# Suisun Bay and Delta Bathymetry

## United States Geological Survey

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The grid we have developed extends 9 km inland of Mare Island and 10 km from Sacramento south to Mossdale, nearly 100 million cells. The addition of this digital map will allow analysis and understanding of the Delta's complex hydrology and ecosystem. Improvements remain to be done and below we have pointed out some of the limitations of the analysis.

*New analytical tool*

The production of an accurate 10m grid of depth provides a database for rapid analysis of volume and area properties that was previously unavailable or based on gross approximations. In addition to providing an easy access to any cross section, with this grid, the surface areas and volumes for any channel or region of the Delta can be computed.

Table 1 - Volume and area for various regions of the Delta. Water level 0.0 meters NGVD.

| Region | Area (Mm2) | Volume (Mm3) | % Area water depth <= 2m | % Volume water depth <= 2m |
|---|---|---|---|---|
| **Suisun Bay** | 165 | 954 | 30.9 | 7.2 |
| **North Delta** | 74 | 407 | 17.2 | 3.4 |
| **Central Delta** | 66 | 267 | 27.5 | 8.8 |
| **South Delta** | 10 | 28 | 38.8 | 15.6 |
| **Total** | 316 | 1656 | 27.2 | 6.7 |

*Sources of Error*

- **Data Accuracy -** Inconsistent survey-to-survey accuracy, is probably the greatest source of grid error. Within a survey, the depth precision is on the order of one foot or less under optimal conditions. However, between surveys adjacent track lines collected one or two years apart commonly have 2-3 ft differences in depth. We could not develop a systematic rational to accept one dataset over the other. Inconsistencies do not persist for the entire survey and furthermore the differences could be real due to the dynamic nature of seasonal deposition and the migration of sand waves. When these track lines were parallel to each other and perpendicular to the main channel these inconsistencies can generate artificial ripples or channel networks during the gridding process.

- **Datum Adjustment -** The datum adjustment from MLLW to NGVD ranges from -0.8 to +2.2ft. A correction surface was developed by DWR based on 28 tidal benchmarks (Figure 14). This correction surface (Figure 15) has some sharp gradients around Three Mile Slough and would benefit from some additional control points around the confluence of the Sacramento and San Joaquin Rivers.

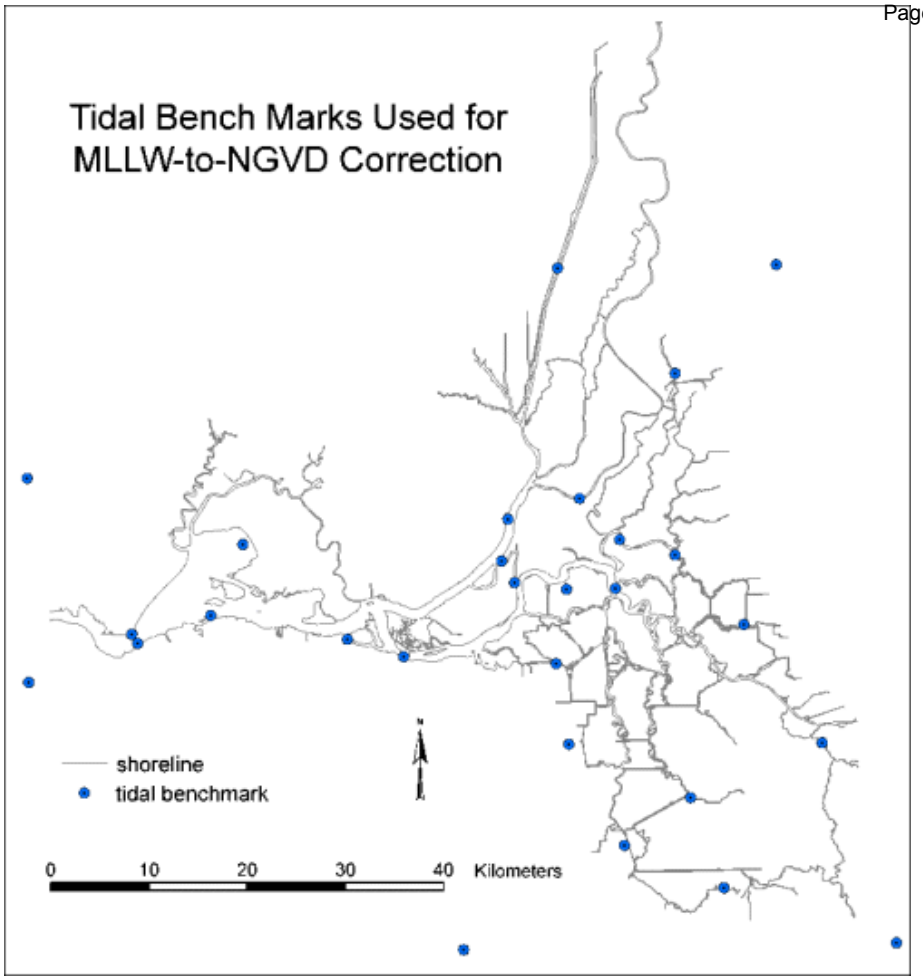


**Figure 14 - Tidal Benchmark used for MLLW to NGVD datum adjustment.**

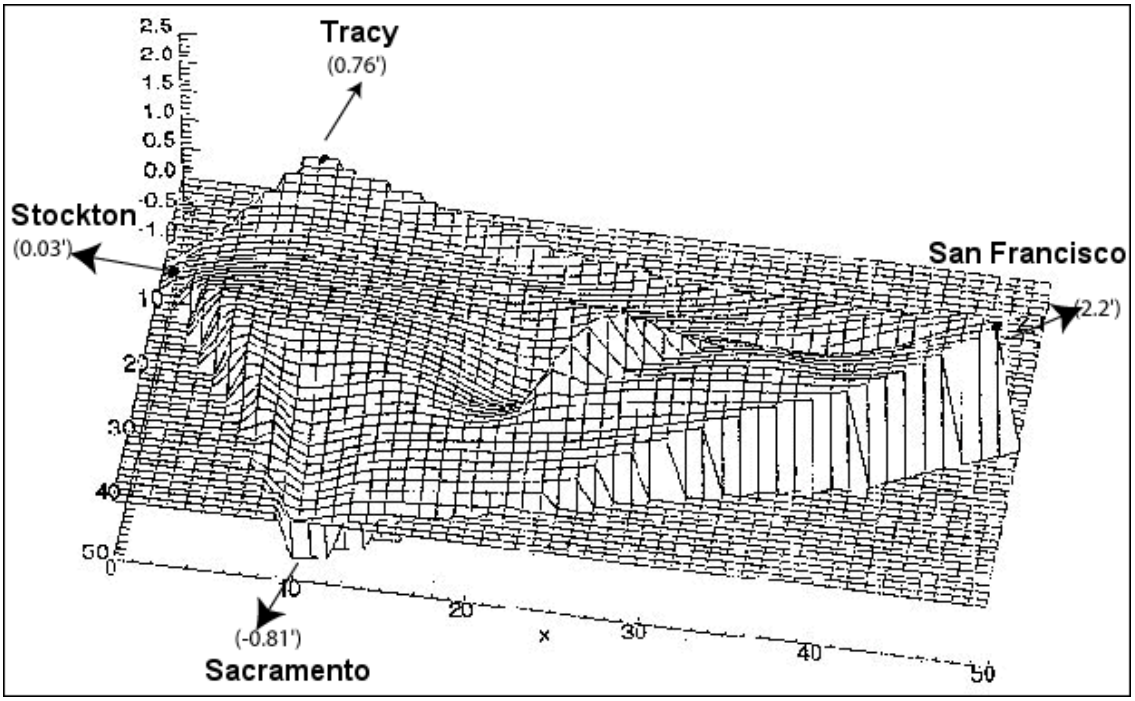


**Figure 15 - Datum adjustment surface for converting MLLW tidal datum to NGVD.**

- **Grid resolution -** given that each cell is a 'best estimate' of the mean depth within the cell, narrow channels have a greater error in the grid estimate of cross-section area (see cross-section 6 in the Results section).

*Suggested Additional Work*

- **Update Datum -** New Control Points and soundings will most likely be collected using GPS, NAV88 vertical datum. All soundings collected since 1980 should be converted to the new vertical datum.

- **Old and Sparse Data -** Additional soundings are needed in areas of sparse or outdated soundings (see Figure 16).

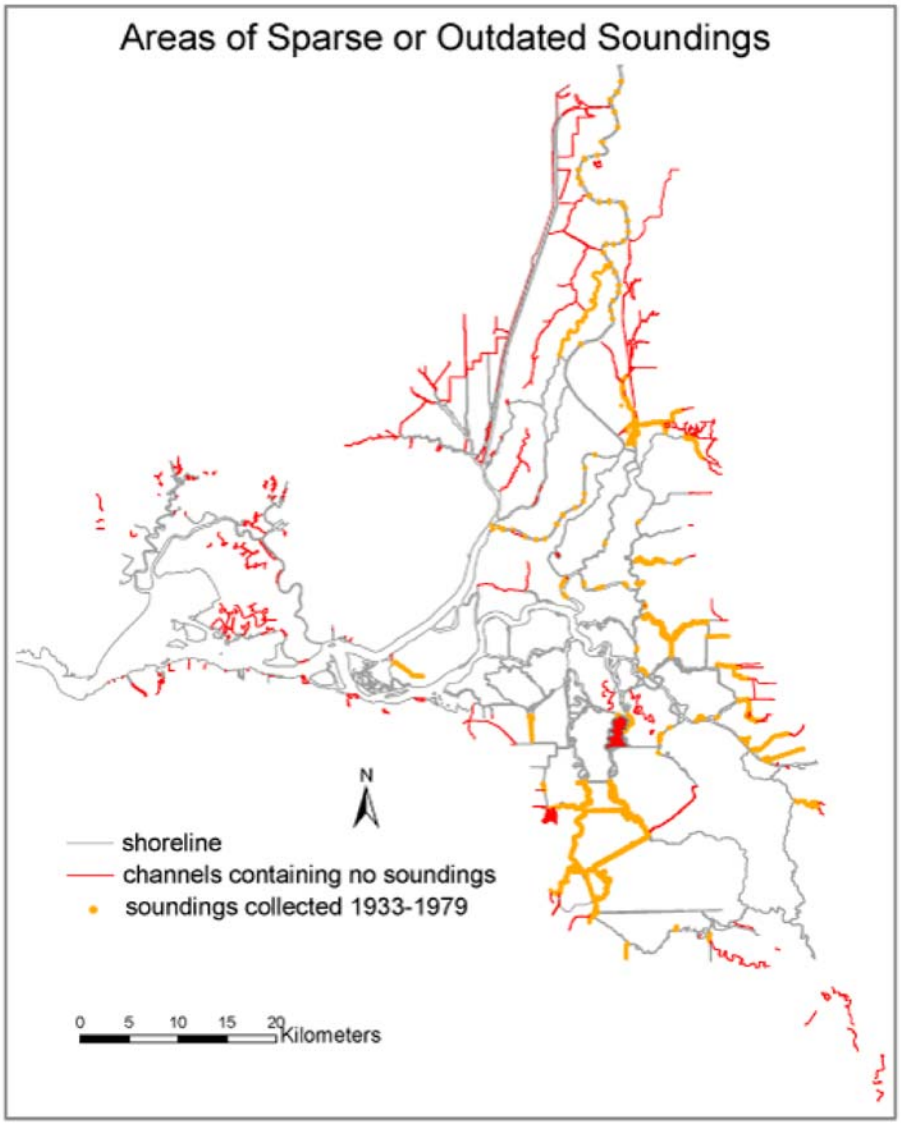


**Figure 16 - Channels needing additional or new soundings.**

- **Other Datum -** Develop grids for other datum which may be significant for ecological or hazard analysis (eg. MLLW, MHHW)

- **Software Tools -** A grid on demand system that would allow specification of cell size and orientation of cells to optimize/minimize the number of cells needed to describe a channel.

- **Island and Marsh Elevations -** In order to fully utilize the grid, allow hazard assessment, define potential flood volumes, channel carrying capacity at high flow, etc. the elevation of marsh and agricultural islands should be defined.

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URL:http://sfbay.wr.usgs.gov/sediment/delta/conclusions.html
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