



**A product of the San Francisco Estuary Institute  
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**Flood Control 2.0 Sediment Loads Data Final Database Metadata**

This metadata document is to accompany the "Sediment loads data SFEI Mar2017.xls" which was produced by SFEI staff (Sarah Pearce, Carolyn Doebling, Lester McKee, Pete Kauhanen, and Scott Dusterhoff). This metadata document was completed by Sarah Pearce, March 2017.

A description of the data for each column in the database is found below:

- 1) Name- In alphabetical order, the name of all 33 creeks that were included in this component of the project.
- 2) County- The county in which the creek is located.
- 3) Watershed area upstream of Head of Tide (HOT) (km<sup>2</sup> or mi<sup>2</sup>)- The watershed area that drains to the head of tide location. The watershed areas are based primarily upon the boundaries created for SFEI's Proposition 13 project, for the footprint where they exist, the East Bay, South Bay, and Peninsula (which include the Oakland Museum's creek and watershed map series boundaries). For the North Bay and Marin, the watershed boundaries are based primarily upon topography, derived in ArcGIS using USGS 10m DEMs, and BAARI stream mapping. The boundaries from the HOT position on the creek, to the adjacent watershed boundaries were created by hand, using topography, BAARI streamline mapping, and general knowledge of stormdrain systems. There is likely some error in the placement of these short boundary segments, but not likely causing significant differences in the resultant watershed areas. These watershed boundaries should be used with caution, and only for planning purposes.
- 4) Watershed area upstream of gauge (km<sup>2</sup> or mi<sup>2</sup>)- The watershed area that drains to the flow or sediment gauge location. Most gauges are operated by the USGS, and have locations and watershed areas reported on-line. A few gauges are locally operated (e.g. by SFEI or Balance Hydrologics) and have locations reported by GPS lat/long, with watershed area calculated in ArcGIS.
- 5) Area upstream of dams (km<sup>2</sup> or mi<sup>2</sup>)- The watershed area upstream from major reservoirs in each watershed. Note, some watersheds do not have a reservoir. Smaller impoundments such as stock ponds are not included. The watershed area draining to the dam was calculated in ArcGIS.
- 6) Free-flowing watershed area upstream of gauge (or HOT if no gauge) (km<sup>2</sup> or mi<sup>2</sup>)- The total watershed area that flows to the stream gauge location (or to the HOT location if no gauge exists in that watershed) that is downstream from any major dams. This was calculated in ArcGIS by taking the watershed area upstream from the gauge, and removing the watershed area upstream of the dams.

- 7) Free-flowing watershed area upstream of HOT (km<sup>2</sup> or mi<sup>2</sup>)– The total watershed area that flows to the HOT location that is downstream from any major dams. This is very similar to the previous column.
- 8) HOT description- A verbal description of the Head of Tide (HOT) location, sometimes relating to the channel station (distance measure) maintained by the local flood control district.
- 9) HOT latitude- The latitude of the HOT location, in decimal degrees, calculated in ArcGIS. NAD83 datum.
- 10) HOT longitude- The longitude of the HOT location, in decimal degrees, calculated in ArcGIS. NAD83 datum.
- 11) Tidal Channel length from Bay to HOT (meters or feet)- The length of the channel from the HOT location to the confluence with San Francisco Bay.
- 12) Total Flood Control Channel Area (m<sup>2</sup> or ft<sup>2</sup>)- The channel area between the channel confluence with San Francisco Bay and the top (upstream most) portion of constructed or maintained flood control channel. This was calculated by taking the channel length for the tidal and the fluvial portions, and multiplying by an average width (three measurements made in Arc GIS) for the tidal portion and the fluvial portion.
- 13) Estimated Fluvial Flood Control Channel Area (m<sup>2</sup> or ft<sup>2</sup>)- The channel area from the HOT location to the top (upstream most) portion of constructed or maintained flood control channel. Calculated as described above.
- 14) Estimated Tidal Flood Control Channel Area (m<sup>2</sup> or ft<sup>2</sup>)- The channel area from the confluence with San Francisco Bay upstream to the HOT location. Calculated as described above.
- 15) Total Flood Control Channel Area (km<sup>2</sup> or mi<sup>2</sup>)- The channel area between the channel confluence with San Francisco Bay and the top (upstream most) portion of constructed or maintained flood control channel. This was calculated by taking the channel length for the tidal and the fluvial portions, and multiplying by an average width (three measurements made in Arc GIS) for the tidal portion and the fluvial portion.
- 16) Estimated Fluvial Flood Control Channel Area (km<sup>2</sup> or mi<sup>2</sup>)- The channel area from the HOT location to the top (upstream most) portion of constructed or maintained flood control channel. Calculated as described above.
- 17) Estimated Tidal Flood Control Channel Area (km<sup>2</sup> or mi<sup>2</sup>)- The channel area from the confluence with San Francisco Bay upstream to the HOT location. Calculated as described above.
- 18) Historical Connection- The type of fluvial-tidal interface that the channel had with the historical baylands. This is further described in Chapter 2 and in “How Creeks Meet the Bay”  
<http://storymaps.sfei.org/flood-control/>
- 19) Contemporary Connection- The type of fluvial-tidal interface that the channel currently has with the baylands. See also: <http://storymaps.sfei.org/flood-control/>
- 20) Full record (calendar years)- The years for which that creek has sediment removal, deposition or other data, or as-built survey data. These years represent the period of record for that creek. The record often begins with the construction of the channel or the first sediment removal event.
- 21) Length of Record (number of years)- The total number of years within the Full Record.
- 22) Average Annual Sediment Load 1957-2013 (metric tonnes or US tons)- The average annual sediment load from each watershed, using a combination of measured and estimated sediment and flow records. Detailed methodology for each watershed can be found in the “Total sediment loads estimates methodology narratives” document.
- 23) Average Annual Sediment Load full record (metric tonnes or US tons)- The average sediment load from each watershed for the full record of data for that creek (see Full Record). This data uses a combination of measured and estimated sediment and flow records. Detailed

methodology can be found in the “Total sediment loads estimates methodology narratives” document.

- 24) Average Annual Sediment Load 2000 - 2013 (metric tonnes or US tons)- The average sediment load from each watershed for only these years, using a combination of measured and estimated sediment and flow records. Detailed methodology can be found in the “Total sediment loads estimates methodology narratives” document.
- 25) Free-flowing Sediment Yield to HOT, full record (metric tonnes/ km<sup>2</sup>/ yr or US tons/ mi<sup>2</sup>/ yr)- The total sediment load for the full record of data for each creek, normalized to the free-flowing watershed area that drains to the head of tide location, and divided by the number of years in the full record.
- 26) Free-flowing Sediment Yield to HOT, 2000-2013 (metric tonnes/ km<sup>2</sup>/ yr or US tons/ mi<sup>2</sup>/ yr)- The total sediment load from 2000-2013, normalized to the free-flowing watershed area that drains to the head of tide location, and divided by 14 years (2000-2013).
- 27) Total Sediment Removal, full record (CY)- The total volume of sediment that has been removed and recorded from each flood control channel, for the full record number of years for each creek.
- 28) Sediment Removal, Fluvial full record (CY)- The total volume of sediment that has been removed and recorded from only the fluvial portion (upstream of HOT) of each flood control channel, for the full record number of years.
- 29) Sediment Removal, Tidal full record (CY)- The total volume of sediment that has been removed and recorded from only the tidal portion (downstream of HOT) of each flood control channel, for the full record number of years.
- 30) Total Sediment Removal, 2000-2013 (CY)- The total volume of sediment that has been removed and recorded from each flood control channel, for only the years 2000-2013.
- 31) Sediment Removal Fluvial, 2000-2013 (CY)- The total volume of sediment that has been removed and recorded from only the fluvial portion (upstream of HOT) of each flood control channel, for only the years 2000-2013.
- 32) Sediment Removal Tidal, 2000-2013 (CY)- The total volume of sediment that has been removed and recorded from only the tidal portion (downstream of HOT) of each flood control channel, for only the years 2000-2013.
- 33) Total Sediment Removal per unit flood control channel area (CY/km<sup>2</sup> or CY/mi<sup>2</sup>)- The total recorded amount of sediment removal that has occurred in each flood control channel, divided by the total flood control channel area.
- 34) Annual Sediment Removal Fluvial per Unit Area, full record (CY/km<sup>2</sup>/yr or CY/mi<sup>2</sup>/yr)- The total recorded amount of sediment removal that has occurred in only the fluvial (upstream of HOT) portion of each flood control channel, divided by the area of the fluvial portion of the channel, and divided by the number of years in the full record.
- 35) Annual Sediment Removal Tidal per Unit Area, full record (CY/km<sup>2</sup>/yr or CY/mi<sup>2</sup>/yr)- The total recorded amount of sediment removal that has occurred in only the tidal (downstream of HOT) portion of each flood control channel, divided by the area of the fluvial portion of the channel, and divided by the number of years in the full record.
- 36) Percent of Total Removal that is Fluvial, full record- For the full record of years for each flood control channel, the percentage of total sediment removal that occurred in the fluvial portion (upstream of HOT).
- 37) Percent of Total Removal that is Tidal, full record- For the full record of years for each flood control channel, the percentage of total sediment removal that occurred in the tidal portion (downstream of HOT).
- 38) Years of Recorded Removal Events- A list of each year when a sediment removal event occurred.

- 39) Number of Years with Removal Events, full record- The total discrete number of years that had a sediment removal event occur.
- 40) Removal Frequency, full record (years)- The average frequency of removal in the past, in bins: 1-5 years, 5-15 years, or responsive to need. In some instances, the frequency has changed through time; here the most recent frequency was chosen.
- 41) Total Recorded Sediment Removal Costs (unadjusted dollars)- The total costs of removal that were recorded for each creek. For some creeks, volumes of sediment removal were recorded, but the cost was not; this column is only the recorded costs. The dollar amount has not been adjusted to 2016 dollars.
- 42) Total Extrapolated Sediment Removal Costs (using \$25.20/CY) (unadjusted dollars)- For removal events that did not have cost data recorded, an estimated cost was produced, using \$25.20 per CY, which is the average cost per CY for all of the recorded data. By combining these estimates along with the recorded data, the total sediment removal costs for each creek was calculated.
- 43) Average Annual Estimated Removal Cost per Channel area, full record (unadjusted dollars/km<sup>2</sup> of flood control channel or unadjusted dollars/mi<sup>2</sup> of flood control channel)- For the full record of data for each creek, the total extrapolated sediment removal costs were divided by the Total Flood Control Channel Area, and divided by the number of years in the record. Again, the costs have not been adjusted to 2016 dollars.
- 44) Removed sediment fate- The location where sediment was placed after it was removed from a flood control channel.
- 45) Total Deposition, full record (CY)- The total amount of deposition that has occurred in the flood control channel during the period of record for each creek. This does not, however, represent the total net deposition that has occurred; that is, it is not the total amount of sediment that is currently stored in the channel. Often the data only covers a portion of the temporal or spatial deposition that has occurred. This data also sometimes includes sediment that has since been removed.
- 46) Total Fluvial Deposition, full record (CY)- The total amount of deposition that has occurred in the fluvial portion of the flood control channel during the period of record for each creek. Like above, it does not represent the total net deposition.
- 47) Total Tidal Deposition, full record (CY)- The total amount of deposition that has occurred in the tidal portion of the flood control channel during the period of record for each creek. Like above, it does not represent the total net deposition.
- 48) Grainsize- Qualitative data (either fine or coarse) for both the fluvial and tidal portions of each flood control channel. However, many channels did not have any data.
- 49) Data Sources- The people in City, County, Flood Control Districts, or consulting firms that were interviewed or provided data on each channel. Also, the reports or other data sources that provided information or data.