the Sandbar (October 16 to May 14)</b>		
October	Averages ½ day per breaching event	2 <sup>c</sup>
November		2
December		2
January		1
February		1
March		1
April		1
May		2
12 events maximum		
<b>Biological and Physical Habitat Monitoring in the Estuary</b>		
SCWA topographic survey of sandbar	1 per month for duration of IHA, averages ½ day	12
Fisheries seining	4 days, monthly from May to October	24 <sup>d</sup>
Invertebrate/salmonid prey study	1 day monthly from May to October (during a mouth closure an additional 1 to 2 sampling events per month could be conducted)	18 <sup>d</sup>
Water quality	2 days, every week from May 15 to October 15	44 <sup>d</sup>
BML flow circulation (under contract w/SCWA)	Weekly from May to October	27

<sup>a</sup> For implementation of the lagoon outlet channel it may be necessary to return on a second day if the initial outlet channel closes after the first day, disturbances would be recorded on any day lagoon outlet channel excavation occurs. For the remaining activities, an event is defined as a single day on which an activity occurs. Some events may include multiple activities.

<sup>b</sup> The lagoon outlet channel discharge, bed structure, and channel topography monitoring would occur on the same day each month. The outlet channel discharge is collected every 2 weeks and would require an additional ½ day of work.

<sup>c</sup> The number of events is the monthly average number of bar closure events from 1996 to 2015 (Table 1). The average number of breaching events from 1996 to 2015 is 5 events/year and the most that occurred in a single year was 15 (Table 1).

<sup>d</sup> Assumption is that pinnipeds may be encountered once per event and flush from river haul-out in the Estuary.

### 3. SPECIES AND NUMBER OF MARINE MAMMALS WITHIN THE REGION

#### 3.1 Species typically found within the area

The species of marine mammals that are likely to occur in the project area include the following pinnipeds: harbor seals, California sea lions, and northern elephant seals. Earlier literature reports sightings of sea lions during the months from December to June, likely foraging, but their numbers are normally low (Hanson 1993). Our data includes observations of sea lions in and around the estuary in all months of the year, except June. These sea lions were rarely observed hauled out on land at the Russian River. In February and April 2015 a juvenile sea lion was observed hauled out at the Russian River mouth. In previous years, a single male northern elephant seal (*Mirounga angustirostris*) had been present at the Jenner haul-out during the late winter and spring. Recently a sub-adult elephant seal was observed multiple times resting ashore at the Jenner harbor seal haul-out during July and August of 2014. Based on a tag located on the seal's rear flipper the elephant seal was identified as being tagged as a weaned pup on Año Nuevo Island, more than 100 miles south of Jenner (P. Robinson, personal communication, August 14, 2014). Similarly a young elephant seal was observed at Jenner in August of 2013, prior to that the latest reported sighting was in spring of 2009.

The number of harbor seals at the Russian River varies throughout the year (Table 4). These numbers have been recorded extensively since 1972 at the mouth of the Russian River, where several local residents, working independently or under the guidance of the Stewards of the Coast and Redwoods, have recorded the harbor seal population at the mouth and within the Russian River. It is believed that harbor seals established the haul-out site at the Russian River in 1972 (*i.e.*, the first known records) and their numbers at the site have steadily grown (Hanan and Beeson 1994, Mortenson and Twohy 1994, SCWA 2015). Pups are born at the Jenner haul-out beginning in March and continuing into May. Pups are counted during surveys through June, after which time it becomes difficult to distinguish pups from sub-adult seals. Peak seal abundance is typically during the summer molting period (Figure 4). Abundance of seals on the Jenner haul-out declines in the fall after the molting season is complete, but seals are present at Jenner and locally year round. The number of harbor seals at this haul-out has fluctuated from year to year (Figure 5). Currently the population of seals at the Jenner haul-out appears to be steady following an observed increase during the 1980s and early 1990s. Based on the most recent statewide harbor seals counts from May to July of 2012 the state population is estimated at 30,968 seals (Carretta *et al.* 2015), which is lower than the 2009 and 2004 statewide estimates (Harvey and Goley 2011, Lowry *et al.* 2008). Table 4 reflects the monthly mean number of harbor seals recorded by E. Twohy during daily counts of seals at the Jenner haul-out from 1993 to 2005 (without differentiating between bar-open and bar-closed conditions) and includes monthly average seal abundance from the Water Agency's 2009 – 2015 baseline surveys. Table 5 shows the average number of harbor seals observed at the Jenner haul-out during bar-closed conditions by month from Water Agency observations since 2009.

### **3.2 Species with low likelihood of occurrence**

Northern fur seals (*Callorhinus ursinus*), Guadalupe fur seals (*Arctocephalus townsendi*), and Steller sea lions (*Eumetopias jubatus*) have the potential to occur at Goat Rock State Beach in Jenner along the Sonoma County Coast. While no observations of these species have been made at the project area they have been observed on beaches in Sonoma County. In 2015 two northern fur seals and three Guadalupe fur seals stranded in Sonoma County and were brought to The Marine Mammal Center in Sausalito, Ca (TMMC 2016). Stellar sea lions occur at Sea Lion Rocks just off shore of Fort Ross, about 12 kilometers north of the Russian River mouth in Jenner (J. Mortenson, personal communication, April 5, 2016). These species are not expected to occur at the project area and therefore would not be affected by the proposed activities.

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Table 4. Average daily number of seals observed at the Jenner haul-out (Goat Rock State Beach), for each month from 1993 to 2005 (adapted from Mortenson and Twohy 1994 and Elinor Twohy unpublished data) and from the 2009-2015 Sonoma County Water Agency twice monthly baseline pinniped surveys.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993	140	219	269	210	203	238	197	34	8	38	78	163
1994	138	221	243	213	208	212	246	98	26	31	101	162
1995	133	270	254	261	222	182	216	74	37	24	38	148
1996	144	175	261	247	157	104	142	65	17	29	76	139
1997	154	177	209	188	154	119	186	58	20	29	30	112
1998	119	151	192	93	170	213	232	53	33	21	93	147
1999	161	170	215	210	202	128	216	98	57	20	74	123
2000	151	185	240	180	158	245	256	63	46	50	86	127
2001	155	189	161	168	135	212	275	75	64	20	127	185
2002	117	12	20	154	134	213	215	89	43	26	73	126
2003	--	1	26	161	164	222	282	100	43	51	109	116
2004	2	5	39	180	202	318	307	35	40	47	68	61
2005	0	7	42	222	220	233	320	145	--	--	--	--
2009	--	--	--	--	--	--	219	117	17	22 <sup>a</sup>	96 <sup>a</sup>	80 <sup>a</sup>
2010	66 <sup>a</sup>	84	129	136	109	136	267	111	59	25	89	26
2011	116	92	162	124	128	145	247	98	31	53	92	48
n	35	35	36	31	35	30	23	25	39	34	35	35
2012	108	74	115	169	164	166	156	128	100	71	137	51
n	35	37	35	35	35	35	39	35	35	34	27	35
2013	51	108	158	112	162	139	411	175	77	58	34	94
n	26	17	31	35	35	34	24	35	28	33	18	35
2014	98	209	243	129	145	156	266	134	53	15	27	172
n	35	32	35	35	33	25	33	35	31	28	35	35
2015	113	171	145	177	153	219	373	120	48	33	49	138
n	28	34	34	27	29	29	35	35	27	22	35	24
2011-2015 average <sup>b</sup>	99	131	165	141	151	164	282	133	62	48	68	98

Months represented by "--" indicate periods where data were missing or incomplete.

<sup>a</sup> only one baseline survey conducted during these months

<sup>b</sup> average is calculated as a weighted average to account for unequal sample sizes between years

Russian River Estuary Management Project at Goat Rock State Beach and the Russian River Estuary

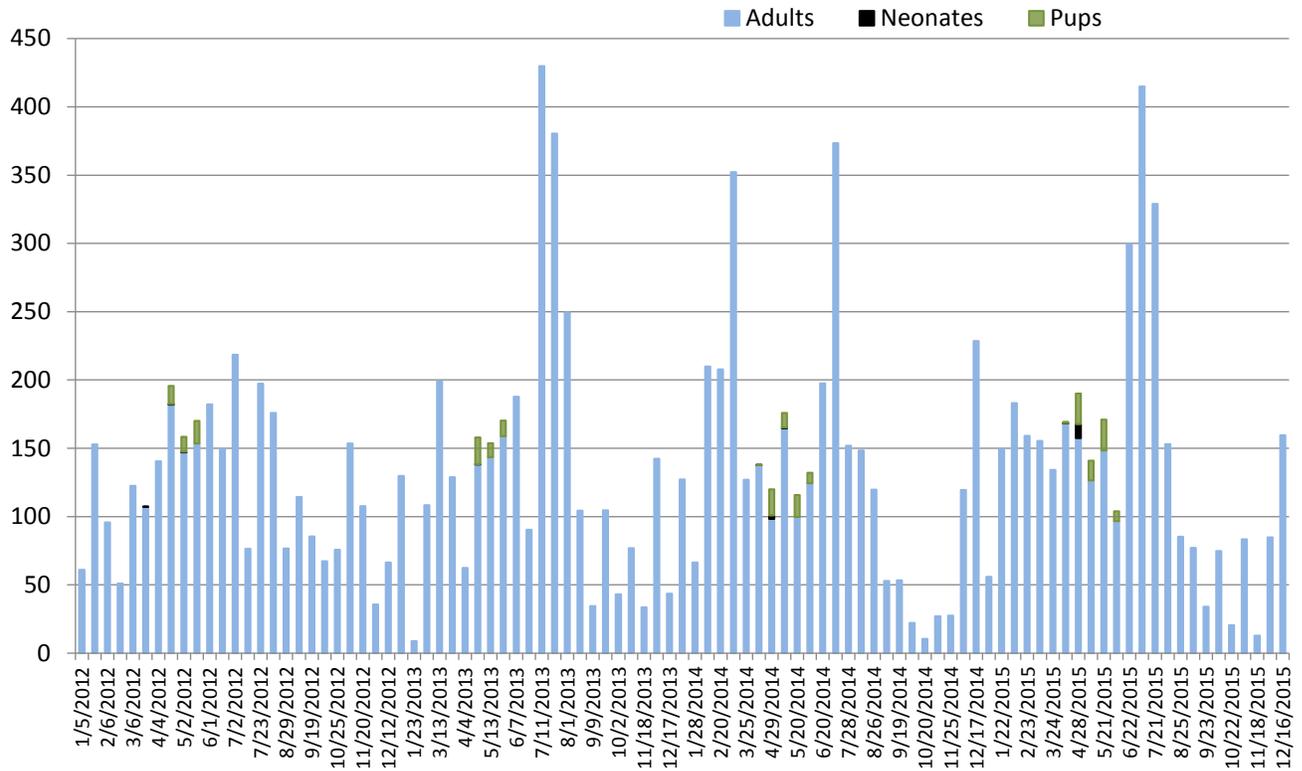


Figure 4. Average number of harbor seals observed at the Jenner haul-out (Goat Rock State Beach) during Russian River Estuary Management Project baseline pinniped monitoring from January 2012 to December 2015. Pups are counted separately through June, after which all seals are counted as adults as it becomes more difficult to accurately age individuals.

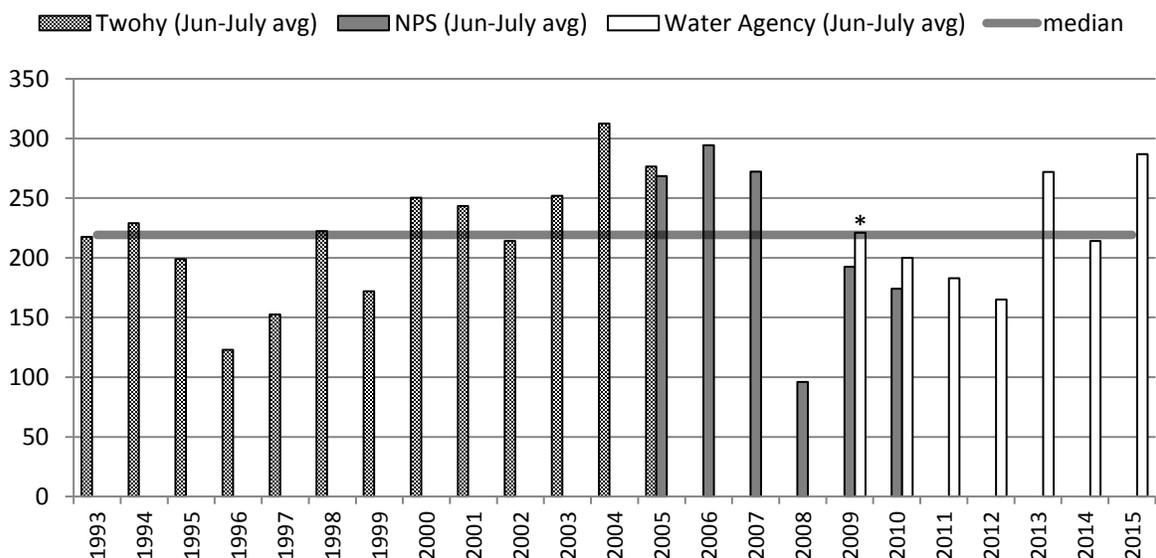


Figure 5. Average number of harbor seals observed at Jenner (Goat Rock State Beach), recorded during the molting season of June 1 – July 31 from 1993 to 2015. Adapted from Mortenson and Twohy 1994 and Elinor Twohy unpublished data, National Parks Service (NPS) Annual Reports 2005- 2010 and Sonoma County Water Agency monitoring surveys from 2009 to 2015. \* Water Agency 2009 data from July only.

Table 5. Average number of harbor seals observed at the Jenner haul-out (Goat Rock State Beach) during bar-closed conditions by month during Water Agency surveys (excluding during water level management activities) at the Jenner haul-out from 2009 to 2015; numbers reported are average number of seals hauled out by month.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009-2015 <sup>a</sup>	49	75	133	99	80	98	117	17 <sup>b</sup>	30	28	32	59

<sup>a</sup> values have changed since previous permit application because additional observations from 2015 bar closed conditions were incorporated into monthly averages.

<sup>b</sup> no data available for bar closed conditions in August for Water Agency observations since 2009, average presented is from monitoring of artificial breaching activities from 1996 to 2000 (Merritt Smith Consulting 1997, 1998, 1999 and 2000 and Sonoma County Water Agency and Merritt Smith Consulting 2001).

#### 4. STATUS AND DISTRIBUTION OF AFFECTED SPECIES

##### 4.1 Pacific harbor seals-California stock

Pacific harbor seals (*Phoca vitulina richardsi*) range from Cedros Island (Baja California) along the Pacific coasts of the United States, Canada and Alaska, through the Aleutian Islands to the Pribilof Islands. In California, approximately 400-500 harbor seal haul-out sites are widely distributed along the mainland and on offshore islands, including intertidal sandbars, rocky shores and beaches (Hanan 1996). California harbor seals are not listed under the ESA or considered strategic under the MMPA.

Currently the California harbor seal population is estimated to be 30,968 with the minimum population estimated to be 27,348 (Carretta *et al.* 2015). Counts of harbor seals in California showed a rapid increase from approximately 1972 (when the MMPA was passed) to 1990. Net production rates appeared to decline from 1982 to 1994. Although earlier analyses were equivocal (Hanan 1996) and there has been no formal determination that the California stock has reached its Optimal Sustainable Population level (defined in the MMPA), the decrease in population growth rate has occurred at the same time as a decrease in human-caused mortality and may be an indication that the population is reaching its environmental carrying capacity (Carretta *et al.* 2012).

In general, harbor seals do not undertake long migrations, but do travel 150-300 km on occasion to find food or suitable breeding areas (Pitcher and McAllister 1981, Herder 1986, Gemmer 2002). Harbor seals are rarely found in pelagic waters and typically stay within the tidal and intertidal zones. On land, harbor seals haul out on rocky outcrops, mudflats, sandbars and sandy beaches with unrestricted access to water and with minimal human presence. Haul-out sites are important as resting sites for harbor seals. Harbor seals feed opportunistically in shallow waters on fish, crustaceans, and cephalopods. Foraging occurs in shallow littoral waters, and common prey items include flounder, sole, hake, codfish, sculpin, anchovy and herring (California Department of Fish and Game 2005). Harbor seals are typically solitary while foraging, although small groups have been observed.

Seasonal variation in the abundance of harbor seals at their haul-out locations is commonly observed throughout their range (Allen *et al.* 1989, Stewart and Yochem 1994, Gemmer 2002).

Peak haul-out abundance typically occurs during their annual molt, which occurs in mid-July in California. Abundance of seals on their haul-outs is also high during the pupping season when females come ashore to give birth. Pupping at the Russian River haul-out begins in March and pups are most abundant in mid-May. Seal abundance is lower during the fall and winter months when seals may spend more time foraging at sea and winter storms and low ambient temperatures make coming ashore less desirable.

Mortenson (1996) observed pups were first seen at the Jenner haul-out in late March, with maximum counts in May. In this study, pups were not counted separately from other age-classes at the haul-out after August due to the difficulty in discriminating pups from small yearlings (Mortenson 1996). Hanson (1993) observed during her study from August 1989 to July 1991 that pupping began at the Jenner haul-out in mid-April, with a maximum number of pups observed during the first two weeks of May. Water Agency monitors have observed newborn pups on Goat Rock State Beach as early as March 23<sup>rd</sup> (SCWA 2013). This corresponds with the peaks observed at Point Reyes, where the first viable pups are born around the first to second week of March and the peak is the last week of April to early May (J. Mortenson and S. Allen, personal communication). Pupping season is defined as March 15 to June 30 at the Jenner haul-out by the NMFS Incidental Harassment Authorization dated April 21, 2016.

Harbor seals have many haul-out sites in Northern California, with approximately 6 primary mainland haul-out sites and possibly a total of 17 haul-out sites, if smaller areas are considered, in Sonoma County (Figure 6). The Russian River haul-out in Jenner is the largest in Sonoma County, comprising approximately 18% of the harbor seal population found there (M. DeAngelis, personal communication). Harbor seals may also rest on logs and rock outcroppings in the Russian River estuary. Monitoring efforts are particularly strong in the Point Reyes area, located in Marin County, south of Sonoma County, at the Russian River, and the Gualala River area (south near Sea Ranch). Further north, seals are known to have numerous haul-out sites, but monitoring efforts are sparse in the stretch of coastline between the Gualala River area and Humboldt Bay (Figures 7 and 8).

Observations at the Jenner haul-out indicate that the number of seals present declined during bar closed (barrier beach closed) conditions (Mortenson 1996; SCWA 2013, 2014, 2015). The Water Agency's pinniped monitoring program that began in 2009 has included observations from water level management activities (*i.e.*, artificial breaching and lagoon outlet channel implementation) and its effects on the Jenner haul-out. Seal counts and disturbances were recorded from 1 to 2 days prior to a breaching or channel implementation event, the day of an event, and the day after an event (SCWA 2011, 2012, 2013, 2014, 2015). During most events the trend observed was that harbor seal numbers declined during a beach closure (occasionally, the numbers rose again and then declined again during a closure) and increased the day following an artificial breaching event.

Joe Mortenson began his ongoing monthly seal counts at the Jenner haul-out and Bodega Rock in January 1987, with nearby haul-outs added to the counts thereafter. Elinor Twohy began daily counts of seals and people at the Jenner haul-out, including photographing the haul-out,

on November 1, 1989. Her daily counts were taken at different times on successive days to determine if there were diurnal patterns in use of the haul-out (Mortenson and Twohy 1994). She also photographed and noted whether the river mouth at the Jenner haul-out was open or closed each day. Mortenson and Twohy (1994) previously reported that the Jenner haul-out is atypical in terms of the time of year that the peak numbers of harbor seals are present, reporting haul-out peaks in the late winter (February and March). Recent data from baseline monitoring conducted by the Water Agency and the Stewards of the Coast and Redwoods indicated that these winter peaks in abundance are no longer occurring and that the Jenner haul-out is showing seasonal variation more similar to those reported elsewhere with a molting and pupping season peak (Figure 4) (SCWA 2012, 2013, 2014, 2015).

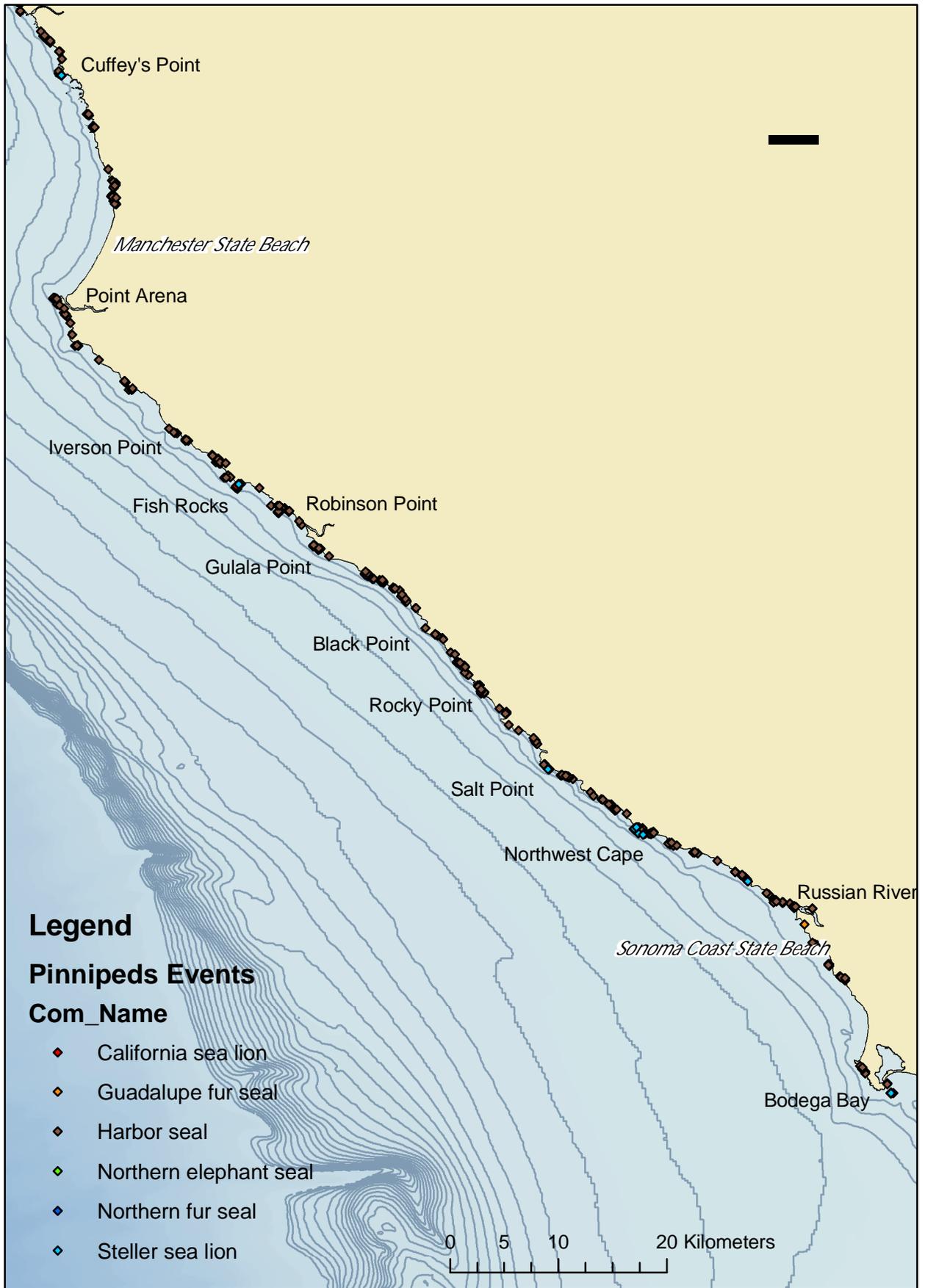


Figure 6. Pinniped haul-outs from Bodega Bay to Cuffey's Point, California Coast. Data includes haul-outs and rookeries surveyed using aerial or ground methodologies and observations and monitoring results. Com\_Name is the species common name. Source: California Pinniped Rookeries & Haul-out Sites. GIS public map. NOAA National Marine Fisheries Service Southwest Regional Office. <http://www.swr.noaa.gov/psd/rookeryhaulouts/index.htm>

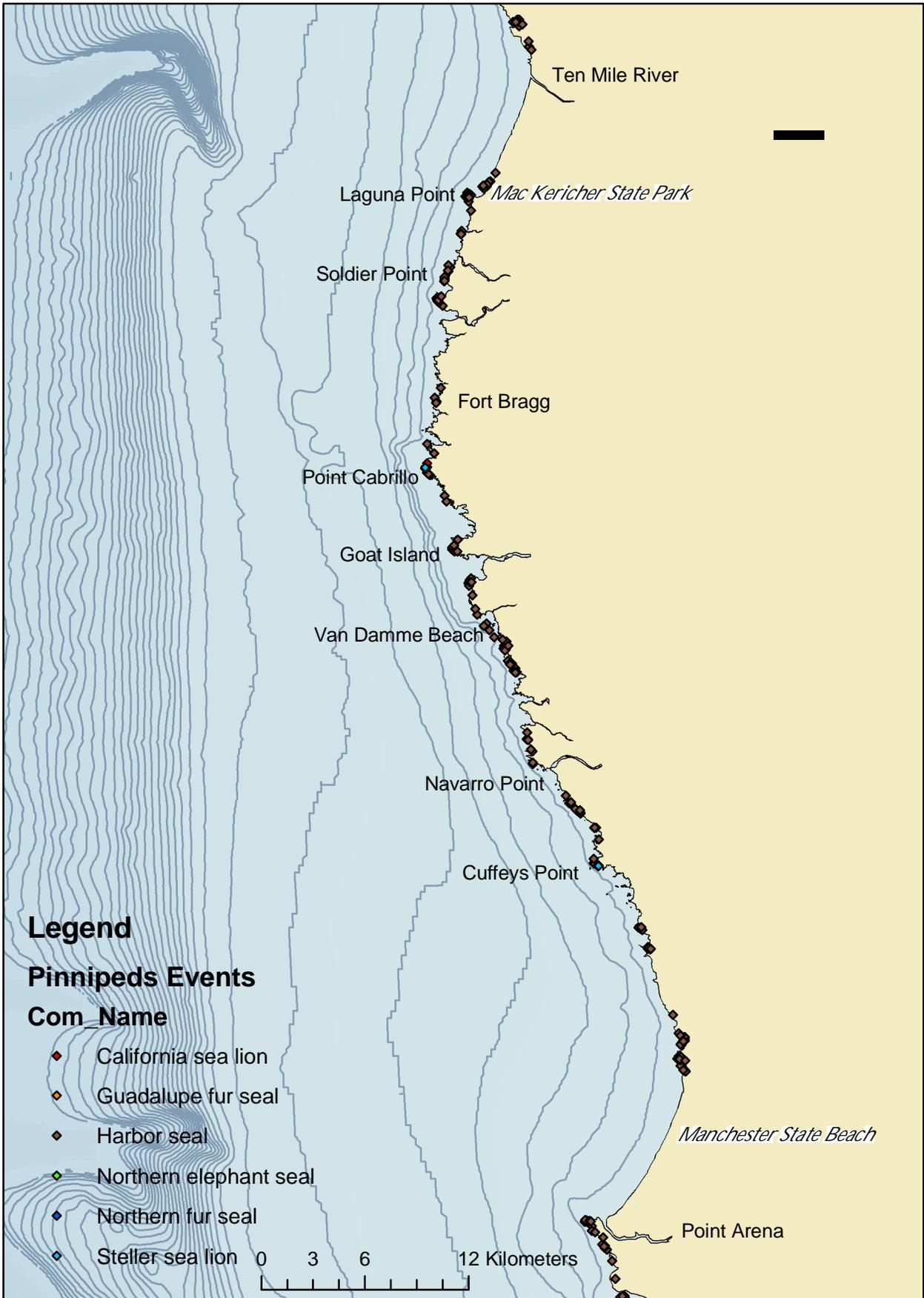


Figure 7. Pinniped haul-outs from Point Arena to Ten Mile River, California Coast. Data includes haul-outs and rookeries surveyed using aerial or ground count methodologies and observations and monitoring results. *Source:* California Pinniped Rookeries & Haul-out Sites. GIS public map. NOAA National Marine Fisheries Service Southwest Regional Office. <http://www.swr.noaa.gov/psd/rookeryhaulouts/index.htm>



Figure 8. Pinniped haul-outs from Caspar Point to Humboldt Bay, California Coast. Data includes haul-outs and rookeries surveyed using aerial or ground count methodologies and observations and monitoring results. *Source:* California Pinniped Rookeries & Haul-out Sites. GIS public map. NOAA National Marine Fisheries Service Southwest Regional Office. <http://www.swr.noaa.gov/psd/rookeryhaulouts/index.htm>

#### **4.2 California sea lions-U.S. stock**

California sea lions (*Zalophus californianus*) range from southern Mexico to British Columbia, Canada. The entire U.S. population has been estimated at 296,750, with a minimum population size estimated to be 153,337 (Carretta *et al.* 2012). The population was estimated to be growing at a rate of approximately 5.4% annually between 1975 and 2008 (Carretta *et al.* 2012). The most recent count of pups made in 2011 totaled 61,943 seals and was the highest count to date. Estimates of total population size based on these counts are being developed (Carretta *et al.* 2015). The species is not listed under the Endangered Species Act and is not “depleted” or listed as “strategic” stock under the MMPA. Sea lions can be found at sea from the surf zone out to near shore and pelagic waters. On land, the sea lions are found resting and breeding in groups of various sizes, and haul out on rocky surfaces and outcroppings and beaches, as well as manmade structures such as jetties and docks. Sea lions prefer haul-out sites and rookeries near abundant food supplies, with easy access to water; although sea lions occasionally travel up rivers and bays in search of food.

Sea lions exhibit seasonal migration patterns organized around their breeding patterns. California sea lions breed at large rookeries on the Channel Islands in southern California, and on both sides of the Baja California peninsula, typically from May to August. Females tend to remain close to the rookeries throughout the year, while males migrate north after the breeding season in the late summer, and then migrate back south to the breeding grounds in the spring (California Department of Fish and Game 1990). No established rookeries are known north of Point Reyes, California, but large numbers of sub-adult and non-breeding or post-breeding male California sea lions are found throughout the Pacific Northwest. There is a seasonal pattern of peak numbers occurring in the northwest during fall, but local areas show high annual and seasonal variability.

Sea lions feed on fish and cephalopods, including Pacific whiting, rockfish, anchovy, hake, flatfish, small sharks, squid, and octopus (California Department of Fish and Game 1990). Although solitary feeders, sea lions often hunt in groups, which can vary in size according to the abundance of prey (California Department of Fish and Game 1990).

California sea lions have been observed in and around the Russian River mouth and in the Russian River estuary (Merritt Smith Consulting 1999,2000; SCWA and Merritt Smith Consulting 2001; SCWA 2012, 2013, 2014). Juvenile sea lions were observed from August to October of 2009 at Patty’s Rock (Figure 1) by Water Agency staff and members of the public. Regular observation of juvenile California sea lions were reported along the Sonoma Coast and in the Russian River estuary and were generally considered to be a result of poor foraging conditions in the ocean in 2009. Male California sea lions are occasionally observed hauled out at or near the Russian River mouth: once in August 2009, January and December 2011, January 2012, December 2013, and February 2014. Other individuals were observed in the surf at the mouth of the river or swimming inside the estuary. These sightings in the winter months are more typical of male sea lions traveling along the western coast of North America outside of their breeding beaches. On two occasions in 2015 a juvenile sea lion was hauled out at the Russian River mouth: February 2 and April 8. Although these observations coincided with the 2013-

2015 Unusual Mortality Event for California sea lion pups and yearlings,<sup>5</sup> these individuals appeared to be in good physical condition.

### **4.3 Northern elephant seals – California stock**

Northern elephant seals (*Mirounga angustirostris*) breed and give birth in California (U.S.) and Baja California (Mexico), primarily on offshore islands (Stewart *et al.* 1994), from December to March (Stewart and Huber 1993). Males feed near the eastern Aleutian Islands and in the Gulf of Alaska, and females feed further south, south of 45°N (Stewart and Huber 1993, Le Boeuf *et al.* 1993). Adults return to land between March and August to molt, with males returning later than females. Adults return to their feeding areas again between their spring/summer molting and their winter breeding seasons. Pups are born in early winter from December to January. Breeding occurs from December to March, and gestation lasts around 11 months. Northern elephant seals are polygamous; males establish dominance over large groups of females during the breeding season.

Populations of northern elephant seals in the U.S. and Mexico were all originally derived from a few tens or a few hundreds of individuals surviving in Mexico after being nearly hunted to extinction (Stewart *et al.* 1994). Given the very recent derivation of most rookeries, no genetic differentiation would be expected. Although movement and genetic exchange continues between rookeries, most elephant seals return to their natal rookeries when they start breeding (Huber *et al.* 1991). The California breeding population is now demographically isolated from the Baja California population and is considered to be a separate stock. Based on the 2010 survey an estimated 40,684 pups were born in California, resulting in a population estimate of 179,000 northern elephant seals (Carretta *et al.* 2015). Based on trends in pup counts the population is estimated to be growing at an annual rate of 3.8% since 1988 (Lowry *et al.* 2014).

Northern elephant seals range along the entire California coast (California Department of Fish and Game 2009). Adult male elephant seals breed with harems of females from mid-December through March in dense rookeries on San Miguel Island, Santa Barbara Island, San Nicolas Island, San Simeon Island, Southeast Farallon Island, Año Nuevo Island, on the mainland at Año Nuevo (San Mateo Co.), and the Point Reyes Peninsula (California Department of Fish and Game 2001). From April to November, they feed at sea or haul out to molt at rookeries. They are not listed as "endangered" or "threatened" under the Endangered Species Act nor as "depleted" or "strategic" under the MMPA. Elephant seals feed at night in deep water, primarily on rays, sharks, pelagic squid, ratfish, and Pacific hake (California Department of Fish and Game 2009). Entanglement in marine debris, fishery interactions, and boat collisions are their main threats.

Censuses of pinnipeds at the mouth of the Russian River have been taken at least semimonthly since 1987. Elephant seals were noted from 1987 to 1991. From 1992-1995, one or two elephant seals were counted during the censuses conducted in May, with occasional records during the fall and winter (Mortenson and Follis 1997). A single male northern elephant seal

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<sup>5</sup> <http://www.nmfs.noaa.gov/pr/health/mmume/californiasealions2013.htm>

was present at the mouth of the Russian River harbor seal haul-out site, during the late winter and spring for several years. The elephant seal was believed to be a juvenile or sub-adult male when it first began using the area as a haul-out site. It was observed harassing harbor seals hauled out at the mouth of the Russian River. A northern elephant seal sub-adult, tagged R-1 by Dr. Sarah Allen in August 2003, was present at the Jenner haul-out from 2002 to 2007. He was generally present during molt and again from late December through March into the early pupping season. In recent years a single sub-adult elephant seal (not known to be the same individual) was observed hauled out at the Russian River in the late summer in 2013 and 2014, prior to that the latest reported sighting was in June 2009.

## **5. TYPE OF INCIDENTAL TAKE AUTHORIZATION**

This is a request for rulemaking and letters of authorization for Level B incidental harassment of Pacific harbor seals, northern elephant seals and California sea lions at the Russian River, in Sonoma County, California. The type of take expected is incidental harassment of pinnipeds from the activities associated with estuary management and biological and physical monitoring throughout the estuary as required from the Biological Opinion (NMFS 2008). Estuary management activities will include people, vehicles, and heavy equipment on the beach near the haul-out. Activities may include: excavation and maintenance of the lagoon outlet channel, construction of a pilot channel during artificial breaching events, posting and removal of warning signs on the beach, monitoring the lagoon outlet channel, monthly topographic surveys of the sandbar at the mouth of the estuary. Activities in the Russian River estuary near river haul-out locations will include boat operation associated with flow circulation and water quality monitoring, and beach-seining and boat operation associated with biological monitoring near haul-out locations.

## **6. DESCRIPTION AND ESTIMATION OF TAKE**

The estimates of the number of Pacific harbor seals that may be harassed by the proposed water level management activities is based upon the number of potential take events associated with Lagoon Outlet Channel and artificial breaching activities (Table 3) and the average number of harbor seals that are present at the Jenner haul-out during bar-closed conditions (Table 5). The numbers of take events associated with lagoon outlet channel management are split into two categories: 1) initial channel excavation, which would likely occur between May and September, and 2) maintenance and monitoring of the outlet channel, which would continue until October 15<sup>th</sup>. Recent observations indicate that seals continue to use the Jenner haul-out during bar closed conditions, while there is some evidence that increased human interactions during these conditions will reduce the average number of seals hauled out (SCWA 2014, 2015). Based on Water Agency pinniped monitoring from 2009 to 2015, the average number of harbor seals hauled out during barrier beach-closed conditions (Table 5) can be used to estimate the number of individuals that may be harassed by both lagoon outlet channel and artificial breaching activities. Both activities would likely be implemented soon after a beach closure (within 14 days), so the data presented in Table 5 would be reasonable for the take estimates. Because the lagoon outlet channel

implementation dates cannot be determined yet (they are dependent on when the barrier beach naturally closes after May 15<sup>th</sup>), the highest average number of harbor seals during the Lagoon Management Period presented in Table 5 was used to estimate the number of seals that may be taken during implementation of the lagoon outlet channel. For maintenance and monitoring activities associated with the lagoon outlet channel, the monthly average of harbor seals during bar closed conditions was used (Table 5). Table 6 provides detailed take estimates.

The majority of the biological and physical monitoring of the estuary occurs away from the main harbor seal haul-out; however boats are driven past small (peripheral) resting areas on logs, rocks and sand bars in the estuary. The estimate for seal disturbance for these activities is based on the assumption that one seal would be encountered during each of these sampling events (Table 3). For the river mouth haul-out, the estimate for harbor seal disturbance is based on the monthly average reported from 2011 to 2015 in Table 4. The estimated potential total number of individual animals that may be taken equates to the average number of seals of each species anticipated to be encountered per event multiplied by the estimated number of events annually. The potential total number of individual animals that may be taken is likely an overestimate because the same seals would presumably be taken multiple times throughout the year (Table 6).

California sea lions and northern elephant seals are occasional visitors to the estuary. Based on the small amount of observations available for these species, the estimate is that there is a potential to encounter one adult or sub-adult animal (per species) per month throughout the year (Table 6).

Based on the estimate of activities to occur annually and the average number of pinnipeds expected to occur we are requesting take authorization for incidental (level B) harassment of 4,341 Pacific harbor seals, 34 California sea lions and 34 northern elephant seals for each year of the requested Letter of Authorization or a total of 21,705 take events for Pacific harbor seals and 170 take events each for California sea lions and northern elephant seals for the duration of the Letter of Authorization. Since harbor seals are not distinguished by age class throughout the year we are unable to divide our take estimate by age and we estimate that the majority of animals encountered are greater than one year old. For California sea lions and northern elephant seals we have not previously observed mature females of these species at the Russian River so we expect the individuals likely to be encountered would be adult or sub-adult males and juveniles of either sex.

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Table 6. Estimated number of pinnipeds that may be affected (Level B harassment) by Russian River estuary management activities annually.

Species	No. Animals Expected to Occur <sup>a</sup>	No. Take Events <sup>b</sup>	Potential Total Number of Individual Animals that may be Taken <sup>c, d</sup>
<b>Lagoon Outlet Channel Management on the Sandbar (May 15 to October 15)</b>			
Pacific harbor seal <sup>e</sup>	Implementation: 117 Maintenance & Monitoring: May-80; June-98; July-117; Aug-17; Sept-30; Oct-28	Implementation (May-Sept): 3 Maintenance May -1; June-Sept-4 per month; Oct-1 Monitoring (June-Sept-2 per month; Oct-1	Implementation: 351 Maintenance: 1,156 Monitoring: 552 TOTAL: 2,059
California sea lion (potential to encounter once per month May-Oct)	1	6	6
Northern elephant seal (potential to encounter once per month May-Oct)	1	6	6
<b>Artificial Breaching on the Sandbar (October 16 to May 14)</b>			
Pacific harbor seal <sup>e</sup>	Oct: 28 Nov: 32 Dec: 59 Jan: 49 Feb: 75 Mar: 133 Apr: 99 May: 80	Oct: 2 <sup>f</sup> Nov: 2 Dec: 2 Jan: 1 Feb: 1 Mar: 1 Apr: 1 May: 2 12 events maximum	Oct: 56 Nov: 64 Dec: 118 Jan: 49 Feb: 75 Mar: 133 Apr: 99 May: 160 TOTAL: 754
California sea lion (potential to encounter once per month Oct-May)	1	8	8
Northern elephant seal (potential to encounter once per month Oct-May)	1	8	8
<b>Topographic Survey of the Barrier Beach</b>			
Pacific harbor seal <sup>g</sup>	Jan: 99 Feb: 131 Mar: 165 Apr: 141 May: 151 June: 164 July: 282 Aug: 133 Sept: 62 Oct: 48 Nov: 68 Dec: 98	12	Jan: 99 Feb: 131 Mar: 165 Apr: 14 <sup>h</sup> May: 151 June: 164 July: 282 Aug: 133 Sept: 62 Oct: 48 Nov: 68 Dec: 98 TOTAL: 1,415

Species	No. Animals Expected to Occur <sup>a</sup>	No. Take Events <sup>b</sup>	Potential Total Number of Individual Animals that may be Taken <sup>c, d</sup>
California sea lion (potential to encounter once per month)	1	12	12
Northern elephant seal (potential to encounter once per month)	1	12	12
<b>Biological and Physical Habitat Monitoring in the Estuary (excluding topographic surveys, see above)</b>			
Pacific harbor seal <sup>i</sup>	1	113	113
California sea lion (potential to encounter once per month May-Dec)	1	8	8
Northern elephant seal (potential to encounter once per month May-Dec)	1	8	8

<sup>a</sup> Number of animals expected to occur during bar closed conditions differ from previous permit applications due to the addition of observations from 2015, see Table 5. This has changed the total take estimates since the previous permit application.

<sup>b</sup> For implementation of the lagoon outlet channel, an event is defined as a single, 2-day episode. It is assumed that the same individual seals would be hauled out during a single event. For the remaining activities, an event is defined as a single day on which an activity occurs. Some events may include multiple activities listed in Table 3.

<sup>c</sup> The estimated potential total number of individual animals that may be taken equates to the maximum number of seals of each species anticipated to be encountered per event multiplied by the estimated number of events during the term of the IHA.

<sup>d</sup> The potential total number of individual animals that may be taken is likely an overestimate because the same seal would likely be taken multiple times throughout the season.

<sup>e</sup> Number of seals expected to occur based on monthly averages of seals during bar closed conditions as presented in Table 5.

<sup>f</sup> The number of events is the monthly average number of bar closure events from 1996 to 2015 (Table 1). The average number of breaching events from 1996 to 2015 is 5 events/year, and the most that occurred in a single year was 15 (Table 1).

<sup>g</sup> Number of seals expected to occur based on 2011-2015 monthly averages in Table 4.

<sup>h</sup> The potential number of individual animals that may be taken was calculated at 10% of the population expected to be present at the river mouth for a given month during the period where neonates are likely present. This figure was chosen based on the fact that if neonates are on the beach the survey crew will retreat away from the haul-out at the first sign that seals are alert to their presence. Outside of this time, it is assumed that the entire haul out will be disturbed in order to completely map the barrier beach.

<sup>i</sup> Number of harbor seals expected to occur is one per event, events listed in Table 3.

## 7. ANTICIPATED IMPACT OF THE ACTIVITY

The anticipated impacts of the estuary management activities are temporary disturbances caused by the presence of staff and equipment, and associated noise, on the beach near the Jenner haul-out, and operation of boats and deployment of beach seines near river haul-outs. The Water Agency counted seals hauled out and monitored disturbances before, during, and after breaching events from 1996 to 2000 (Merritt-Smith Consulting 1997, 1998, 1999, and 2000; SCWA and Merritt Smith Consulting 2001) and since 2009 (SCWA 2011, 2012, 2013, 2014, 2015). Seals at the Jenner haul-out responded most negatively to human disturbances on the beach (typically beach visitors approaching the haul-out and the presence of Water Agency crews and equipment near the haul-out). During breaching events harbor seals alerted to the sound of equipment on the beach and left the haul-out as the crew and equipment approached

closer on the beach. When breaching activities were conducted south of the haul-out location seals often remained on the beach during all or some of the breaching activity. This indicates that seals are less disturbed by activities when equipment and crew do not pass directly past their haul-out (SCWA 2011, 2012, 2013, 2014, 2015).

Stampeding or dead pups have not been observed during monitoring of the Water Agency's artificial breaching activities. Implementation of the lagoon outlet channel, as required by NMFS' Russian River Biological Opinion, has occurred on a single event (July 8, 2010), and the potential direct effects on harbor seals and their pups was similar to artificial breaching activities as construction methods are similar.

More specific data on the behavior of harbor seals during artificial breaching activities, specifically their responses to disturbance, are available in Merritt Smith Consulting (1997, 1998, 1999 and 2001) and SCWA and Merritt Smith Consulting (2001), and the annual data reports for NMFS IHA (SCWA 2011, 2012, 2013, 2014 and 2015). Mortenson (1996) also discusses harbor seal behavior during the time pups are present. To date water level management activities have occurred outside the harbor seal pupping season so the annual NMFS IHA data reports do not describe pup behavioral responses to Water Agency activities. In April of 2015 a scheduled breaching activity was canceled due to the presence of neonatal harbor seals on the beach.

The opportunity for mother-pup bonding at the Jenner haul-out is not expected to be impacted by implementation of the lagoon outlet channel or artificial breaching activities. The majority of pups are born by mid-May in most years (SCWA 2012, 2013, 2014, 2015), and implementation of the lagoon outlet channel would begin around May 15<sup>th</sup> (as required by the Russian River Biological Opinion). By this time, it is expected that bonding between mothers and pups would have likely occurred. The number of artificial breaching activities during the months of March, April and May has been relatively low in the past (Table 1), and the breaching activities occur in a single day over several hours. Artificial breaching activities are not expected to impact mother-pup bonding.

Excavation of the lagoon outlet channel may require the presence of Water Agency crews and equipment on the beach for up to 2 consecutive days. There have been several breaching events that required up to 2 days of work with a bulldozer or excavator without any apparent long-term impacts to the presence of seals at the haul-out. Seals at the Jenner haul-out experience regular disturbance by beach visitors and continual noise from the adjacent Highway 1 and would likely only be temporarily disturbed by the presence of Water Agency crews over a 2-day period. However, it is difficult to predict the response to the presence of up to 2 pieces of heavy equipment on the beach during the initial construction of the outlet channel. Monitoring of the pinniped response to this disturbance is detailed in section 13.

During both summer lagoon outlet channel management and artificial breaching activities, Water Agency crews would approach the haul-out ahead of the heavy equipment to minimize the potential for flushes to result in a stampede, a particular concern during pupping season.

Water Agency staff would avoid walking or driving equipment through the haul-out. Crews on foot would take caution to approach the haul-out slowly and to make an effort to be seen from a distance, if possible, rather than appearing suddenly at the top of the beach. Seals are usually alerted to the presence of the heavy equipment on the barrier beach well before it approaches the haul-out due to the equipment's noise. Equipment would be driven slowly on the beach and care would be taken to minimize the number of shut-downs and start-ups when the equipment is on the beach. During the Water Agency's monitoring since 2009 harbor seals typically leave the haul-out prior to the excavator reaching the breaching location due to the presence of crews arriving on foot. Once breaching was completed, equipment and crews left the beach and pinnipeds returned to the haul-out soon after.

## **8. ANTICIPATION IMPACTS ON SUBSISTANCE USES**

Marine mammals are not used for subsistence in and around the Russian River estuary. No impacts to the availability of marine mammals for subsistence are expected as a result of the proposed project.

## **9. ANTICIPATED IMPACT ON MARINE MAMMAL HABITAT**

The purposes of the lagoon outlet channel management and artificial breaching activities are to manage the barrier beach at Goat Rock State Beach to improve summer rearing habitat for juvenile salmonids in the Russian River estuary and to minimize potential flood risk to low-lying properties on the estuary, respectively. These activities would result in physical alterations of the Jenner haul-out. When the barrier beach closes, water surface elevations in the estuary rise resulting in the haul-out increasing in elevation on the beach and flooding of haul-outs in the Russian River. For the summer lagoon outlet channel, elevations would range between 4 and 9 feet NGVD with a target of 7 feet. For artificial breaching activities, the sandbar would be breached when water surface elevations ranged from 4.5 and 7 feet NGVD.

The lagoon outlet channel would alter the beach by creating a shallow outlet channel that would convey river flow to pass over the sandbar and minimize or eliminate tidal exchange from May 15<sup>th</sup> to October 15<sup>th</sup>.<sup>6</sup> The gentle slope of the outlet channel would allow seals to travel through the channel, although the shallow depths (0.5 to 2 feet) would likely not allow for swimming through the channel. Depending on the barrier beach height and the location of the river's thalweg when the beach closes, part of the outlet channel may be constructed in areas where seals typically haul out on the estuary side. The outlet channel would be maintained from May 15<sup>th</sup> to October 15<sup>th</sup>. After October 15<sup>th</sup>, the closed barrier beach would be artificially breached when water surface elevations in the estuary approach 7.0 feet NGVD as read at the Jenner visitor's center. Artificial breaching activities alter the habitat by creating a pilot channel through the closed sandbar. The location of the pilot channel is dependent on the height and width of the sandbar and the location of the river's thalweg. The pilot channel could

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<sup>6</sup> The lagoon management period is May 15<sup>th</sup> to October 15<sup>th</sup>, as described in the Russian River Biological Opinion (NMFS 2008).

be constructed in areas where seals typically haul out. Construction of the lagoon outlet channel and artificial breaching pilot channels requires excavated sand to be side cast on the beach. Any sand excavated would be side cast on the adjacent beach in such a way as to minimize changes to beach topography. During implementation and maintenance of the lagoon outlet channel, side cast sand would be graded on the adjacent beach and/or placed within the wave run-up zone on the beach so it is redistributed on the beach. During artificial breaching, the excavated sand is side cast adjacent to the pilot channel because it will be scoured as the mouth opens with flows leaving the estuary.

During the Water Agency's pinniped monitoring associated with artificial breaching activities from 1996 to 2000, the number of harbor seals hauled out at Goat Rock State Beach declined when the barrier beach closed (although the initial decline was often observed to be followed by a brief increase in the number of seals at the haul-out) and then increased the day following an artificial breaching event (Merritt-Smith Consulting 1997, 1998, 1999, and 2000; SCWA and Merritt Smith Consulting 2001, SCWA 2011). Our recent observations of seal haul-out abundance during barrier beach closed conditions and associated with artificial breaching activities follow the previously described trends (SCWA 2014, 2015, 2016). Recently we have gained more information regarding the number of pinnipeds that use the haul-out during extended sandbar closure in the lagoon management period (May 15<sup>th</sup> to October 15<sup>th</sup>). In 2015 the barrier beach was closed for a total of 49 days during the lagoon management period, with the longest closure lasting 27 days in September and October (SCWA 2016). Generally, fewer seals were hauled out during closure events compared to bar open conditions. However, the monthly average number of seals hauled out did not differ significantly from previous years (SCWA 2016). Results are similar for barrier beach closures during the lagoon management period in 2013 and 2014 (SCWA 2014, 2015). While there were fewer seals hauled out during closed conditions, the monthly average of seal abundance during September and October did not vary significantly from previous years combined (SCWA 2015, 2016). Collection of baseline information during the lagoon management period would be included in the monitoring described under question 13 below. The Water Agency's previous monitoring, as well as Twohy's daily counts of seals at the sandbar (Table 4), indicates that the number of seals at the haul-out declines from August to October, so management of the lagoon outlet channel would have little effect on haul-out use. The late spring and early summer (May, June, and July), may be the most sensitive time period for pinniped disturbance since it coincides with pupping and the likely initiation of lagoon management (following a closure in this time period). In 2013 prolonged closures occurred in late spring and early summer (8 to 25 days). The average number of pinnipeds at the haul-out ranged from 50 to 96 harbor seals over the course of the barrier beach closures (SCWA 2014). This indicates that seals present at the haul-out during the pupping season are unlikely to completely abandon the haul-out from May to July in the event a seasonal lagoon is maintained. During closure event seals are routinely observed travelling across the barrier beach between the estuary and the ocean. Based on these monitoring results, the numbers of seals hauled out from May through July would be expected to fluctuate, but it is likely that the haul-out would continue to be used by harbor seals. In April 2015 the barrier beach was closed for 8 days during the peak pupping period and the number of pups

observed was similar to previous years when the mouth remained open at this time (SCWA 2016).

## **10. ANTICIPATED LOSS OR MODIFICATION TO HABITAT**

The modifications of habitat described previously in Section 9 would be temporary. The Russian River estuary management activities are anticipated to have minimal effects on the overall habitat of California stocks of Pacific harbor seal and northern elephant seal, and the U.S. stock of California sea lion. Habitat modification effects would be limited to the Jenner haul-out at the mouth of the Russian River.

Changes in haul-out elevation regularly occur with the tides at this site and any habitat that would be impacted by side cast sand would be temporary. Seals would still have access to the estuary lagoon waters and could still flush into the water during high water surface elevation periods. Modification of habitat resulting from construction of the lagoon outlet channel or artificial breaching pilot channel would also be temporary in nature. Harbor seals are regularly observed crossing overland from the Pacific Ocean to haul out on the estuary side of the beach, even in bar-open conditions, so it is anticipated that seals would continue to use the haul-out in bar-closed, lagoon conditions.

## **11. MITIGATION MEASURES**

During both summer lagoon outlet channel management and artificial breaching activities, Water Agency crews would approach the haul-out ahead of the heavy equipment to minimize the potential for flushes to result in a stampede. Water Agency staff would avoid walking or driving equipment through the haul-out. Crews on foot would take caution to approach the haul-out slowly and to make an effort to be seen from a distance, if possible, rather than appearing suddenly at the top of the sandbar. Seals are usually alerted to the presence of the heavy equipment on the sandbar well before it approaches the haul-out due to the equipment's noise. Equipment would be driven slowly on the beach and care would be taken to minimize the number of shut-downs and start-ups when the equipment is on the beach to reduce disturbance of seals from loud noises following a relatively quiet period. All work, including monitoring, would be completed as efficiently as possible, with the fewest number of heavy equipment possible, to minimize disturbance of seals at the haul-out. Boats operating near river haul-outs would be kept within posted speed limits and driven as far from the haul-outs as safely possible to minimize flushing seals.

The proposed project would include the following additional mitigation measures to limit access to the beach during the pupping season (March 15 to June 30) as follows:

- If a pup less than one week old is on the beach where heavy machinery would be used or on the path used to access the work location, the breaching event will be delayed until the pup has left the site or the latest day possible to prevent flooding while still maintaining suitable fish rearing habitat. Pups less than one week old should be characterized by being up to 15 kg, thin for their body length, or an umbilicus or natal

pelage is present. The Water Agency will coordinate with the locally established seal monitoring program (SealWatch) to determine if pups less than one week old are on the beach prior to a breaching event;

- A water level management event may not occur for more than two consecutive days unless flooding threats cannot be controlled;
- The Water Agency will maintain a one week (7 day) “no work” period between water level management events (unless flooding is a threat to the low-lying residential community) to allow for adequate disturbance recovery period. During the “no-work” period, equipment must be removed from the beach; and
- Physical and biological monitoring, as described in Table 2, will not be conducted if a pup less than one week old is present at the monitoring site or on a path to the site.

## **12. ARCTIC PLAN OF CONSIDERATION**

The proposed project will not occur in or near any traditional Arctic hunting areas and therefore will not have an impact on Arctic subsistence uses.

## **13. MONITORING AND REPORTING**

The Russian River Estuary Management Project Pinniped Monitoring Plan (SCWA and Stewards 2016) describes in detail the methods for ongoing baseline (general) and Estuary Management Project (mitigation) monitoring protocols. The goal of the monitoring plan is to continue to develop our understanding of the physical and biological factors that influence seal abundance and behavior. Annual reports to the National Oceanic and Atmospheric Administration (NOAA) Fisheries Office of Protected Resources will continue to specifically address the following four questions:

1. Under what conditions do pinnipeds haul out at the Russian River estuary mouth at Jenner?
2. How do seals at the Jenner haul-out respond to activities associated with the construction and maintenance of the lagoon outlet channel and artificial breaching activities?
3. Does the number of seals at the Jenner haul-out significantly differ from historical averages with formation of a summer (May 15th to October 15th) lagoon in the Russian River estuary?
4. Are seals at the Jenner haul-out displaced to nearby river and coastal haul-outs when the mouth remains closed in the summer?

Harbor seals are found at the mouth of the Russian River (Jenner haul-out) throughout the year. They are observed on the beach throughout the tidal cycle and at any time of day. Our baseline pinniped monitoring concluded that tidal state and time of day influenced harbor seal

abundance at the Jenner haul-out, with seals less abundant in the early morning and at high tide (SCWA 2012). Harbor seals were most abundant on the Jenner haul-out in July during their annual molt (SCWA 2012), with these same trends being observed in subsequent years (SCWA 2013, 2014). Seasonal variation in the abundance of harbor seals at their haul-out locations is commonly observed throughout their range (Allen et al. 1989, Stewart and Yochem 1994, Gemmer 2002). The variation in their abundance can mostly be explained by changes in their biological and physiological requirements throughout the year. Peak seal abundance occurring in July during their molting season is likely a result of seals spending more time on land in order to help facilitate the molting process. This annual peak is typically followed by a decline in seal abundance which is likely a result of individual seals decreasing the amount of time on the haul-out post-molt to spend more time foraging and also coincides with the time that young seals may temporarily disperse from their natal haul-out (Stewart and Yochem, 1994, Thompson et al. 1994, Small et al. 2005).

The Jenner haul-out is a harbor seal rookery and we have attempted to standardize a measure of pup counts so that comparisons can be made across years. However, our ability to accurately measure natality (i.e., proportion of births to the number of mature females) is limited by the fact that harbor seals are not sexually dimorphic so the number of adult females on the beach cannot be easily determined. Harbor seal pups are very precocial and are able to swim just after birth, so counts of pups on the beach does not accurately reflect the total number of births.

Harbor seals will use the beach when there is an open channel or when a barrier beach has formed, however, the number of seals at Jenner was influenced by river mouth condition. Daily average seal abundance was lower during closed conditions compared to open conditions. This effect is also closely related to time of year, since most closures occur during the fall and winter, when seal abundance is low. However, when seal counts were grouped by season, the influence of mouth condition was observed for winter, spring, summer and fall (SCWA 2016).

The response of harbor seals at the Jenner haul-out to water level management activities in 2015 was similar to the responses observed in previous years of monitoring (Merritt Smith Consulting 1997, 1998, 1999, 2000; Sonoma County Water Agency and Merritt Smith Consulting 2001; SCWA 2011, 2012, 2013, 2014 and 2015). Harbor seals alerted to the sound of equipment on the beach and left the haul-out as the crew and equipment approached closer on the beach. When breaching activities were conducted south of the haul-out, or when seals were hauled out on the ocean side of the beach, seals often remained on the beach during all or some of the breaching activity. This indicates that seals are less disturbed by activities when equipment and crew do not pass directly past their haul-out.

Since the beginning of the modified estuary water level management procedures as a result of the Russian River Biological Opinion in 2009 through 2015 a lagoon outlet channel was only implemented once (July 2010). While the Water Agency has not had further opportunity to implement and sustain an outlet channel, observations when a barrier beach has formed during the lagoon management period provide information as to how harbor seals respond when aquatic access between the estuary and the ocean is limited. A barrier beach has formed during

the lagoon management period sixteen times, the longest incidence lasting 29 days, with an average duration of fourteen days during this period. While seal abundance was lower during closed conditions, overall there continues to be a slight increasing trend in seal abundance. These results indicate that while seal abundance may exhibit a short term decline during closed conditions it has not inhibited seals from using the Jenner haul-out during any period of the year. We conclude that the effect of barrier beach condition on seal abundance represents only a short term response, and is not an indication that seals are less likely to choose Jenner as a haul-out overall. We do not yet know how seals would respond to a maintained lagoon outlet channel.

As stated above we are unable to draw conclusions about the response of harbor seals to the implementation and maintenance of summer lagoon as outlined in the Russian River Biological Opinion. Results to date indicate that the peripheral haul-outs located in the estuary (see Figure 1) are little used by seals, and access is limited by rising water level in the estuary. At Chalanchawi seals are more likely to haul out during open conditions, as the logs that compose the site become submerged as water levels rise. Coastal sites are regularly used by harbor seals, albeit in low numbers. We did find that seals were slightly more abundant at North Jenner during mouth closed conditions, however the numbers of seals observed there remains low in either condition.

#### **14. SUGGESTED MEANS OF COORDINATION**

All pinniped data collected during the Russian River estuary management activities at the Russian River would be made available to NMFS, California Department of Parks and Recreation, the Stewards of the Coasts and Redwoods, and to the general public.

## 15. REFERENCES

Allen, S. G., H. R. Huber, C. A. Ribic and D. G. Ainley. 1989. Population dynamics of harbor seals in the Gulf of the Farallones, California. *California Fish and Game* 75(4): 224-232.

Behrens, D. 2008. Inlet Closure and Morphological Behavior in a Northern California Estuary: The Case of the Russian River: University of California, Davis.

California Department of Fish and Game. 1990. California Sea Lion (*Zalophus californianus*). California Habitat Relationship System Online. Available at <http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx>.

California Department of Fish and Game. 2001. California's Living Marine Resources: A Status Report December 2001

California Department of Fish and Game. 2005. Harbor Seal (*Phoca vitulina*). California Habitat Relationship System Online. Available at <http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx>.

California Department of Fish and Game. 2009. Northern Elephant Seal. California Wildlife Habitat Relationships System – online. California Department of Fish and Game California Interagency Wildlife Task Group.

Carretta, J., K.A. Forney, E. Oleson, K. Martien, M.M. Muto, M.S. Lowry, J. Barlow, J. Baker, B. Hanson, D. Lynch, L. Carswell, R.L. Brownell Jr., J. Robbins, D.K. Mattila, K. Ralls and M.C. Hill. 2012. NOAA Technical Memorandum NMFS, U.S. Pacific Marine Mammal Stock Assessments: 2011. NOAA-TM-NMFS-SWFSC-488. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

Carretta, J.V., E.M. Oleson, D.W. Weller, A.R. Lang, K.A. Forney, J. Baker, M.M. Muto, B. Hanson, A.J. Orr, H. Huber, M.S. Lowry, J. Barlow, J.E. Moore, D. Lynch, L. Carswell, and R.L. Brownell Jr. 2015. NOAA Technical Memorandum NMFS, U.S. Pacific Marine Mammal Stock Assessments: 2014. NOAA-TM-NMFS-SWFSC-549. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

ESA 2015. Russian River Estuary Outlet Channel Adaptive Management Plan 2015. Prepared for the Sonoma County Water Agency by ESA PWA with Bodega Marine Laboratory, University of California at Davis, May 15, 2015. ESA PWA ref # DW01958.

Gemmer, A. 2002. Ecology of harbor seals, *Phoca vitulina*, in northern California. M.A. Thesis, Humboldt State University: 128pp.

Hanan, D. and M. J. Beeson. 1994. Harbor Seal, *Phoca vitulina richardsi*, Census in California, May-June, 1993. Final Report submitted to NOAA Fisheries/National Marine Fisheries Service, pursuant to Award NA27FX0273-01.

Hanan, D. A. 1996. Dynamics of Abundance and Distribution for Pacific Harbor Seals, *Phoca vitulina richardsi*, on the Coast of California. Ph.D. Dissertation, University of California, Los Angeles:158 pp.

Hanson, L. C. 1993. The foraging ecology of harbor seals, *Phoca vitulina*, and California sea lions, *Zalophus californianus*, at the mouth of the Russian River, California. Masters thesis, Sonoma State University. May 9, 1993.

Harvey, J. T. and Goley, D. 2011. Determining a correction factor for aerial surveys of harbor seals in California. *Marine Mammal Science*, 27: 719–735.

Heckel, M. 1994. Russian River Estuary Study 1992-1993. Prepared for Sonoma County Department of Planning and California State Coastal Conservancy. 186 pp.

Herder, M. J. 1986. Seasonal movements and hauling site fidelity of harbor seals, *Phoca vitulina richardsi*, tagged at the Klamath River, California. MS. Thesis. Humboldt State University. 52 pp.

Huber, H.R., A.C. Rovetta, L.A. Fry, and S. Johnston. 1991. Age specific natality of northern elephant seals at the South Farallon Islands, California. *J. Mammalogy*. 72: 525-534.

Le Boeuf, B. J., D. Crocker, S. Blackwell, and P. Morris. 1993. Sex differences in diving and foraging behaviour of northern elephant seals. In: I. Boyd (ed.). *Marine Mammal: Advances in Behavioural and Population Biology*. Oxford Univ. Press.

Lowry, M.S., J. V. Carretta, and K. A. Forney. 2008. Pacific Harbor Seal Census in California during May-July 2002 and 2004. *California Fish and Game* 94(4): 180-193.

Lowry, M.S., R. Condit, B. Hatfield, S.G. Allen, R. Berger, P.A. Morris, B.J. Le Boeuf, and J. Reiter. 2014. Abundance, Distribution, and Population Growth of the Northern Elephant Seal (*Mirounga angustirostris*) in the United States from 1991 to 2010. *Aquatic Mammals* 40(1):20-31.

Merritt Smith Consulting. 2000. Biological and Water Quality Monitoring in the Russian River Estuary, 1999. Fourth Annual Report. Prepared for the Sonoma County Water Agency. March 24, 2000.

Merritt Smith Consulting. 1999. Biological and Water Quality Monitoring in the Russian River Estuary, 1998. Third Annual Report. Prepared for the Sonoma County Water Agency. March 15, 1999.

Russian River Estuary Management Project at Goat Rock State Beach and the Russian River Estuary

Merritt Smith Consulting. 1998. Biological and Water Quality Monitoring in the Russian River Estuary, 1997. Second Annual Report. Prepared for the Sonoma County Water Agency. February 5, 1998.

Merritt Smith Consulting. 1997. Biological and Water Quality Monitoring in the Russian River Estuary, 1996. Prepared for Sonoma County Water Agency. February 21, 1997.

Mortenson, J. 1996. Human interference with harbor seals at Jenner, CA, 1994-1995. Stewards of Slavianka, Sonoma Coast State Beaches, Russian River/Mendocino Park District. July 11, 1996.

Mortenson, J. 2009. Location of pinniped haulouts at the Russian River Estuary. April 20, 2009.

Mortenson, J. and M. Follis. 1997. Northern elephant seal (*Mirounga angustirostris*) aggression on harbor seal (*Phoca vitulina*) pups. Marine Mammal Science 13(3): 526-530.

Mortenson, J. and E. Twohy. 1994. Harbor seals at Jenner, CA, 1974-1993. Stewards of Slavianka, California Department of Parks and Recreation. Duncans Mills, CA. 35 pp.

NMFS (National Marine Fisheries Service). 2008. Russian River Biological Opinion. September 24, 2008.

NPS (National Park Service). 2006. Harbor Seal Monitoring at Point Reyes National Seashore and Golden Gate National Recreation Area, Annual Report 2005. National Parks Service, Point Reyes Station, CA. 19 pp.

NPS (National Park Service). 2007. Harbor Seal Monitoring, San Francisco Bay Area, Annual Report, National Park Service 2006. Point Reyes Station, CA. 22 pp.

NPS (National Park Service). 2008. Pacific Harbor Seal (*Phoca vitulina richardsi*) Monitoring at Point Reyes National Seashore and Golden Gate National Recreation Area: 2007 Annual Report. Natural Resources Technical Report NPR/SFAN/NRTR-2008/118.

NPS (National Park Service). 2009. Pacific Harbor Seal (*Phoca vitulina richardsi*) Monitoring at Point Reyes National Seashore and Golden Gate National Recreation Area: 2008 Annual Report. Natural Resources Technical Report NPR/SFAN/NRTR-2009/267.

NPS (National Park Service). 2010. Pacific Harbor Seal (*Phoca vitulina richardsi*) Monitoring at Point Reyes National Seashore and Golden Gate National Recreation Area: 2009 Annual Report. Natural Resources Technical Report NPR/SFAN/NRTR-2010/345.

NPS (National Park Service). 2011. Pacific Harbor Seal (*Phoca vitulina richardsi*) Monitoring at Point Reyes National Seashore and Golden Gate National Recreation Area: 2010 Annual Report. Natural Resources Technical Report NPR/SFAN/NRTR-2011/465.

Russian River Estuary Management Project at Goat Rock State Beach and the Russian River Estuary

Pitcher, K. W. and D. C. McAllister. 1981. Movements and haulout behavior of radio-tagged harbor seals, *Phoca vitulina*. Canadian Field-Naturalist 95(3): 292-297.

Small, R. J., L. F. Lowry, J. M. Ver Hoef, K. J. Frost, R. A. DeLong and M. J. Rehberg. 2005. Differential movements by harbor seal pups in contrasting Alaska environments. Marine Mammal Science 21(4):671-694

Sonoma County Water Agency. 2016. Russian River Estuary Management Project, Marine Mammal Protection Act Incidental Harassment Authorization, Report of Activities and Monitoring Results - January 1 to December 31, 2015. Prepared for Office of Protected Resources and Southwest Regional Administrator, National Marine Fisheries Service, January 2016.

Sonoma County Water Agency. 2015. Russian River Estuary Management Project, Marine Mammal Protection Act Incidental Harassment Authorization, Report of Activities and Monitoring Results - January 1 to December 31, 2014. Prepared for Office of Protected Resources and Southwest Regional Administrator, National Marine Fisheries Service, January 2015.

Sonoma County Water Agency. 2014. Russian River Estuary Management Project, Marine Mammal Protection Act Incidental Harassment Authorization, Report of Activities and Monitoring Results - January 1 to December 31, 2013. Prepared for Office of Protected Resources and Southwest Regional Administrator, National Marine Fisheries Service, January 2014.

Sonoma County Water Agency. 2013. Russian River Estuary Management Project, Marine Mammal Protection Act Incidental Harassment Authorization, Report of Activities and Monitoring Results - January 1 to December 31, 2012. Prepared for Office of Protected Resources and Southwest Regional Administrator, National Marine Fisheries Service, January 2013.

Sonoma County Water Agency. 2012. Russian River Estuary Management Project, Marine Mammal Protection Act Incidental Harassment Authorization, Report of Activities and Monitoring Results - April 2009 to December 31, 2011. Prepared for Office of Protected Resources and Southwest Regional Administrator, National Marine Fisheries Service, January 2012.

Sonoma County Water Agency. 2011. Russian River Estuary Management Project, Marine Mammal Protection Act Incidental Harassment Authorization (No. 14426), Report of Activities and Monitoring Results - April 1 to December 31, 2010. Prepared for Office of Protected Resources and Southwest Regional Administrator, National Marine Fisheries Service, February 2011.

Russian River Estuary Management Project at Goat Rock State Beach and the Russian River Estuary

Sonoma County Water Agency and Merritt Smith Consulting. 2001. Biological and Water Quality Monitoring in the Russian River Estuary, 2000. Fifth Annual Report. June 12, 2001.

Sonoma County Water Agency and Stewards of the Coast and Redwoods. 2016. Russian River Estuary Management Project Pinniped Monitoring Plan, Revised. January 2016.

Stewart, B., B. Le Boeuf, P. Yochem, H. Huber, R. DeLong, R. Jameson, W. Sydeman, and S. Allen. 1994. History and present status of the northern elephant seal population. In: B.J. Le Boeuf and R.W. Laws (eds.) Elephant Seals. Univ. Calif. Press, Berkeley. 414 pp.

Stewart, B.S. and H.R. Huber. 1993. Mammalian species: *Mirounga angustirostris*. *American Journal of Mammalogists* 449:1-10.

Stewart, B. S. and P. K. Yochem. 1994. Ecology of harbor seals in the southern California bight. pp. 123-134 in *The fourth California islands symposium: update on the status of resources*, W. L. Halvorson and G. J. Maender (eds.), Santa Barbara Museum of Natural History, Santa Barbara, California

Thompson, P. M., K. M. Kovacs and B. J. McConnell. 1994. Natal dispersal of harbor seals (*Phoca vitulina*) from breeding sites in Orkney, Scotland. *Journal of Zoology*, London 234:668-673.

TMMC (The Marine Mammal Center), 2016. Released and deceased patients. Available online at <http://www.marinemammalcenter.org/patients/released-deceased-patients/>. Accessed on April 12, 2016.