

## Tide and Water levels

In accordance with Attachment #7, dated October 1, 1998 of the Project Instructions, the existing primary tide station at Port Chicago, California (941-5144) was used for the survey. DEA installed a subordinate tide station at Antioch, California (941-5064).

Station Number	Station Name	Latitude	Longitude
941-5144	Port Chicago, CA	37° 03.4' N	122° 02.3' W
941-5064	Antioch, CA	38° 01.11' N	122° 48.95' W

Three tide zones were established on Sheet F as specified by section 1.2.1 of the project instructions. The time corrector and ratio was based on data from the Port Chicago Station. Zone information is listed below.

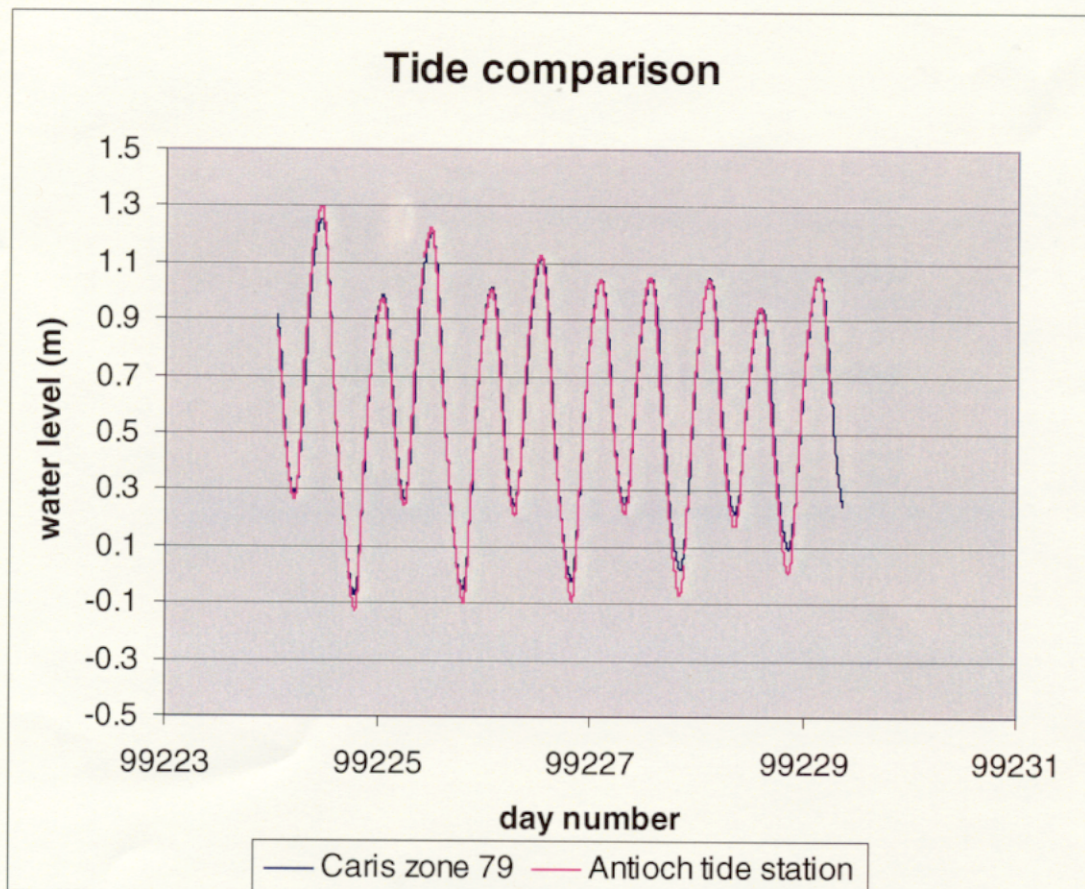
Tidal Zone	Time Corrector	Height Corrector Ratio
SF 77	+72 min	.80
SF 79	+78 min	.76
SF 90	+90 min	.73

Due to the placement of the gauge within the survey limits and upon analysis of hill shaded multibeam data, tides from the Antioch gauge did not require zoning.

During survey operations, the real-time unverified tide data was downloaded from the Ocean and Lake Levels Division of the NOS web page. The tides were zone corrected and used during initial processing of the data with the ISS-2000 Geoswath data cleaning.

For final processing and data verification, water levels from the Antioch tide gauge were used. The gauge at Antioch recorded data on six-minute intervals throughout the survey period, and operated for an additional 60-day period after the survey for datum recovery. See Appendix D for a complete analysis of the tide station data, level history and datum calculations. The Antioch tide data was reviewed for fliers and data points with a high standard deviation or showed a high incidence of outliers. These data were eliminated from the data set. On average, about four data points per survey day were eliminated. At no time were two points, or 12 minutes of data, eliminated successively. The data fliers occurred randomly and at all stages of the tide.

Data from the Antioch tide station was compared with zoned tide data from the Port Chicago station. Using tidal zone information from the SOW, Caris was used to calculate the water level in the survey area. The zoned data from Caris resulted in lower highs and higher lows than the observed data from the local tide gauge. Differences of less than 10 cm can be seen on the high and low tide. Slight time variations are also evident. However, the close relationship between the two stations provides confidence that the two independent stations are working correctly. Below is a graph of the data from the two tide stations during the survey period.



The Port Chicago and Antioch tide stations experienced no down time during periods of hydrographic survey. All data was successfully retrieved and is included on tape #1 with the processed data.