Request for Renewal of Marine Mammal Protection Act
Incidental Harassment Authorization
NMFS No. 14426

# Russian River Estuary Management Project

Applicant:
Sonoma County Water Agency
404 Aviation Blvd
Santa Rosa, CA 95403

January 2012

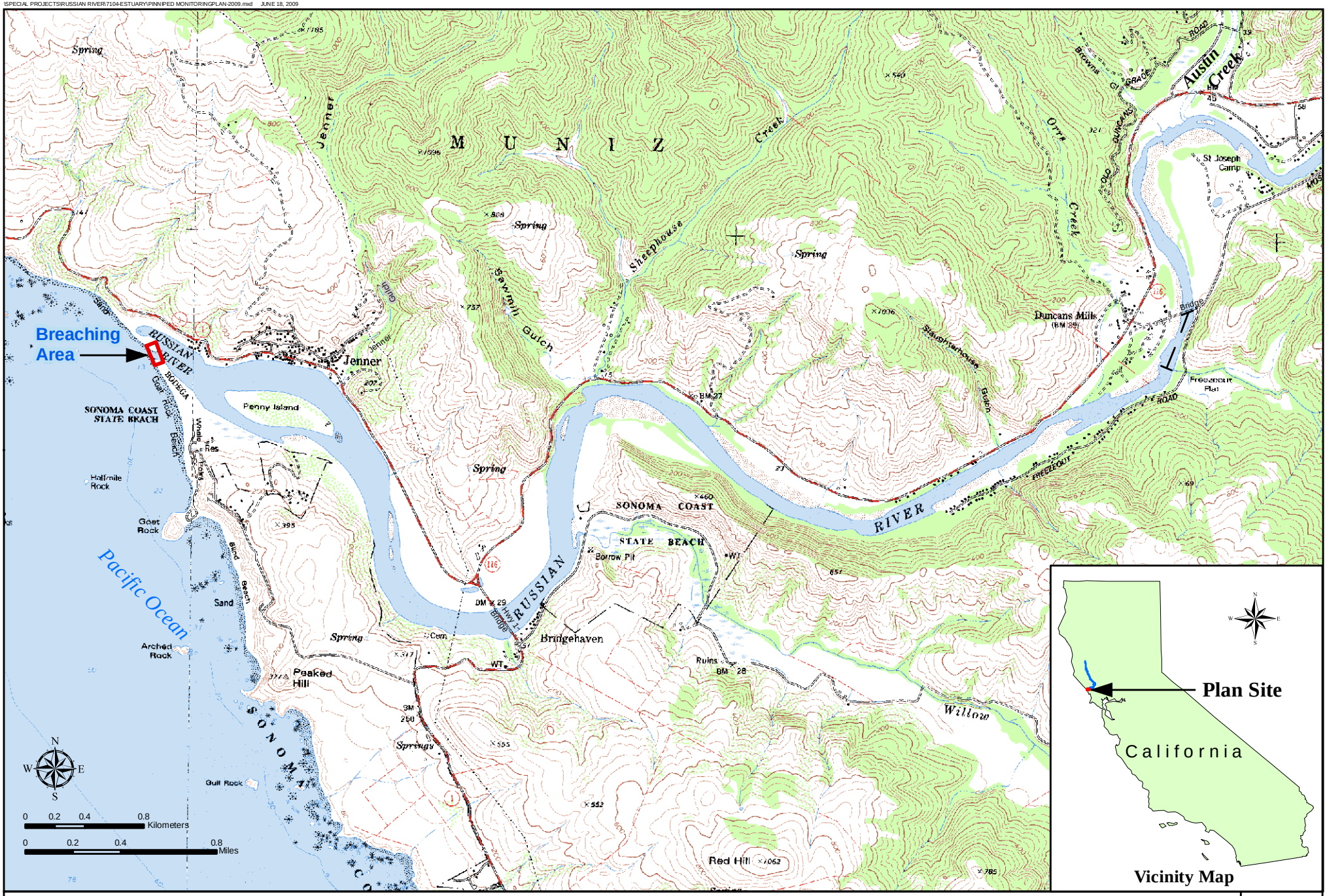
**(1) A detailed description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals.**

The 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). Although closures may occur at anytime of the year, the mouth usually closes during the spring, summer, and fall (Heckel 1994; Merritt Smith Consulting 1997, 1998, 1999, 2000; Sonoma County Water Agency and Merritt Smith Consulting 2001). 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 approximately 1,000 cubic yards. After the last portion of the barrier beach is removed, water begins flowing out of the channel, scouring

\SPECIAL PROJECTS\RUSSIAN RIVER\7104-ESTUARY\PINNIPED MONITORINGPLAN-2009.mxd JUNE 18, 2009

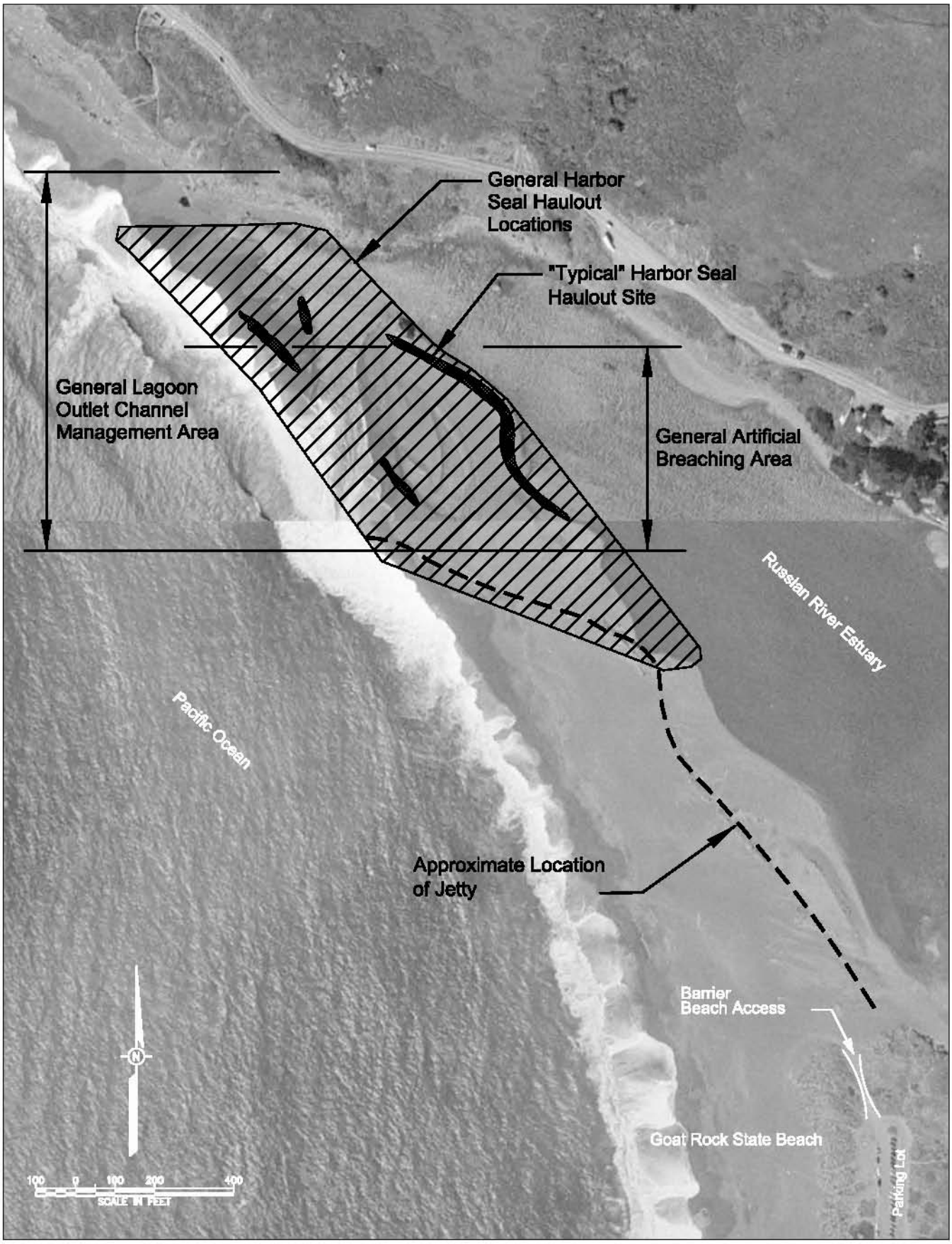



RRIFR
Russian River Instream Flow and Restoration

# Russian River Estuary

This Map is for general reference only.

Figure 1




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

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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 2010, 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 (April, May, and June) and the month of September (Figure 3). The number of artificial breaching events varies each year (Table 1). The lowest number of breaching events occurred in 2004 (1 event) and the highest number was 15 attempted breaches (13 successful artificial breaching events) in 2009. There were no artificial breaching events in 2011. It is difficult to predict how many artificial breaching events are required each year, but there have been an average of 6 artificial breaching events annually over the last 14 years.

**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 management 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 historic artificial breaching practices have significant adverse effects on the Russian River's estuarine rearing habitat for steelhead, coho salmon, and Chinook salmon. The historic 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 historic 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 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 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$^{th}$ to October 15$^{th}$ (referred to hereafter as the "lagoon management period").[1] A program of

[1] The lagoon management period is May 15$^{th}$ to October 15$^{th}$, as described in the Russian River Biological Opinion (NMFS 2008).

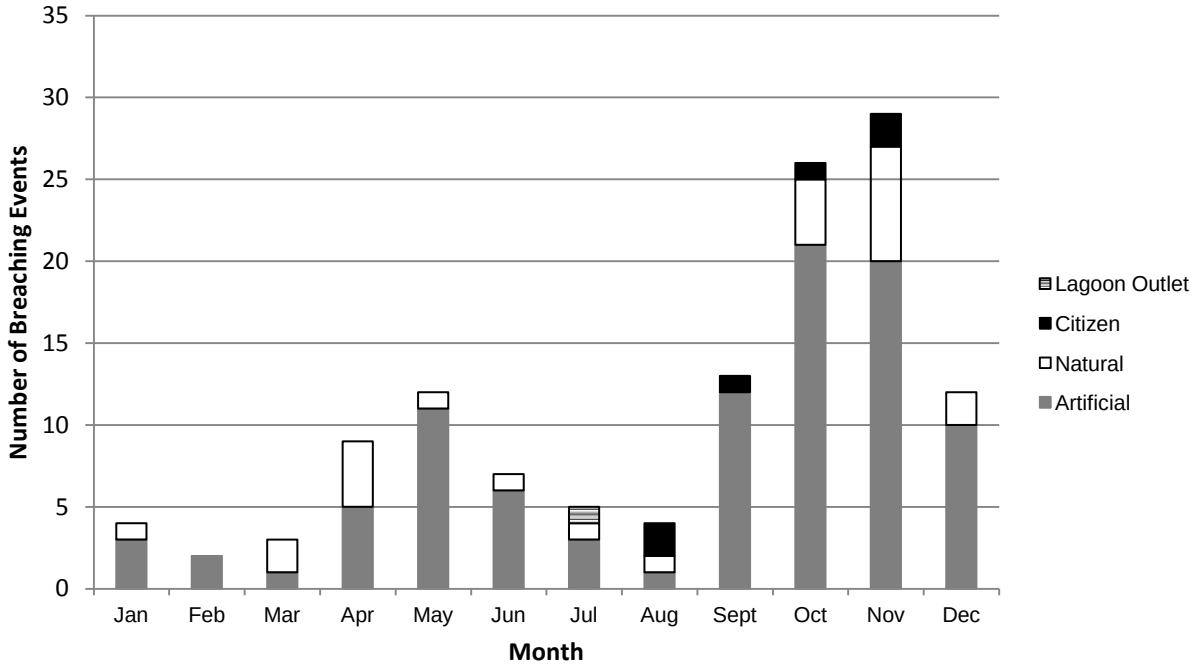



**Figure 3.** The number of Russian River estuary breaching events from 1996 to 2011.

**Table 1.** Breaching of the Russian River Estuary from 1996 to 2011. Number of times breached by year and month, including artificial breaches by Sonoma County Water Agency, natural breaches (denoted by [#]), and breaches conducted by private individuals without a Corps permit, denoted by (#).

| Month | Year | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1996 | 1997 | 1998* | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| January | | | | | | 1 | | | | | | | | 1, [1] | 1 | |
| February | | | | | | | | | | | | 2 | | | | |
| March | | 1, [1] | | | | | | [1] | | | | | | | | |
| April | | [1] | | | | 2 | | | [1] | | | 3 | [1] | [1] | | |
| May | | 1, [1] | | | 1 | 3 | | | 1 | | | | 5 | | | |
| June | | 2 | | 1 | 1 | | 1 | [1] | | | | | | 1 | | |
| July | 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] | |
| November | [1] | 1 | 1 | 1, [1] | 4 | [1] | 3 | 1 | (2) | 2 | [3] | 2 | 1 | 4 | [1] | |
| December | | | | | 2 | | 1 | | | | [1] | 2 | 1, [1] | 4 | | |
| **TOTAL** | 7 | 12 | 8 | 7 | 11 | 9 | 6 | 5 | 6 | 4 | 5 | 10 | 12 | 17 | 6 | 0 |
| **SCWA** | 3 | 9 | 8 | 6 | 11 | 8 | 5 | 3 | 1 | 4 | 0 | 9 | 10 | 15 | 3 | 0 |

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

potential, incremental steps are prescribed to accomplish this, including adaptive management of a lagoon outlet channel on the barrier beach.

In accordance with the Biological Opinion's RPA 2 the Water Agency commissioned a draft study plan to analyze the effects and role of the existing, remnant Goat rock State Beach jetty on beach permeability, seasonal sand storage and transport, seasonal flood risk, and seasonal water surface elevations in the Russian River estuary (ESA PWA 2011a). Implementation of this study plan will begin in 2012 and includes the installation and maintenance of monitoring wells and geophysical surveys.

Harbor seals (*Phoca vitulina richardii*) regularly haul out at the mouth of the Russian River (Jenner haulout) (Figure 4). California sea lions (*Zalophus californianus*) and northern elephant seals (*Mirounga angustirostris*) are occasionally observed at the haulout. There are also several known river haulouts at logs and rock piles in the Russian River estuary (Figure 4). The Water Agency is applying for incidental harassment authorization (IHA) under the Marine Mammal Protection Act (MMPA) for activities associated with Russian River Estuary Management Activities. These activities include:

- excavation and maintenance of a lagoon outlet channel that would facilitate management of a barrier beach (closed sandbar) 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
- construction and maintenance of monitoring wells on the barrier beach south of the jetty; and
- geophysical surveys conducted at the barrier beach south of the jetty.

**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$^{th}$ and October 15$^{th}$ (lagoon management period) after a barrier beach forms and creates a lagoon.[2] 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 will be placed on the adjacent beach and graded to depths of approximately 1-2 ft higher than the existing grade. The placed sand will 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 ft high and not blended into the existing beach topography. The piles may need to remain

[2] The Russian River Biological Opinion (NMFS 2008) establishes the lagoon outlet channel management period as May 15$^{th}$ to October 15$^{th}$.

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 which do not significantly depart from channels which 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 PWA 2011b). 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 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 oceanside 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 ft National Geodetic Vertical Datum (NGVD)[3], 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 ft 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 historic 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 ft, consistent with historic channel lengths observed within the management period (Behrens 2008). Length would be a function of the channel's planform alignment[4]. 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

[3] Water surface elevations are measured by the Water Agency's gauge located at the State Parks Visitor Center in Jenner.

[4] Planform alignment is the centerline alignment of the channel in planimetric view.


SPECIAL PROJECTS/RUSSIAN RIVER/7104-ESTUARY/HARBOR SEAL-2009-JENNER JUNE 18,2009

RRIFR
Russian River Instream Flow and Restoration

# Pinniped Haulouts at the Russian River Estuary and Surrounds

Figure 4

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.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 ft 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 the NMFS and California Department of Fish and Game (CDFG) 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 ESA PWA (2011b) attached to this application.

**Implementation and Maintenance.** 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 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 Jenner visitor's center boat launch.

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 haulout 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 haulout. Crews on foot would take caution to approach the haulout 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$^{th}$ and October 15$^{th}$. However, if estuary water surface elevations rise above 7.0 feet (at the Jenner gage) during the lagoon management period, the Water Agency may consult with NMFS and CDFG regarding artificially breaching the sandbar to alleviate potential flooding, as discussed in the Biological Opinion and described below.

**ARTIFICIAL BREACHING**

Artificial breaching activities occur on the closed sandbar. 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 gage (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 haulout 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 haulout. Crews on foot would take caution to approach the haulout 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) on the beach 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. Creating and maintaining the outlet channel would probably employ one excavator or bulldozer) to move sand 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. The 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$^{th}$ to May 14. However, if estuary water surface elevations rise above 7.0 feet (at the Jenner gage) during the lagoon management period (May 15$^{th}$ through October 15$^{th}$), the Water Agency would 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).

**GOAT ROCK STATE BEACH JETTY STUDY**

Implementation of the *Feasibility of Alternatives to the Goat Rock State Beach Jetty for Managing Lagoon Water Surface Elevations* Study Plan (ESA PWA 2011a) requires monitoring of water seepage through the barrier beach and geophysical mapping of the submerged substrate and structures. This study is a requirement of the Biological Opinion's RPA 2. To study water seepage rates six monitoring wells would be constructed on the barrier beach of the Russian River estuary (Figure 5). The wells would be located along two transects that are perpendicular to the beach barrier, with three wells per transect. The locations of the wells are located between the Goat Rock State Beach parking lot and the concrete-capped portion of the jetty that lies above the sand (Figure 5).

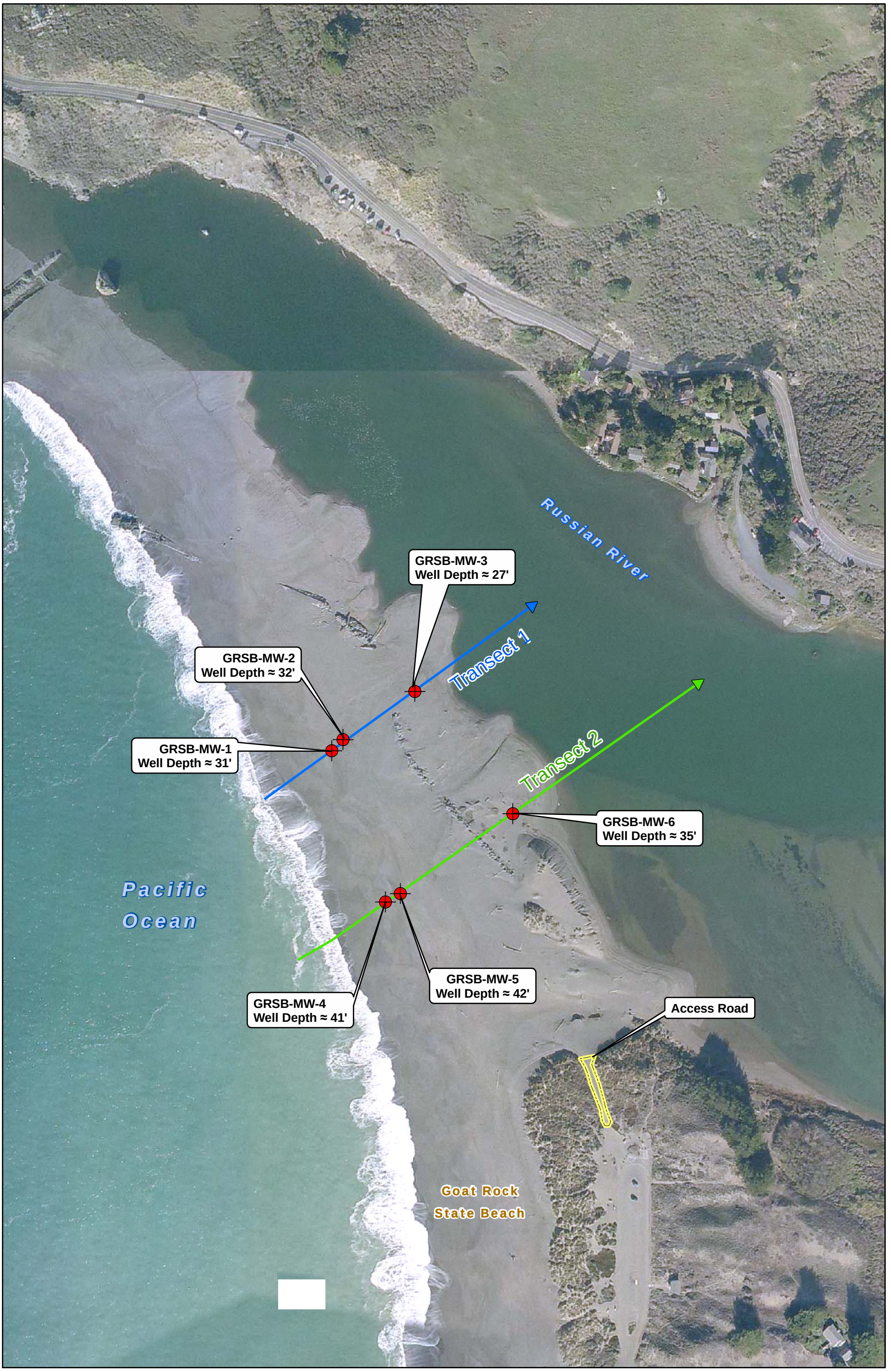
A drilling company would install the monitoring wells. The wells would be installed with an 8" hollow stem auger using a CME 750X drill rig equipped with 31" balloon tires along with a 4x4 wheel drive service truck. PVC casings two inches in diameter would be installed and capped. Temperature and conductivity measuring devices would be installed in each well after well construction completion. The well sites on the beach barrier would be accessed through an existing access road at the north point of the Goat Rock State Beach parking lot (Figure 5). Upheaval of sands into the auger during the drilling is anticipated, to mitigate this water is to be pumped into the auger (rate determined at time of drilling) to create a pressure head to keep the sands from rising up. If soil conditions permit, soil samples are to be taken every five feet at one location. The desired well depths are between 31 and 42 feet, however, large boulders from the Russian River jetty may impede drilling and prevent the wells from reaching the desired depth. The wells would be screened the whole length of the well. No outside material would be placed into the borehole after the well is installed. Wells would be capped and buried below the sand surface to prevent vandalism and tourist interaction.

The following measures would be implemented to avoid the possibility of excavated materials from the well installation running off into the Russian River estuary. Excavated materials would be contained on the west side of the borehole and silt fences would be placed five feet inland along the estuary shoreline. Due to the presence of an endangered plant species on the beach within close proximity of the well construction site (Figure 5), excavated materials from the far-east monitoring well on Transect 2 would be contained on the northwest side of the borehole. Personnel would also be present to monitor the construction activities and intervene if the activities would disturb the plant habitat. Due to the likelihood of harbor seal presence on the beach barrier during well construction the locations of the monitoring wells were chosen to be a safe distance from known seal haul outs to prevent disturbance (alert or take). In addition, Water Agency personnel would be present to monitor the construction activities and intervene if activities would disturb the harbor seals. The monitoring wells would be located south of the concrete-capped portion of the jetty and the known haulout; equipment would not need to drive through or past the haulout. The noise generated from the drill is estimated to be 85-90 db at a distance of 20 ft. The safe threshold of received noise levels in air for pinnipeds, as defined by NFMS, is 90 dB (Ben Laws pers. com.) Given that known pinniped haulouts are located greater than 200ft from the location of the wells, the anticipated received noise levels will be below the safe threshold for disturbance.

In order to better understand the characteristics of the barrier beach substrate and the location and composition of buried portions of the jetty and associated structures, geophysical surveys would be conducted along the barrier beach between the Goat Rock State Park parking lot and the concrete-capped extent of the jetty (Figure 5). Seismic refraction and electrical resistivity profiling would conducted simultaneously using one profile 1,500 ft to 2,000 ft long depending on the location of the mouth opening. Seismic refraction involves pounding an impact hammer on the surface of the beach creating a sound wave that resonates through the sand bar. It is not believed that this would generate enough noise to be detected by seals hauled out along the beach. In fact the engineers' concern is that the sound waves generated by ocean waves crashing on the beach will be a source of interference when trying to detect the sound waves generated by the impact hammer. Electric resistivity profiling involves placing probes down into the substrate and would not produce and additional physical or auditory disturbance to the pinnipeds on the beach. This profile would be completed by a staff of up to three personnel for a period of two consecutive days. The only potential for seal harassment would be from the presence of personnel and vehicles on the beach. Ground penetrating radar (GPR) profiles would also be completed near the jetty in perpendicular transects 30 to 40 feet long. The profiles will be collected by two personnel travelling on foot and should only take one day to complete. The only source of potential harassment of seals would be the presence of the survey crew on the beach. Once the initial geophysical surveys have been completed, additional surface electromagnetic profiles will be collected along the barrier beach in order to explore how the jetty impacts beach seepage relative to the natural beach berm. Collecting these electromagnetic profiles will involve 2-3 personnel walking along the barrier beach using either a hand-held conductivity meter or a pull-along capacitively coupled Ohm-Mapper system cable with sensors that is dragged along the beach. Neither of these instruments will generate noise.

**MONITORING**

Implementation of the lagoon outlet channel adaptive management plan would require monitoring to measure changes in the bar 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 seining and trapping, 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 4, Mortenson 2009). Once in place the ground water seepage monitoring wells would also require periodic monitoring and maintenance by Water Agency staff who would visit the wells monthly to download data collected from inside the wells. Table 2 provides a summary of the monitoring tasks and the frequency of their implementation.




**Estuary Jetty Seepage Study**
**Sonoma County, CA**

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**1 inch = 200 feet**

Figure 5

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

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 2 and 4) 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$^{th}$ to October 15$^{th}$ (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$^{th}$. Artificial breaching activities would generally occur between October 16$^{th}$ and May 14$^{th}$ (Table 3). We anticipate that the installation of monitoring wells will begin in July and should be completed within 10 days. Initial geophysical imaging profiles (seismic refraction, electrical resistivity profiling and ground penetrating radar should be completed in four days and will start no earlier than July. Subsequent electromagnetic imaging profiles will be conducted no earlier than July 1 and will involve a total of twelve survey days over various tidal cycles between July and February. The focus of these surveys will center on periods of barrier beach closures and the formation of a seasonal lagoon that typically occurs in the months of September through December. Biological and water quality monitoring generally occurs from mid-April through December (Table 3).

**Table 2.** Monitoring tasks associated with Russian River estuary management with potential to disturb pinnipeds.

| Task | Description | Field Activities | Frequency |
|---|---|---|---|
| **Lagoon Outlet Channel Management on the Barrier Beach** | | | |
| 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 |
| **Biological and Physical Habitat Monitoring in the Estuary** | | | |
| Fisheries seining | Deploy seine to collect fish at up to 8 locations in the estuary | One or two boats with approximately 6 field staff | Monthly |
| Invertebrate/salmonid prey study | Collection of benthic invertebrates and zooplankton | One boat with 2 field staff | Weekly |
| 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. | Every 2 weeks |
| SCWA topographic survey of sandbar | Survey of sandbar height and widths | 2 field staff on beach equipped with a survey rod. | Monthly |
| 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 |
| Maintenance of monitoring wells | Inspection and maintenance of ground seepage monitoring wells positioned on the south end of the barrier beach | Field staff on beach | Monthly |

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

The species of marine mammals that are likely to occur in the project area include the following pinnipeds: harbor seals and the California sea lions. Sightings of sea lions have been reported during the months from December to June, likely foraging, but their numbers are normally low (Hanson 1993). In previous years, a single male northern elephant seal (*Mirounga angustirostris*) has been present at the Jenner haul out during the late winter and spring. No elephant seals have been reported at the Russian River mouth since 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). Pups are born at the Jenner haulout 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 6). Abundance of seals on the Jenner haulout declines in the fall after the molting season is complete, but seals are present in the estuary and on local haulouts year round. The number of harbor seals at this haulout has fluctuated from year to year (Figure 7). Currently the population of seals at the Jenner haulout appears to be steady following an observed increase during 1980s and early 1990s. Based on the most recent statewide aerial census from 2009 the state population is estimated at 30,196 seals (Harvey and Goley 2011), which is lower than the 2004 statewide estimate of 43,449 seals (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 haulout 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 – 2011 baseline surveys. Table 5 shows the average number of harbor seals observed at the Jenner haulout (Goat Rock State Beach) during bar-closed conditions by month during monitoring of artificial breaching activities from 1996 to 2000 and from Water Agency observations during bar closed conditions in 2010.

**Table 3.** Estimated 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[a] |
|---|---|---|
| **Lagoon Outlet Channel Management on the Sandbar (May 15 to October 15)** | | |
| Excavation of outlet channel | Daily up to 2 consecutive days per event; up to 3 events estimated. | 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<br>Structure: ½ day per month (taken on same day as discharge measurements) | 10[b] |
| Outlet channel topography | 1 day per month | |
| **Artificial Breaching on the Sandbar (October 16 to May 14)** | | |
| October<br>November<br>December<br>January<br>February<br>March<br>April<br>May | Averages ½ day per breaching event | 2[c]<br>2<br>2<br>1<br>1<br>1<br>1<br>1<br>11 events maximum |
| **Biological and Physical Habitat Monitoring in the Estuary** | | |
| Fisheries seining | 6 days, monthly from May to October | 6[d] |
| Invertebrate/salmonid prey study | Weekly from July to October | 14[d] |
| Water quality | 3 days, every 3 weeks from May to December | 11[d] |
| SCWA topographic survey of sandbar | 1 per month for duration of IHA, averages ½ day | 12 |
| BML flow circulation (under contract w/SCWA) | Weekly from May to October | 22 |
| **Investigations of Goat Rock Jetty Structure and Ground Water Seepage** | | |
| Installation of groundwater monitoring wells | 10 days in July | 10 |
| Geophysical surveys of jetty and associated structures | 4 days in July | 4 |
| Electromagnetic profiles | 12 days total from July to February | 12 |

[a] *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.*

[b] *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.*

[c] *The number of events is the monthly average number of artificial breaching events from 1996 to 2010 (Table 1). Based on the number of events, the maximum number of artificial breaching events would be 15. The average number of breaching events from 1996 to 2010 is 6 events/year. The number of events was reduced from the data in Table 1 to 1 for the month of April and 1 for the month of May to anticipate the request from NMFS that*

*only a single closure in each of these months be breached if it seemed unlikely that additional closures would occur prior to May 15th. The potential for two closures in the first two weeks of May seems low. The number of artificial breaching events in February was reduced to one because closures in that month occurred only in 2007, which was an unusual circumstance. December was increased from an average of 1 to 2 events because of the recent experience of multiple closures during heavy storm events.*

[d] *Assumption is that pinnipeds may be encountered once per event and flush from river haulout in the Estuary.*

**Table 4.** Average daily number of seals observed at Goat Rock State Beach (at Russian River mouth), for each month from 1993 to 2005 (adapted from Mortenson and Twohy 1994 and Elinor Twohy unpublished data) and from the 2009-2011 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 | -- | -- | -- | -- |
| 2009-2011 | 96[a] | 89[b] | 146[b] | 131[b] | 119[b] | 134[b] | 237 | 108 | 36 | 36[c] | 90[c] | 45[c] |

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

[a] *average based on one baseline count conducted in 2010 and two conducted in 2011*

[b] *average based on twice monthly counts conducted in 2010 and 2011*

[c] *average based on one baseline count in 2009 and two conducted in 2010 and 2011*

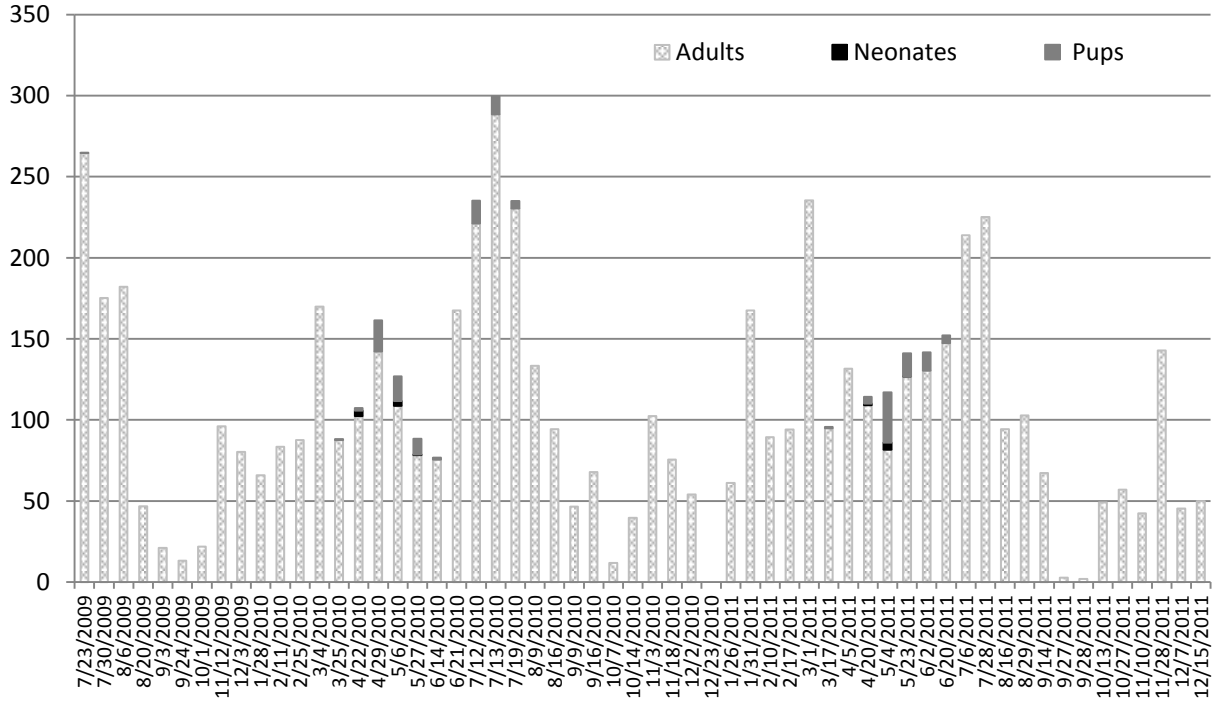


**Figure 6**. Mean number of harbor seals observed at the Jenner haulout (Goat Rock State Beach) during Russian River Estuary Management Project baseline pinniped monitoring from July 2009 to December 2011. Pups are counted separately through June, after which all seals are counted as adults as it becomes more difficult to accurately age individuals.

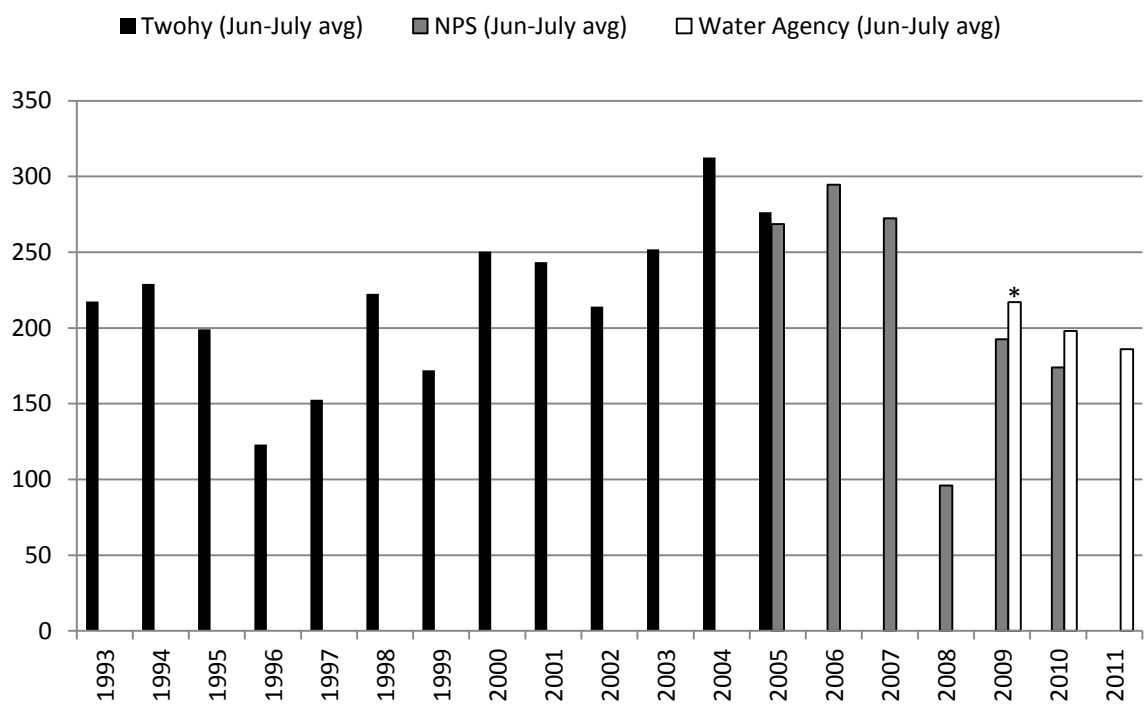


**Figure 7.** Average number of seals observed at Goat Rock State Beach (at Russian River mouth), recorded during the molting season of June 1 – July 31 from 1993 to 2010. Adapted from Mortenson and Twohy 1994 and Elinor Twohy unpublished data, National Parks Service (NPS) Annual Reports 2006, 2007, 2008, 2009, 2010, 2011 and Water Agency monitoring surveys. * Water Agency 2009 data from July only.

**Table 5.** Average number of harbor seals observed at the Jenner haulout (Goat Rock State Beach) during bar-closed conditions by month during monitoring of artificial breaching activities from 1996 to 2000. From Merritt Smith Consulting (1997, 1998, 1999 and 2000) and Sonoma County Water Agency and Merritt Smith Consulting (2001). Additional data is from 2009[a] and 2010[b] Water Agency observations of seals at the Jenner haulout during river closed conditions, numbers reported are average number of seals hauled out by month.

| April | May | June | July | August | September | October | November | December |
|---|---|---|---|---|---|---|---|---|
| 173 | 103 | 100 | 75 | 17 | 5 | 22 | 11 | |
| - | - | 91[a] | 105[b] | - | 13[a]/19[b] | 22[a]/13[b] | - | 0[a] |

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

**Pacific harbor seals-California stock.** Pacific harbor seals (*Phoca vitulina richardii*) 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 Marine Mammal Protection Act (MMPA).

A recent minimum population estimate of the harbor seal population is approximately 31,600 (Carretta *et al.* 2007). 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.

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. Haulout 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 haulout locations is commonly observed throughout their range (Allen et al. 1989, Stewart and Yochem 1994, Gemmer 2002). Peak haulout abundance typically occurs during their annual molt, which occurs in mid July in California. Abundance of seals on their haulouts is also high during the pupping season when females come ashore to give birth. Pupping at the Russian River haulout 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 haulout in late March, with maximum counts in May. In this study, pups were not counted separately from other age-classes at the haulout 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 haulout in mid-April, with a maximum number of

pups observed during the first two weeks of May. 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 (Mortenson and Allen, pers. comm.). Pupping season is defined as March 15 to June 30 at the Jenner haulout by the NMFS Incidental Harassment Authorization No. 14426 dated March 31, 2010.

Harbor seals have many haulout 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 8). The Russian River haul out is the largest in Sonoma County, comprising of approximately 18% of the harbor seal population found there (M. DeAngelis, pers. comm.). There are also several known haulouts in the Russian River estuary at logs and rock outcroppings in the river.

Monitoring efforts are particularly strong in the Point Reyes area, located in Marin County, south of Sonoma County, at the Russian River (Figure 9), 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 (Figure 10).

Mortenson (1996) discussed that the number of seals present at the Jenner haulout declined during bar closed (barrier beach closed) conditions. The Water Agency's pinniped monitoring from 1996 to 2000 focused on the barrier beach artificial breaching activities and its effects on the Jenner haulout. Seal counts and disturbances were recorded from 1 to 2 days prior to breaching, the day of breaching, and the day after breaching (Merritt Smith Consulting 1997, 1998, 1999, 2000; Sonoma County Water Agency and Merritt Smith Consulting 2001). In each year, 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. Observations of disturbances to the Jenner haulout show that the numbers of seals at the haulout (during barrier beach closures) were higher in the morning than later in the day. While seals often alerted to distance sources of disturbance, such as the sound of trucks braking on Highway 1 nearby, seals primarily fled the haulout as a result of disturbances on the beach. The number of seals declined during the day due to disturbances by people on the beach or kayakers/boaters approaching the haulout. Disturbances on the beach typically increased as the morning progressed (greater number of visitors on the beach in the late mornings and early afternoons). There were numerous occasions when the Water Agency's heavy equipment was in operation, but the seals did not leave the haulout or flushed into the water in low numbers.

According to Heckel (1994), "the loss of easy access to the haulout and ready escape to the sea when the river mouth is closed may account for the lower number of harbor seals seen at that time." The mouth of the Russian River is typically open during the winter months, but intermittently closes during the late spring through fall (Figure 2).


Figure 8. Pinniped Haulouts from Bodega Bay to Cuffey's Point, California Coast. Data includes haul-outs and rookeries surveyed using aerial or ground count 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

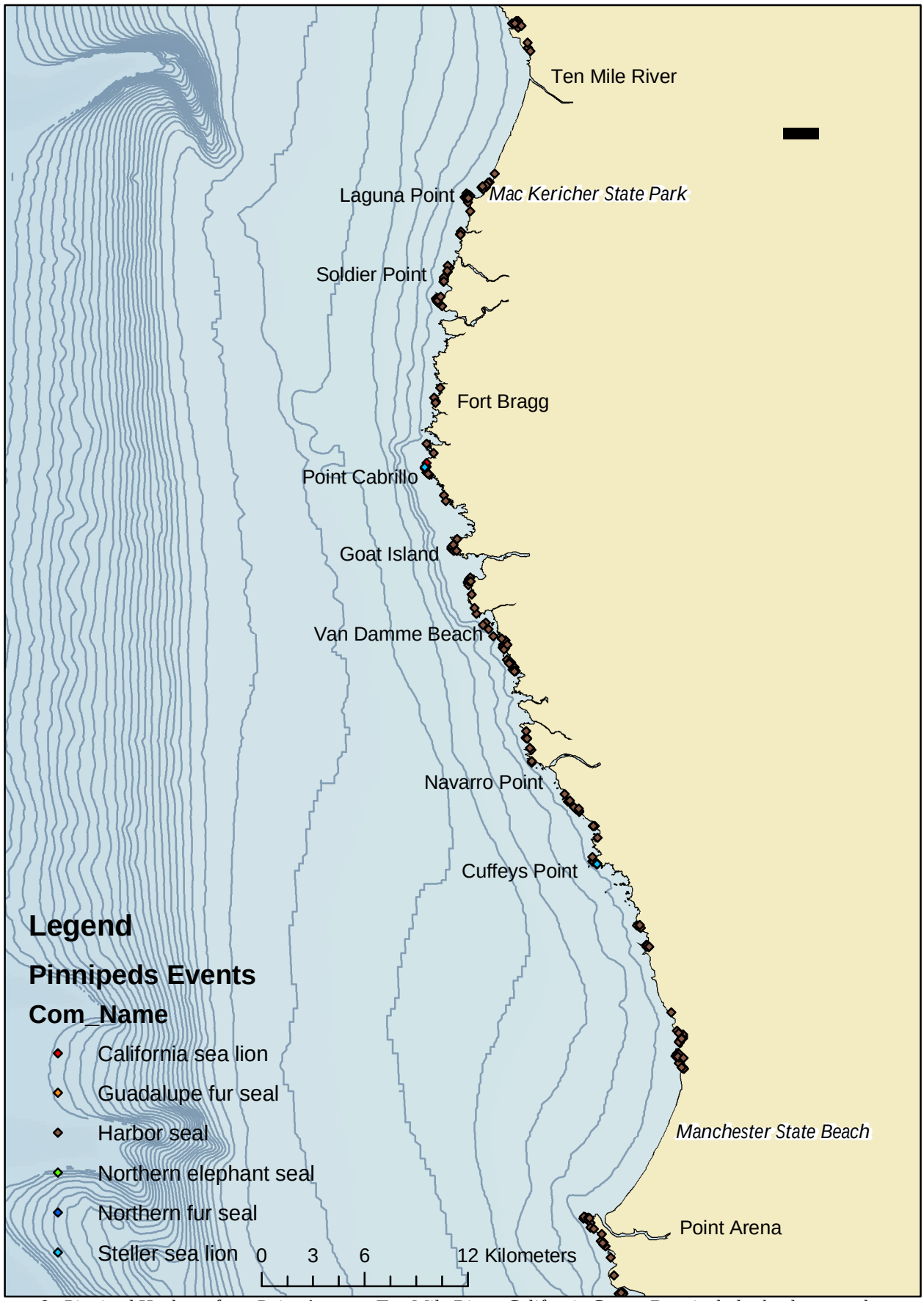


Figure 9. Pinniped Haulouts from Point Arena to Ten Mile River, California Coast. Data includes haul-outs and rookeries surveyed using aerial or ground count methodologies and observations and monitoring results. *Source*: California Pinniped Rookeries & Haul-out Sites. GIS public map. NOAA National Marine Fisheries Service Southwest Regional Office. http://www.swr.noaa.gov/psd/rookeryhaulouts/index.htm


Figure 10. Pinniped Haulouts 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

Joe Mortenson began his ongoing monthly seal counts at the Jenner haulout and Bodega Rock in January 1987, with nearby haulouts added to the counts thereafter. Elinor Twohy began daily counts of seals and people at the Jenner haulout, including photographing the haulout, 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 haulout (Mortenson and Twohy 1994). She also photographed and noted whether the mouth at the Jenner haulout was opened or closed each day. Mortenson and Twohy (1994) previously reported that the Russian River haulout is atypical in terms of the time of year that the peak numbers of harbor seals are present, reporting haulout 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 Russian River haulout is showing seasonal variation more similar to those reported elsewhere with a molting and pupping season peak (Figure 6).

**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 238,000, and growing at a rate of approximately 6.52% annually between 1975 and 2005 (Carretta *et al.* 2007). The population has experienced an annual growth rate of approximately 6% since at least 1975. 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 beaches. 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 mean 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, flat-fish, 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).

Solitary California sea lions were occasionally observed between the river mouth and the Jenner visitor's center during bar-open conditions in the Russian River estuary (Merritt Smith

Consulting 1999 and 2000). A single sea lion was hauled out during post-breaching monitoring on September 6, 2000 (Sonoma County Water Agency and Merritt Smith Consulting 2001). Juvenile sea lions were observed during the summer of 2009 at Patty's Rock by Water Agency staff and members of the public. Regular observation of juvenile 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. During baseline and artificial breaching monitoring in 2009 and 2010, individual California sea lions were observed at the mouth of the Russian River in November and December 2009. Only a single individual was observed hauling out at the Jenner haulout in November 2009. Other individuals were observed in the surf at the mouth of the river or swimming inside the Estuary. More recently a solitary male sea lion was observed hauled out at the river mouth in January and again in December of 2011. 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.

**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$^{o}$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 estimated 35,549 pups born in California in 2005, the California stock was approximately 124,000 in 2005 (Carretta *et al.* 2009). Based on trends in pup counts, northern elephant seal colonies were continuing to grow in California through 2005 (Carretta *et al.* 2009), but appear to be stable or slowly decreasing in Mexico (Stewart *et al.* 1994).

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 in from mid-December through March in dense rookeries on the San Miguel Island, Santa Barbara Island, San Nicolas Islands, 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 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. Censuses of pinnipeds at the mouth of the Russian River have recorded observations of elephant seals at the mouth of the Russian River in May from 1992 to 1995, with occasional records in the fall and winter (Mortenson and Follis 1997). A northern elephant seal subadult, tagged R-1 by Dr. Sarah Allen in August 2003, was present at the Jenner haulout from 2002 to 2007. He was generally present during molt and again from late December through March into the early pupping season. The last known record of elephant seals at the Russian River was a single juvenile elephant seal observed at the Jenner haulout in June 2009.

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

This is a request for an incidental harassment authorization (IHA, Level B harassment) of harbor seals, California sea lions, and northern elephant seals 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, which includes people, vehicles, and heavy equipment on the beach near the haulout and activities in the Russian River estuary near river haulout locations. 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, installation of ground water seepage monitoring wells, monthly topographic surveys of the sandbar at the mouth of the Estuary, geophysical surveys of the jetty and associated structures, boat operation associated with flow circulation and water quality monitoring, and beach-seining and boat operation associated with biological monitoring near haulout locations.

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

The estimates of the number of Pacific harbor seals, California sea lions, and northern elephant seals that may be harassed by the proposed activities is based upon the number of potential

take events associated with Russian River estuary management activities (Table 3) and the average number of individuals of each species that are present at the Jenner haulout during bar-closed conditions (information in response to question 4). 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 15th. The Estuary has remained closed for an extended period of time (greater than 14 days) only on a single event (September 2009) since regular counts of pinnipeds at the Jenner haulout began. It is difficult to estimate the numbers of seals that may be hauled out on the barrier beach when the lagoon is formed; however, 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 haulout in bar-closed, lagoon conditions. Based on pinniped monitoring from 1996 to 2000 associated with artificial breaching events and more recent observations from 2009 and 2010 beach closures 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 from April to November. Because the lagoon outlet channel implementation dates cannot be determined yet (they are dependent on when the barrier beach naturally closes after May 15th), the highest average number of harbor seals presented in Table 5 (July 2010) was used to conservatively estimate the number of seals that may be taken during barrier beach-closed conditions and excavation of the lagoon outlet channel. For maintenance and monitoring activities associated with the lagoon outlet channel, the highest average number of harbor seals for each month (Table 5) was used. Harbor seal numbers from 2009 - 2011 Water Agency twice monthly baseline surveys presented in Table 4 were used to estimate take associated with artificial breaching from December to March as this was the most recent information available for those months. For monthly topographic surveys on the barrier beach it is estimated that only a small percentage (10%) of seals hauled out will be disturbed by this activity. During these surveys two Water Agency personnel walk along the barrier beach with a survey rod. During these surveys a pinniped monitor is positioned at the Highway 1 Overlook in Jenner (Figure 2) and is able to notify the surveyors via radio when any seals on the haulout begin to alert to their presence. At this time the surveyors retreat slowly away from the haulout typically resulting in no disturbance. We do allow for the 10% take estimated in Table 6 for the occasions where a few seals move or flush following their initial alert. The number of seals expected to be encountered is based on the average monthly number of seals hauled out as recorded during baseline surveys conducted by the Water Agency in 2009 -2011 (Table 4). For electromagnetic imaging profiles the estimate of take was calculated similar to that of the topographic surveys described above. The field work for these profiles will be conducted in a similar manner to the topographic surveys with a monitor present. In addition, these imaging profiles will be conducted outside of the harbor seal pupping season, in an effort to reduce disturbance to nursing females and young pups. For biological and physical habitat monitoring activities in the Estuary, it was assumed that pinnipeds may be encountered once per event and flush from a river haulout. 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. 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 (Table 6).

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

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 haulout, and operation of boats and deployment of beach seines near river haulouts. 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; Sonoma County Water Agency and Merritt Smith Consulting 2001). Seals at the Jenner haulout responded most negatively to human disturbances on the beach (typically beach visitors approaching the haulout and the presence of Water Agency crews and equipment near the haulout). The typical pinniped reactions to disturbances observed were alerts (lifting heads towards source of disturbance), moving to a different location on the beach, or flushing into the water. It is not unusual for pinnipeds to remain on or near the haulout during breaching activities, which may indicate that pinnipeds at the Jenner haulout are somewhat tolerant to disturbance (Heckel 1994).

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 Sonoma County Water Agency and Merritt Smith Consulting (2001), and the annual data report for NMFA IHA No. 14426. Mortenson (1996) also discusses harbor seal behavior during the time pups are present. However, water level management activities described in 2009 occurred outside the harbor seal pupping season and so the NMFS IHA No. 14426 data report does not describe pup behavioral responses to Water Agency activities.

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

| Species | No. Animals Expected to Occur | No. Take Events[a] | Potential Total Number of Individual Animals that may be Taken[b,c] |
|---|---|---|---|
| **Lagoon Outlet Channel Management on the Sandbar (May 15 to October 15)** | | | |
| Pacific harbor seal | Implementation: 105[b]<br>Maintenance & Monitoring:<br>May-103; June-100; July-105; Aug-17; Sept-19; Oct-22 | Implementation (May-Sept): 3<br>Maintenance May -1; June-Sept-4/month;Oct-1<br>Monitoring (June-Sept-2/month; Oct-1 | Implementation: 315<br>Maintenance.: 1,089<br>Monitoring: 504<br>TOTAL: 1,906 |
| California sea lion (potential to encounter once per event May-Oct) | 1 | 3 | 3 |
| Northern elephant seal (potential to encounter once per event May-Oct) | 1 | 3 | 3 |
| **Artificial Breaching on the Sandbar (October 16 to May 14)** | | | |
| Pacific harbor seal | Oct: 22<br>Nov: 11<br>Dec:45<br>Jan: 96<br>Feb: 89<br>Mar: 146<br>Apr: 173<br>May: 103 | Oct: 2[d]<br>Nov: 2<br>Dec: 2<br>Jan: 1<br>Feb: 1<br>Mar: 1<br>Apr: 1<br>May: 1<br>11 events maximum | Oct: 44<br>Nov: 22<br>Dec: 90<br>Jan: 96<br>Feb: 89<br>Mar: 146<br>Apr: 173<br>May: 103<br>TOTAL: 763 |
| California sea lion (potential to encounter once per event Oct-Apr) | 1 | 7 | 7 |
| Northern elephant seal (potential to encounter once per event Dec-May) | 1 | 6 | 6 |
| **Topographic Survey of the Barrier Beach** | | | |
| Pacific harbor seal | Jan: 114<br>Feb: 93<br>Mar: 142<br>Apr: 128<br>May: 100<br>June: 134<br>July: 217<br>Aug: 98<br>Sept: 46<br>Oct: 48<br>Nov: 86<br>Dec: 32 | 12 | Jan: 11[e]<br>Feb: 9<br>Mar: 14<br>Apr: 13<br>May: 10<br>June: 13<br>July: 22<br>Aug: 10<br>Sept: 5<br>Oct: 5<br>Nov: 9<br>Dec: 3<br>TOTAL: 124 |
| California sea lion (potential to encounter once per month May-Dec) | 1 | 8 | 8 |

| | | | |
|---|---|---|---|
| Northern elephant seal (potential to encounter in Dec) | 1 | 1 | 1 |
| **Geophysical Survey of the Barrier Beach** | | | |
| Pacific harbor seal | July: 217<br>Aug: 98<br>Sept: 46<br>Oct: 48<br>Nov: 86<br>Dec: 32<br>Jan: 114<br>Feb: 93 | July: 1<br>Aug: 1<br>Sept: 2<br>Oct: 2<br>Nov: 2<br>Dec: 2<br>Jan: 1<br>Feb: 1 | July: 22[e]<br>Aug: 10<br>Sept: 10<br>Oct: 10<br>Nov: 18<br>Dec: 6<br>Jan: 11<br>Feb: 9<br>TOTAL: 96 |
| California sea lion (potential to encounter once per visit May -Dec) | 1 | 10 | 10 |
| Northern elephant seal (potential to encounter in Dec) | 1 | 2 | 2 |
| **Biological and Physical Habitat Monitoring in the Estuary** | | | |
| Pacific harbor seal | 1 | 65 | 65 |
| California sea lion (potential to encounter once per month May-Dec) | 1 | 8 | 8 |
| Northern elephant seal (potential to encounter in Dec) | 1 | 1 | 1 |

[a] *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.*

[b] *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.*

[c] *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*

[d] *The number of events is the monthly average number of artificial breaching events from 1996 to 2010 (Table 1). Based on number of events, the maximum number of artificial breaching events would be 15. The average number of breaching events from 1996 to 2010 is 6 events/year. The number of events was reduced from the data in Table 1 to 1 for the month of April and 1 for the month of May to anticipate the request from NMFS that only a single closure in each of these months be breached if it seemed unlikely that additional closures would occur prior to May 15th. The potential for two closures in the first two weeks of May seems low. The number of artificial breaching events in February was reduced to one because closures in that month occurred only in 2007, which was an unusual circumstance. December was increased from an average of 1 to 2 events because of the recent experience of multiple closures during heavy storm events.*

[e] *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. This figure was chosen based on the fact that the survey crew will retreat away from the haulout at the first sign that seals are alert to their presence. Therefore these numbers are still an overestimate given that the typical survey results in no animals taken.*

The opportunity for mother/pup bonding at the Jenner haulout is not expected to be impacted by implementation of the lagoon outlet channel or artificial breaching activities. The peak of pupping season is likely by mid-May in most years, and implementation of the lagoon outlet channel would begin around May 15th (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 (see Table 1 of the Water Agency's IHA application), and the breaching activities occur in a single day over several hours. Artificial breaching activities are not expected to impact mother/pup bonding. The proposed project would incorporate the mitigation measures included in the NMFS IHA No. 14426, including limiting 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 or 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;
- 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.

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 haulout. Seals at the Jenner haulout 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 included under question 13 below.

During both summer lagoon outlet channel management and artificial breaching activities, Water Agency crews would approach the haulout 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 haulout. Crews on foot would take caution to approach the haulout 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 haulout 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 from 1996 to 2000, pinnipeds typically abandoned the haulout prior to the bulldozer reaching the breaching location due to disturbance from beach visitors prior to crews arriving onsite. Once breaching was completed, equipment and crews left the beach and pinnipeds returned to the haulout soon after.

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

Not applicable.

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

The 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 haulout. When the barrier beach closes, water surface elevations in the Estuary rise, resulting in the haulout increasing in elevation on the beach, as well as flooding of haulouts in the Russian River. For the summer lagoon outlet channel, elevations would range between 4 and 9 ft NGVD with a target of 7 ft. For artificial breaching activities, the sandbar would be breached when water surface elevations ranged from 4.5 and 7 ft 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 15th to October 15th.[5] The gentle slope of the outlet channel would allow seals to travel through the channel, although the shallow depths (0.5 to 2 ft.) 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 15th to October 15th. After October 15th, 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 be constructed in areas where seals typically haul out.

[5] The lagoon management period is May 15th to October 15th, as described in the Russian River Biological Opinion (NMFS 2008).

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 runup 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 short increase in the number of seals at the haulout) and then increased the day following an artificial breaching event (Merritt-Smith Consulting 1997, 1998, 1999, and 2000; Sonoma County Water Agency and Merritt Smith Consulting 2001, Sonoma County Water Agency 2011). This response to barrier beach closure followed by artificial breaching is anticipated to continue. However, less information is available regarding the number of pinnipeds that use the haulout during extended sandbar closure in the lagoon management period (May 15$^{th}$ to October 15$^{th}$) or when a perched lagoon and outlet channel are established. 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 haulout declines from August to October, so management of the lagoon outlet channel would have little effect on haulout use. This was the general observation in the fall of 2009 and 2010. The late spring and early summer (May, June, and July), which coincides with pupping season and the likely initiation of lagoon management (following a closure in this time period), may be the most sensitive time period. Pinniped monitoring in 1997 represented some of the longest beach closures in the late spring and early summer months (7 to 11 days). The number of pinnipeds at the haulout varied during the course of the barrier beach closure. Numbers of pinnipeds declined, but then increased, and declined again during the closure and then increased following artificial breaching during each of the spring and early summer sandbar closures in 1997 (Merritt-Smith Consulting 1998). This may indicate that seals present at the haulout during the pupping season are unlikely to completely abandon the haulout from May to July. The outlet channel is anticipated to provide access into the lagoon and to the ocean for pinnipeds at the Jenner haulout. 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 haulout would continue to be used by harbor seals.

Installation of the ground water seepage monitoring wells on the barrier beach at Goat Rock State Park for the jetty study will take place south of the jetty wall and therefore will not alter the beach where pinnipeds are typically found (Figure 5). Additionally, once the wells are in place they will be capped and buried below the sand in an effort to limit any human interference with the wells and to minimize their physical impact on the beach. The noise generated from the drill rig is estimated to be 85-90 db at a distance of 20 ft. The safe

threshold of received noise levels in air for pinnipeds, as defined by NFMS, is 90 dB (Ben Laws pers. com.) Given that known pinniped haulouts are located greater than 200 ft from the location of the wells, the anticipated received noise levels will be below the safe threshold for disturbance.

Geophysical imaging surveys would not physically alter pinniped habitat. Biological and water quality monitoring would not physically alter pinniped habitat.

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

The modifications of habitat described previously under question 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, or the U.S. stock of California sea lion. Habitat modification effects would be limited to the Jenner haulout at the mouth of the Russian River.

Changes in haulout 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 haulout in bar-closed, lagoon conditions.

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

During both summer lagoon outlet channel management and artificial breaching activities, Water Agency crews would approach the haulout 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 haulout. Crews on foot would take caution to approach the haulout 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 haulout 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 haulout. Boats operating near river

haulouts would be kept within posted speed limits and driven as far from the haulouts as safely possible to minimize flushing seals.

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

Not applicable

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

Please see the attached "Russian River Estuary Management Activities Pinniped Monitoring Plan."

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

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.

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