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December 5, 2008

M&A# 08-132-02

Sheila Henika
Cabrillo Power I LLC
Encina Power Station
4600 Carlsbad Boulevard
Carlsbad, CA 92008-4301

Re: Pre-dredge eelgrass survey in support of the Encina Power Station, Agua Hedionda 2009 Dredging Project at Agua Hedionda Lagoon (Outer Lagoon), Carlsbad, CA

Dear Sheila,

PURPOSE AND INTRODUCTION

Merkel & Associates Inc. (M&A) has been retained by Cabrillo Power I LLC (Cabrillo Power) to perform pre-construction and post-construction eelgrass surveys for the maintenance dredging operations in the Outer Lagoon at Agua Hedionda Lagoon in Carlsbad, CA (Figure 1). The dredging is part of an ongoing effort by Cabrillo Power to prevent intruding sands from forming sandbars in the Outer Lagoon. The work is being performed under U.S. Army Corps of Engineers permit number 200100328-SKB. The permit was issued October 21, 2002 and is valid for 10 years. The permit allows maintenance dredge operations to impact eelgrass within the 13.1-hectare (32.4-acre) area dredge limits delineated in the permit. Dredged sand will be discharged along the beach on the north and south sides of the Agua Hedionda Lagoon entrance jetty. Sand will be placed as far north as Oak Street and as far south as Cannon Road, where the beach ends.

The purpose of this report is to provide information regarding the pre-dredge distribution of eelgrass in the Outer Lagoon and control area. The survey work was completed in conformance with the Southern California Eelgrass Mitigation Policy (SCEMP) (NMFS 1991, revision 11).

PROJECT STUDY AREA

Agua Hedionda Lagoon is a 95.1-hectare (235-acre) coastal estuary located within the City of Carlsbad, in northern San Diego County, California. The Outer Lagoon is approximately 21.5 hectares (53.1 acres) and generally ranges in depth from -34 feet MLLW at the channel mouth just west of the railroad trestle, to about 0 feet MLLW along the top edge of the sandbar in the northern portion of the lagoon. Most of the proposed dredging is anticipated to target the sandbar in the northern portion of the lagoon. However, some level of maintenance dredging is expected to occur in other portions of the lagoon within the permitted dredge limits as well.

The Middle Lagoon was surveyed to act as a control site for the project. This control site is 9.5 hectares (23.5 acres) and serves to compare changes in eelgrass coverage in a non-dredging impact area.

SURVEY METHODOLOGY

The pre-construction survey of the Outer and Middle Lagoons was conducted on November 26, 2008 by M&A staff Robert Mooney, Seth Jones and Kees Schipper. The surveys consisted of eelgrass areal coverage and density investigations within the study and control areas (Figure 2). Data were collected using a side-scan sonar operating at 600 kHz scanning out 20 meters on both the starboard and port channels for a 40-meter wide swath. All data were collected in latitude and longitude using the North American Datum of 1983 (NAD 83), converted to the Universal Transverse Mercator system in meters (NAD 83), and plotted on a geo-rectified aerial image of the project site.

Following completion of the surveys, side-scan sonar traces were joined together and geographically registered. Eelgrass was then digitized as a theme over the aerial image to calculate the amount of eelgrass coverage and plot its distribution. This method of eelgrass distribution calculation allows for monitoring eelgrass trends at the project site with a substantial degree of accuracy and repeatability over time.

A SCUBA diver verified the side-scan data and measured the density of actively growing leaf shoots by conducting shoot counts within a 1/16-m² quadrat. Twenty replicate quadrats were randomly placed within the eelgrass beds of the study and control areas to obtain a mean shoot density for the eelgrass beds.

PRE-CONSTRUCTION EELGRASS SURVEY RESULTS

The pre-construction survey revealed a total of 32,650 square meters (8.07 acres) of eelgrass growing within the Outer Lagoon (Figure 2). The survey showed eelgrass occurring between 0 to -12 feet MLLW. Most eelgrass was located near and along the shoreline in the central and southern portions of the lagoon. In most of the Outer Lagoon, the bottom quickly descends to below -12-feet MLLW, restricting eelgrass to shallow shoreline areas. The notable exceptions to this trend are the beds occurring in shallow water near the northernmost mussel racks in the southeastern portion of the lagoon and the beds in the southwestern portion of the lagoon that occur on a shallow bench that extends bayward from the western shoreline. Eelgrass density within the Outer Lagoon was 206 ± 125 shoots per square meter (n=20). The eelgrass was dense, appeared healthy, and supported a slight epiphytic load.

The control site in the Middle Lagoon was determined to have 46,531 square meters (11.5 acres) of eelgrass coverage (Figure 2). The eelgrass shoot density in the control area was 126 ± 52 shoots per square meter (n=20). The grass was healthy in appearance, and more widely distributed than in prior years (M&A 2006).

IMPACT ANALYSIS

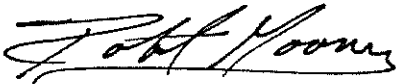
Provided that dredging activities are confined to the area within the dredge limits, the proposed dredging will not adversely affect the adjacent eelgrass resources. In the southern portions of the lagoon, dredge and assist vessels should anchor within the dredge limits to ensure minimal impact to adjacent eelgrass beds. Also, no potential impacts to eelgrass are anticipated due to the discharging activities at the beaches.

The only eelgrass likely to be directly impacted is 23 square meters of eelgrass within the dredge limits. Eelgrass within the dredge limits has been previously mitigated for and can be impacted as per the current permit.

Dredging is permitted to occur between September 15, 2008 and April 15, 2009. Dredging is expected to begin in December 2008. After the dredging is complete, a post-dredge survey will be performed using the same methods described in this report. Once the survey is completed, a comparison will be made between the pre- and post-dredge surveys to determine if there has been a loss of eelgrass outside of the permitted limits due to the dredging.

If you have any questions or need additional information, please do not hesitate to contact me at (858)-560-5465.

Sincerely,

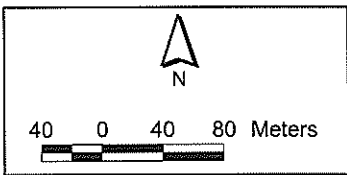
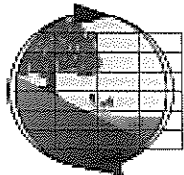
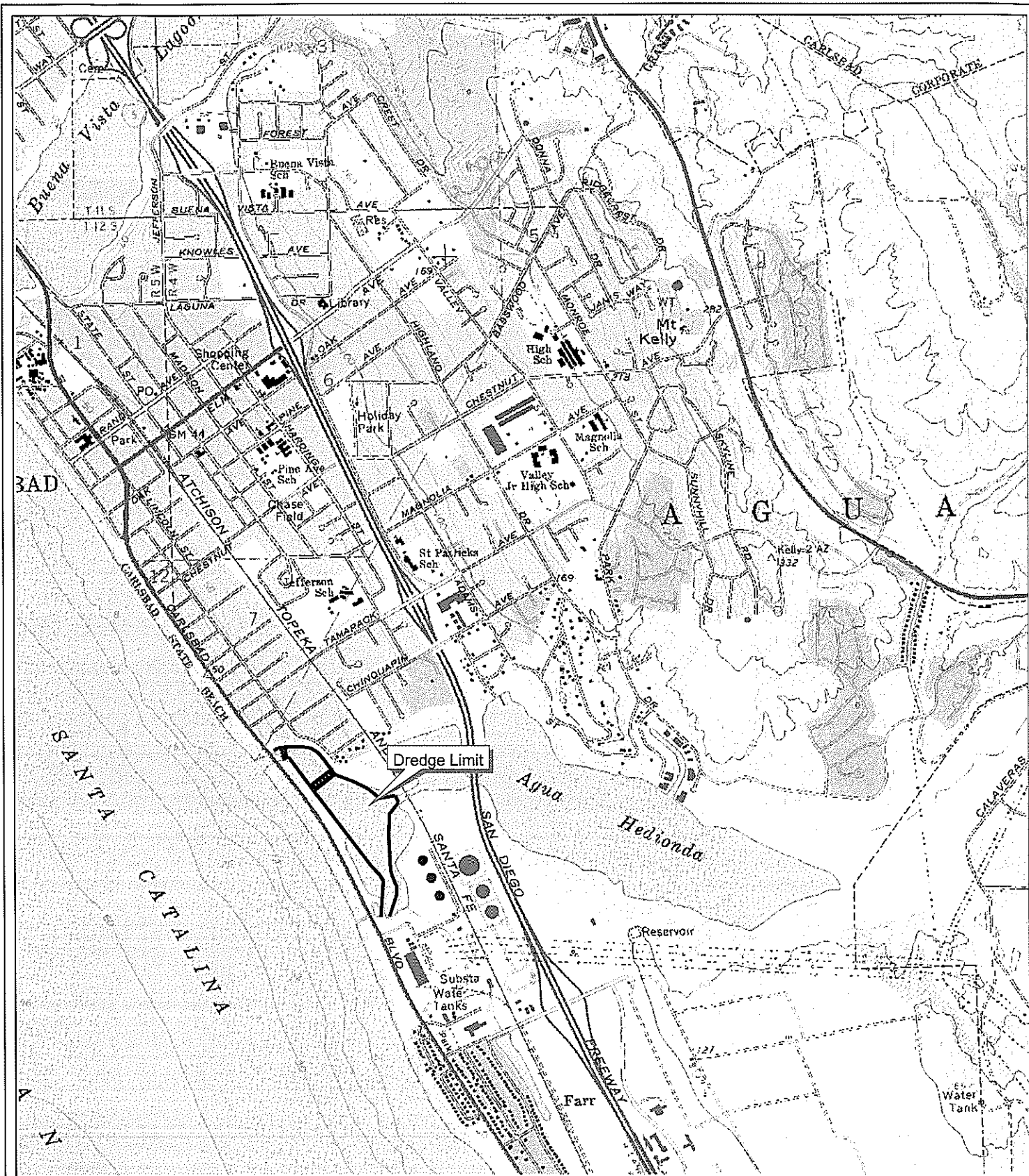


Robert Mooney, Ph.D.
Senior Biologist

REFERENCES

National Marine Fisheries Service. 1991. Southern California Eelgrass Mitigation Policy. R.S. Hoffman, ed. (1991, as amended, Version #11)

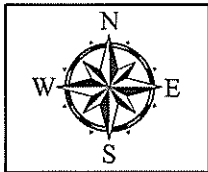
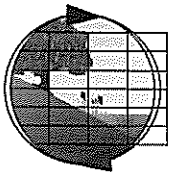
[M&A] Merkel & Associates. 2006. Pre-dredge eelgrass survey in support of the Encina Power Station, Agua Hedionda 2007 Dredging Project at Agua Hedionda Lagoon (Outer Lagoon), Carlsbad, CA. Letter Report; December 15, 2006.



Project Vicinity Map
 Agua Hedionda Lagoon Pre-Dredge Eelgrass Survey

Image Source: USGS San Luis Rey, CA 7.5' Quadrangle

Figure 1



Pre-dredge Eelgrass Survey
Agua Hedionda Lagoon

Figure 2