1. Introduction
On May 3, 2017, Stetson Engineers, with the assistance of MCFCD staff, conducted sediment thickness measurements along the Corte Madera Creek Concrete Channel. This measurement fieldwork was conducted as a follow-up to previous field measurements by Stetson on May 23, 2015, November 19, 2015, and by the USACE on April 5, 2016. The purpose was to measure and compare sediment quantity and composition and provide insight into the persistence of sediment deposits in the concrete channel during high flow events. During the ebb tide and working in the downstream direction, Stetson measured sediment depths in 2015 and/or 2017 along eight transects at the following river stations: 34600 (2017 only), 34400, 33600, 33160 (2017 only), 32900 (2015 only), 32700 (2017 only), 32338, and 31935 (Figure 1).

2. Method
Sediment measurements were conducted by locating a horizontal transect, tying off a rope and tape measure to fixed points on either side of the channel, and measuring sediment depths using an 8-foot metal wading rod with a 3-inch metal disk footing. Three measurements, referenced to the water surface, were collected at each sampling point along each transect.

Depth to “soft (fine) sediment:” First, the wading rod, with the disk footing, was lowered to the bottom until it was just resting on the sediment surface. [Note: Soft sediment deposits measured in 2017 were significantly less than observed in 2015.]

Depth to “underlying (coarse) sediment:” Second, the wading rod with the footing was manually pushed down through the soft sediment until the rod hit refusal.

Depth to “rod refusal:” Third, the rod, without the foot was manually pushed through the underlying sediment to the point of refusal at the concrete bottom.

The distance to the water surface from the top of the concrete wall at each station (where elevation is known) was measured before and after each transect measurement and used to convert the sediment depth measurements to elevations.

3. Results
3.1. Comparison of Sediment Depths
The following graphics (Figures 2-9) compare the 2015 and 2017 measured sediment elevations at each transect. Figure 10 and Table 1 compares the longitudinal sediment elevation profiles (coarse sediment only; averaged over the transect) between these two
measurements. Figure 10 also shows another two measurements, i.e., the measurement by Stetson on May 23, 2015 and the measurement by ACOE on April 5, 2016.

Figure 1  Sediment survey locations
Figure 2  Sediment comparison between Nov 2015 and May 2017: RS 34600

Figure 3  Sediment comparison between Nov 2015 and May 2017: RS 34400
Figure 4  Sediment comparison between Nov 2015 and May 2017: RS 33600

Figure 5  Sediment comparison between Nov 2015 and May 2017: RS 33160
Figure 6  Sediment comparison between Nov 2015 and May 2017: RS 32900

Figure 7  Sediment comparison between Nov 2015 and May 2017: RS 32700
Figure 8  Sediment comparison between Nov 2015 and May 2017: RS 32338

Figure 9  Sediment comparison between Nov 2015 and May 2017: RS 31935
Figure 10  Comparison of the transect-averaged coarse sediment longitudinal profiles

Note: Underlying (coarse) sediments were observed to be composed of predominately sand and gravel during both the 2015 and 2017 surveys; with the exception of Sta. 31935, where it was fine sediment, or “bay mud.”

**Table 1 Average Coarse Sediment Elevations and Changes at Sediment Measurement Transects**

<table>
<thead>
<tr>
<th>ID</th>
<th>River Station (longitudinal profile feet)</th>
<th>November 2015 Elevation (ft NAVD88)</th>
<th>May 2017 Elevation (ft NAVD88)</th>
<th>Change in Sediment (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34600</td>
<td>Not Present</td>
<td>0.50</td>
<td>+0.23</td>
</tr>
<tr>
<td>2</td>
<td>34400</td>
<td>0.08</td>
<td>1.28</td>
<td>+1.20</td>
</tr>
<tr>
<td>3</td>
<td>33600</td>
<td>-0.76</td>
<td>-0.27</td>
<td>+0.49</td>
</tr>
<tr>
<td>4</td>
<td>33160</td>
<td>Not Measured</td>
<td>-1.33</td>
<td>---</td>
</tr>
<tr>
<td>5</td>
<td>32900</td>
<td>-2.30</td>
<td>Not Measured</td>
<td>---</td>
</tr>
<tr>
<td>6</td>
<td>32700</td>
<td>Not Measured</td>
<td>-3.09</td>
<td>---</td>
</tr>
<tr>
<td>7</td>
<td>32338</td>
<td>-4.21</td>
<td>-3.14</td>
<td>+1.07</td>
</tr>
<tr>
<td>8</td>
<td>31935</td>
<td>-4.16</td>
<td>-2.59</td>
<td>+1.57</td>
</tr>
</tbody>
</table>
3.2. Sediment sample photographs

During the fieldwork attempts were made to retrieve sediment samples at each of the sediment measurement transects; however sediment could only be retrieved from the bottom at the upstream transects where samples could be collected by hand. The photographs below show sediment samples collected. No sediment analysis was conducted.

Sediment at Station 34260

Sediment at Station 34200

Sediment at Station 33875

Sediment at Station 33600
3.3. Observations

Based on comparison of the measurements of sediment depth and sediment composition in 2015 and 2017 the sediment observed in the concrete channel in 2017 appeared to be “fresh” (new) sediment. This apparently new sediment may have been deposited during the recessional limbs of the winter 2016-17 floods, replacing the sediment observed/ measured in 2015. The samples that were hand-collected at the upstream transects were observed to be clean, well washed, coarse sands to small gravels with little or no fine sediments (i.e., no mud and silt present). In addition the sediments were unconsolidated and easily moved with the rod and footing. It is believed that the sediment in the downstream transects are of similar composition -- sand and gravel, with little fines – based on the “feel” of the sediment when driving the measuring rod through the sediment down to the concrete channel bottom. During the November 2015 field measurement at Station 31935 the survey rod could be advanced down through the sediment with little effort or resistance. And when the rod was pulled up black bay mud was observed coating the rod. By comparison, in 2017 at Sta. 31935 coarse sediment was encountered across the entire channel and advancing the rod through the sediment required significant effort. Furthermore, when the rod was retrieved no black bay mud was observed on the measuring rod. This suggests that sediment at Sta. 3195 between 2015 and 2017 had been replaced.