

M&T/Llano Seco Fish Screens

complex world

CLEAR SOLUTIONS™

M&T/Llano Seco Fish Screen Short- term/Long-term Project Topographic & Bathymetric Surveys

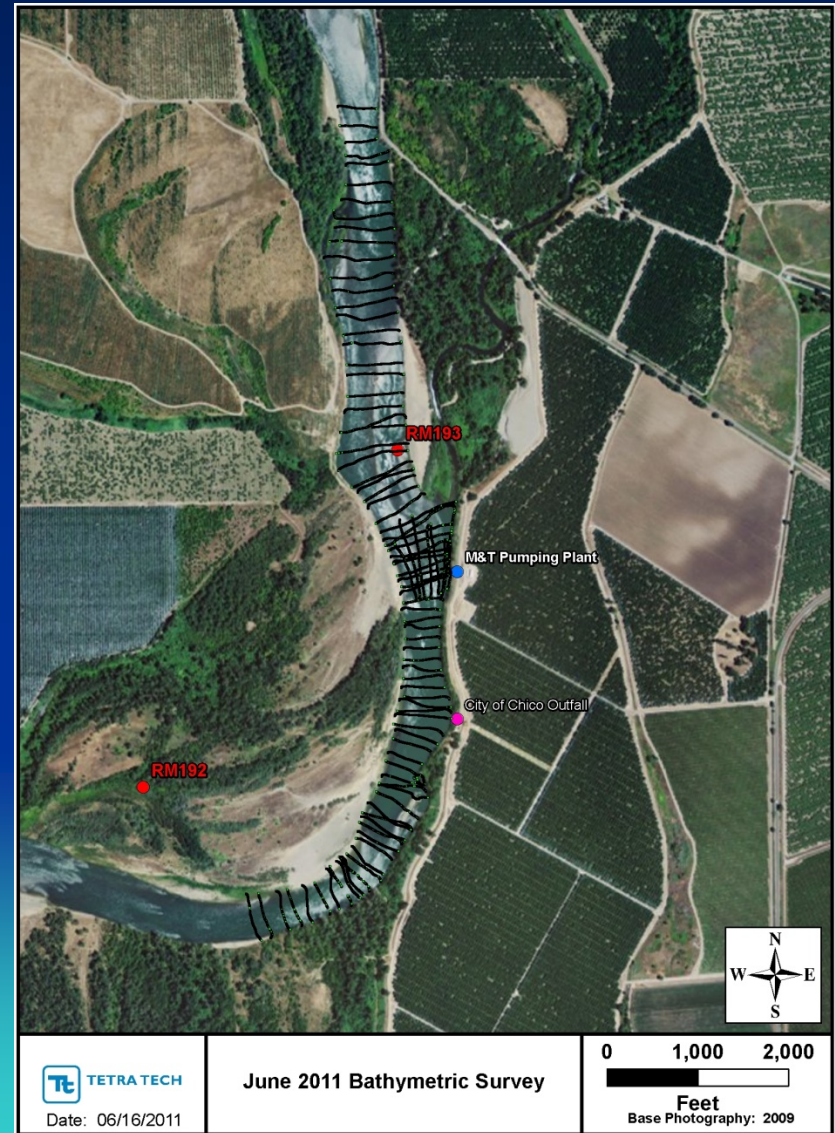
Mike Harvey

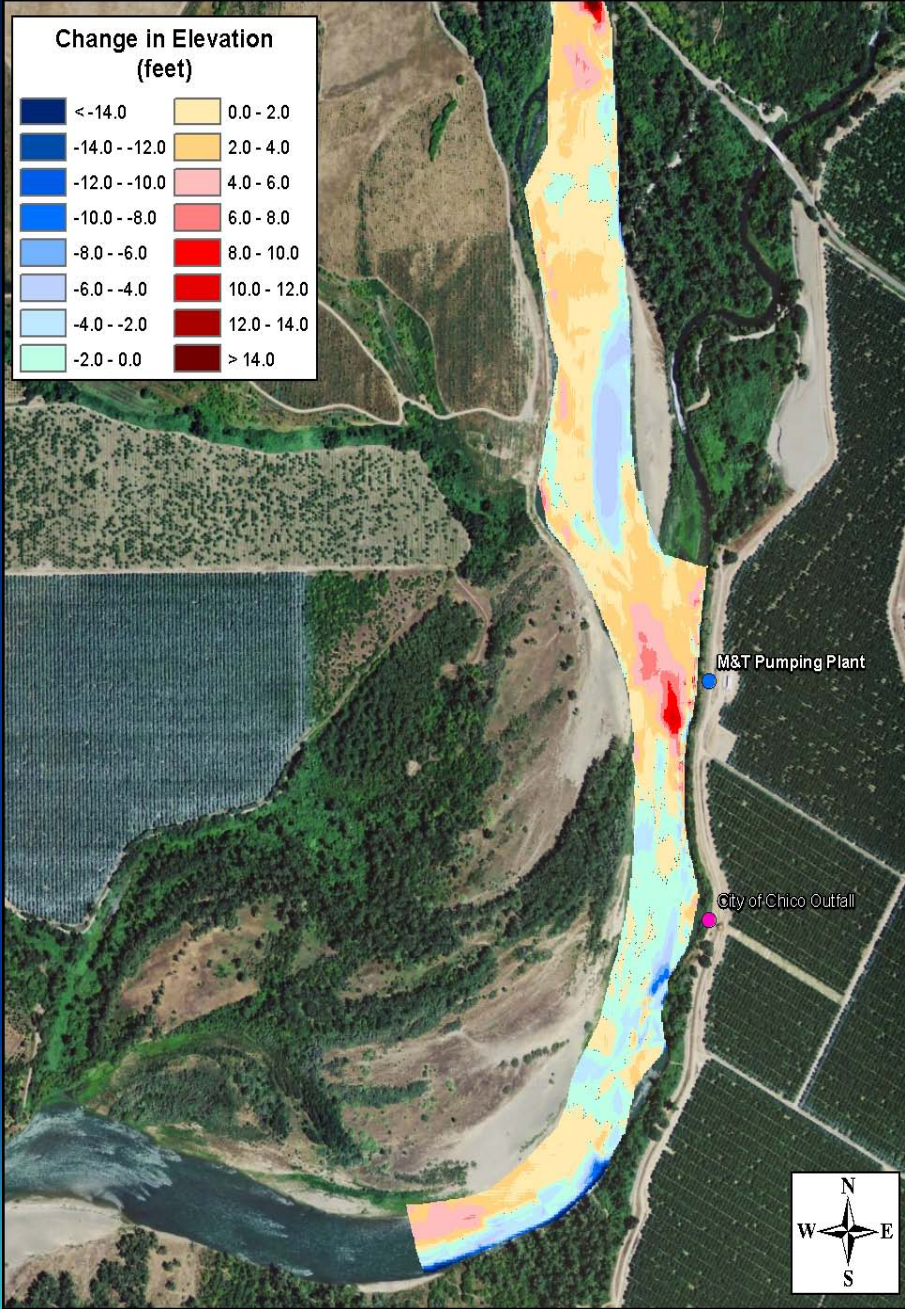




Topographic & Bathymetric Surveys

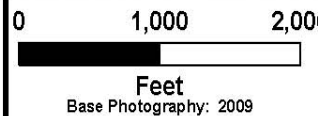
December 2005
May 2006
January 2010
June 2011



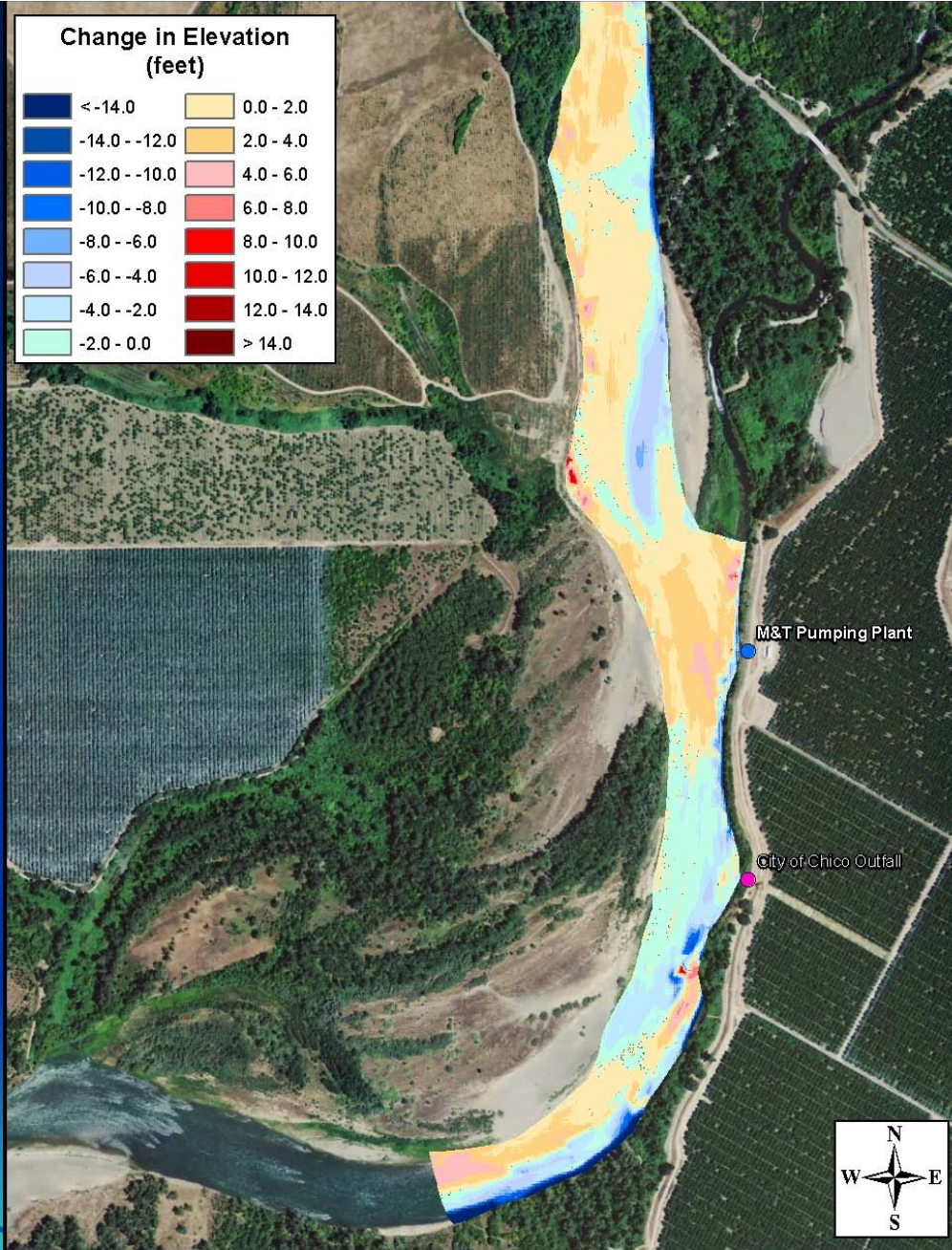


TETRA TECH
Date: 06/21/2011

Elevation Change
Between Jan 2010 - May 2006



Elevation changes in the M&T/Llano Seco reach between the January 2010 and May 2006 surveys



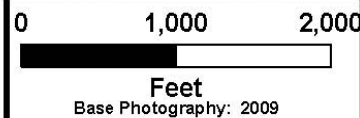
Elevation changes in the M&T/Llano Seco reach between the June 2011 and May 2006 surveys

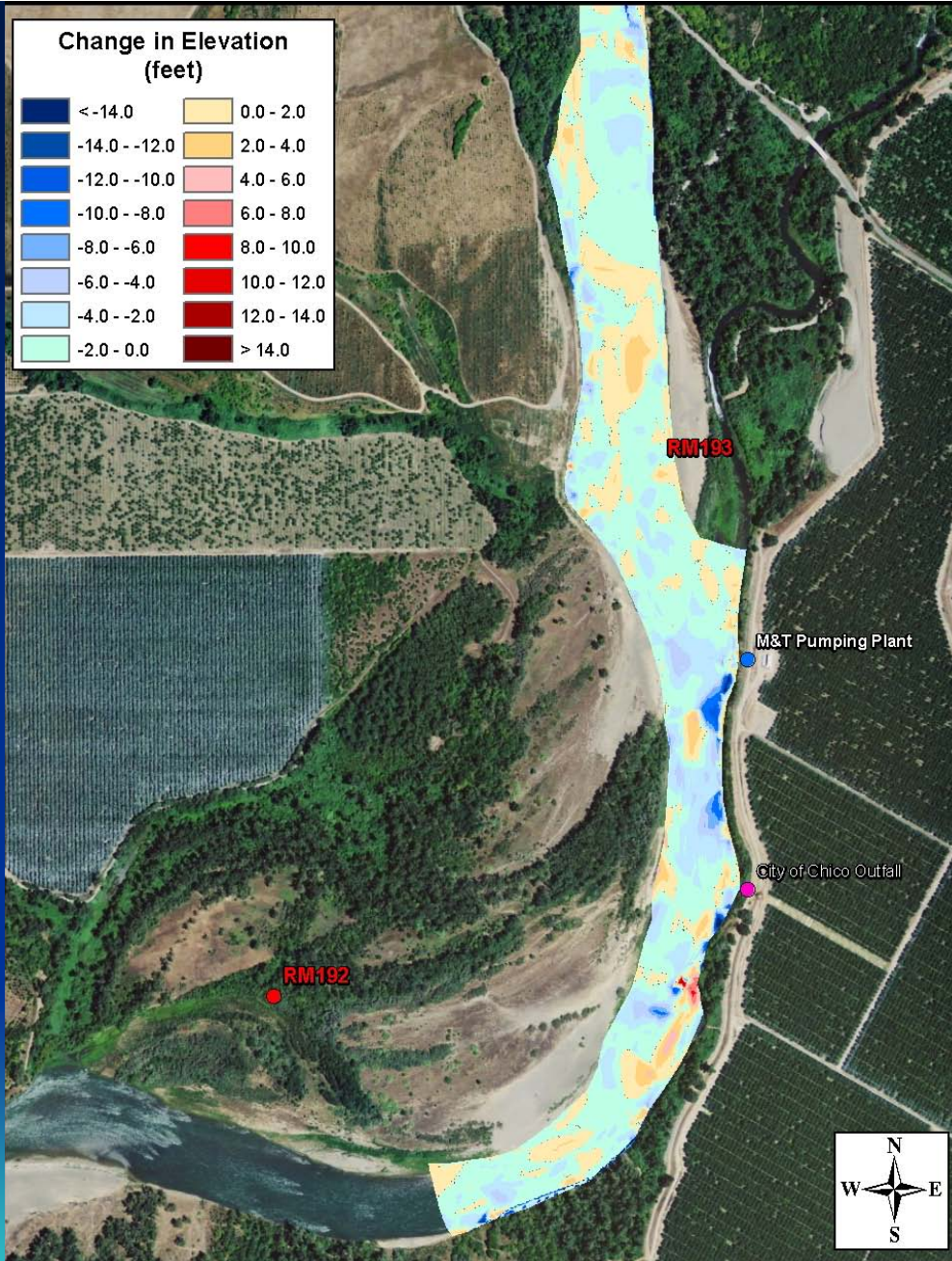


TETRA TECH

Date: 06/21/2011

Elevation Change
Between June 2011 - May 2006



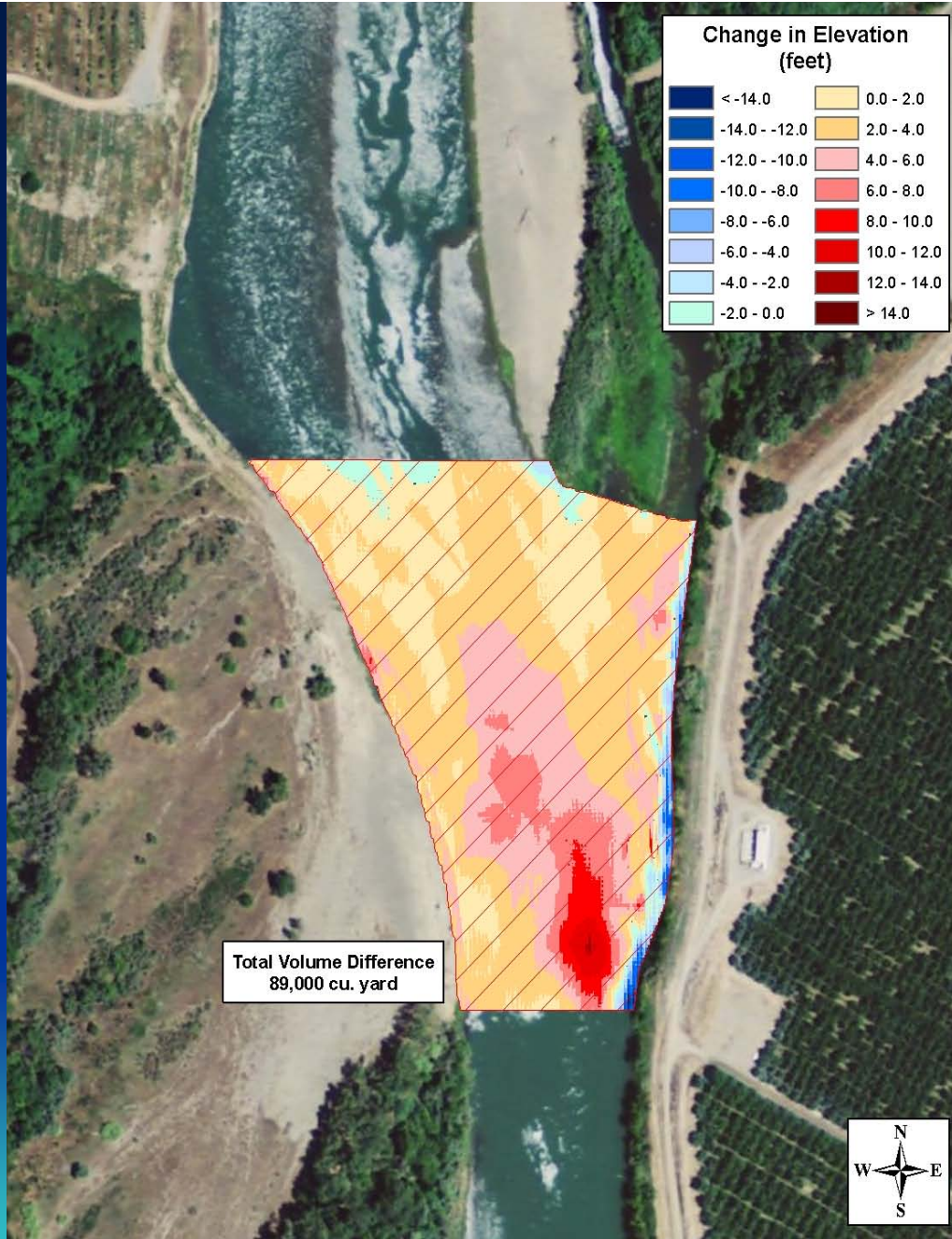


Elevation changes in the M&T/Llano Seco reach between the January 2010 and June 2011 surveys

Tt TETRA TECH
Date: 06/21/2011

Elevation Change
Between June 2011 - Jan2010

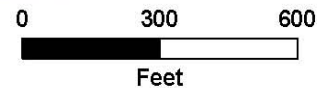
0 1,000 2,000
Feet
Base Photography: 2009



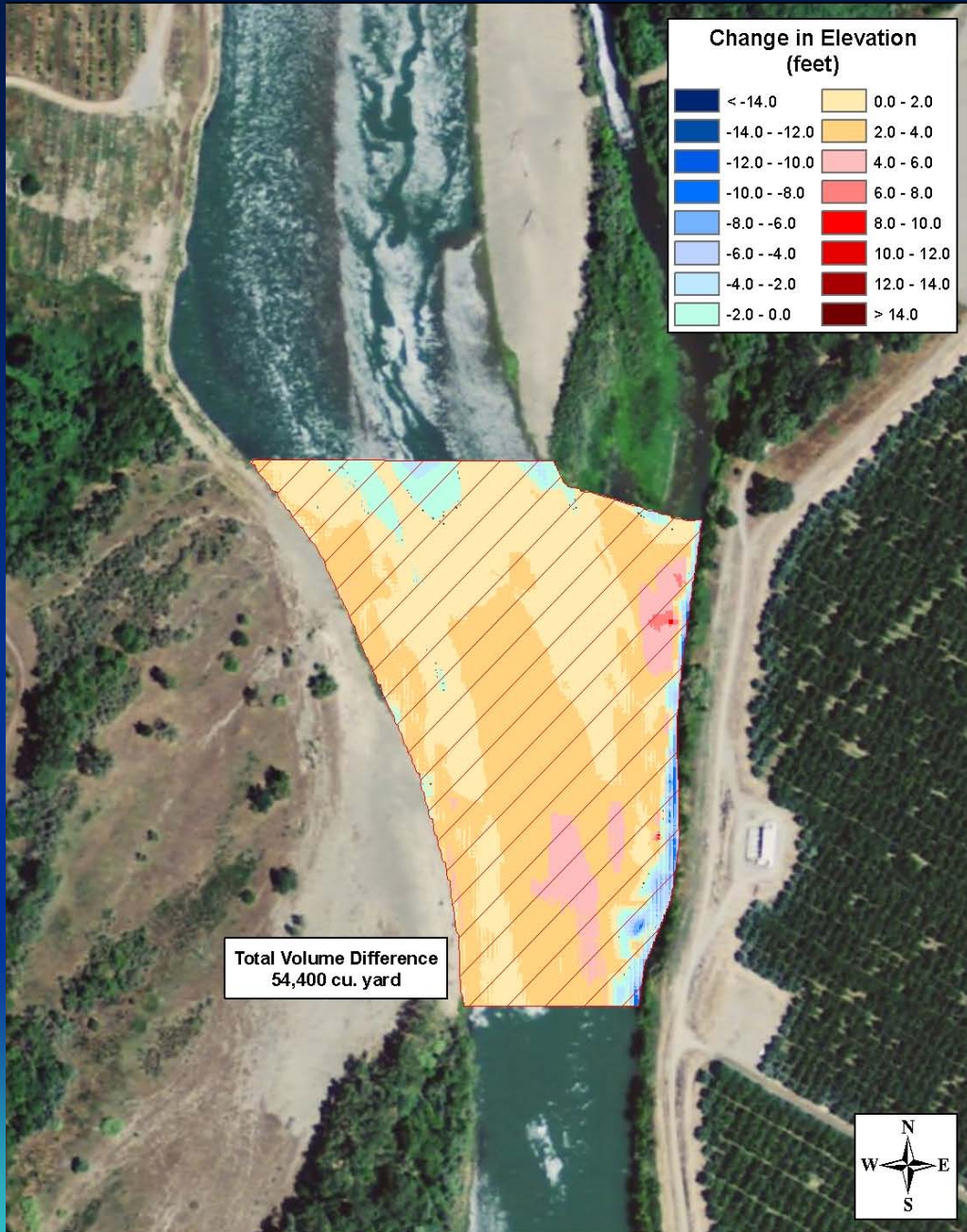
Total Volume Difference
89,000 cu. yard

Elevation Change Between
Jan 2010 and May 2006

Volume Area



**Volumetric
calculation of
the deposition
in the 600 ft by
1200 ft
segment in the
vicinity of the
fish screens
and pump
inlets between
January 2010
and May 2006**

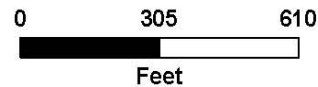


Total Volume Difference
54,400 cu. yard

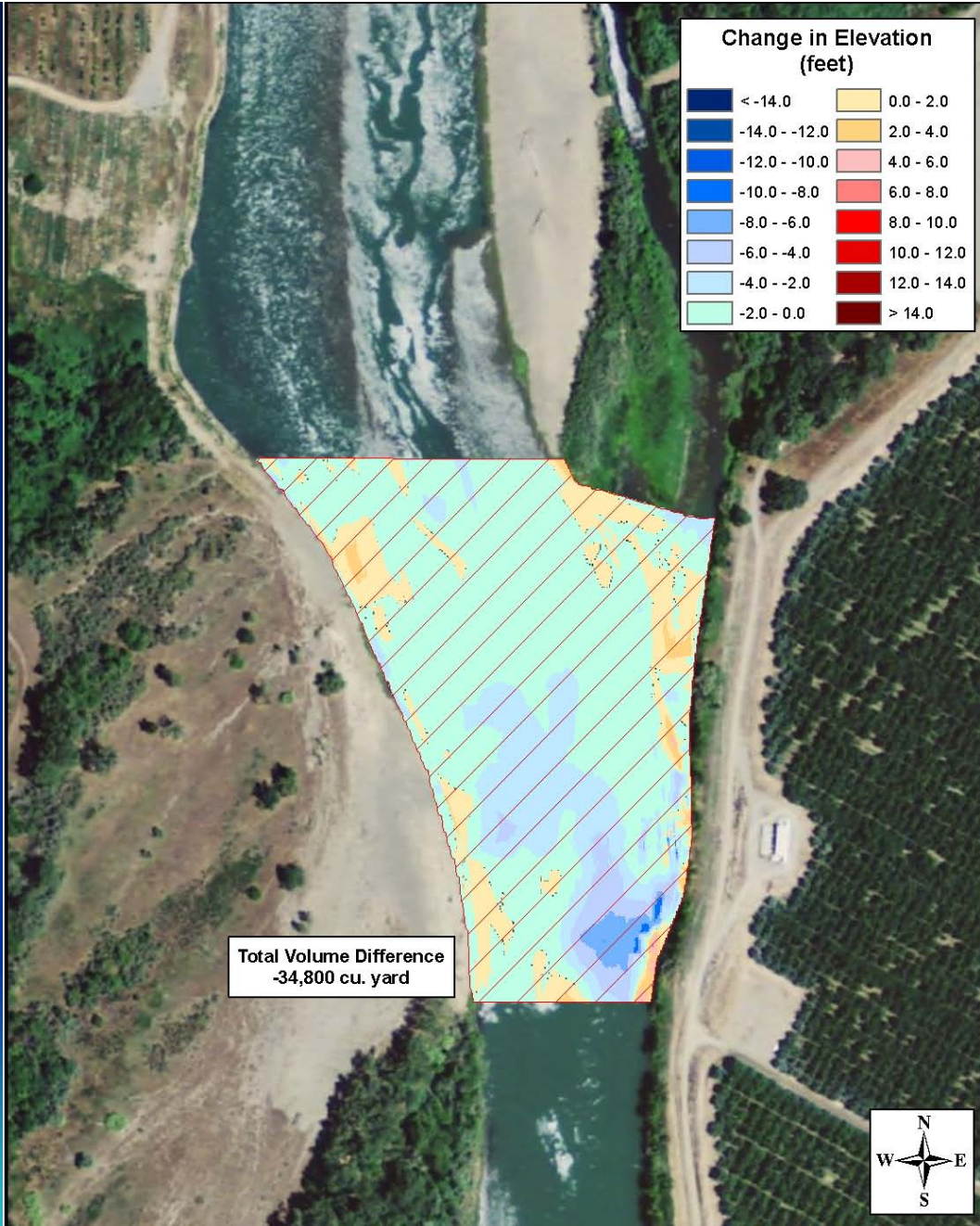


Elevation Change Between
June 2011 and May 2006

Volume Area



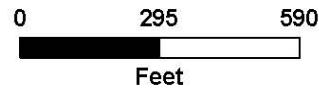
**Volumetric
calculation of
the deposition
in the 600- by
1,200-foot
segment in the
vicinity of the
fish screens
and pump
inlets between
June 2011 and
May 2006**



Total Volume Difference
-34,800 cu. yard

Elevation Change Between
June 2011 and Jan 2010

Volume Area



Volumetric calculation of the deposition in the 600- by 1,200-foot segment in the vicinity of the fish screens and pump inlets between January 2010 and June 2011

Potential “WET” Dredge Volumes

PERIOD	VOLUME (cu.yd)	TONNAGE (tons)
2010 - 2006	89,000	123,000
2011 - 2006	54,400	75,000
2011 - 2010	-34,600	-48,000

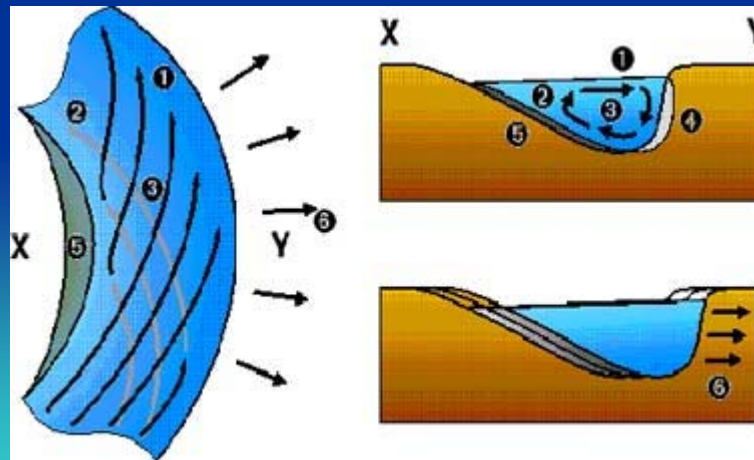




HYPOTHESIS

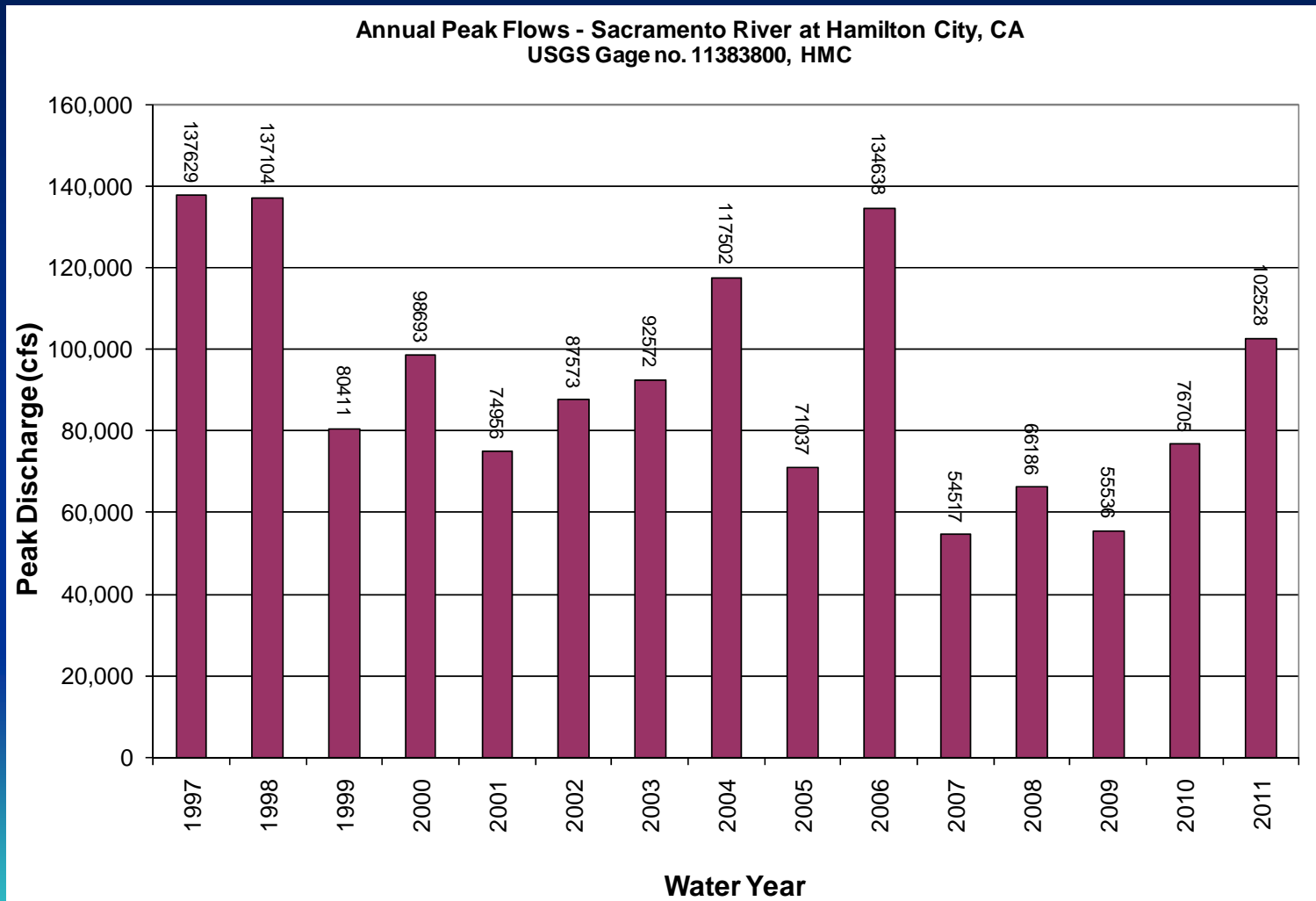
Cyclic behavior of the reach: During years with less than bankful peak flows the bar builds towards the fish screens and pump inlets. During years with greater than bankful flows the bar edge scours in the vicinity of the fish screens and pump inlets due to the development of a strong **helical flow cell** along the riprapped east bank.

Caveat: The existing channel geometry is required to maintain the oblique flow approach angle to the east bank.



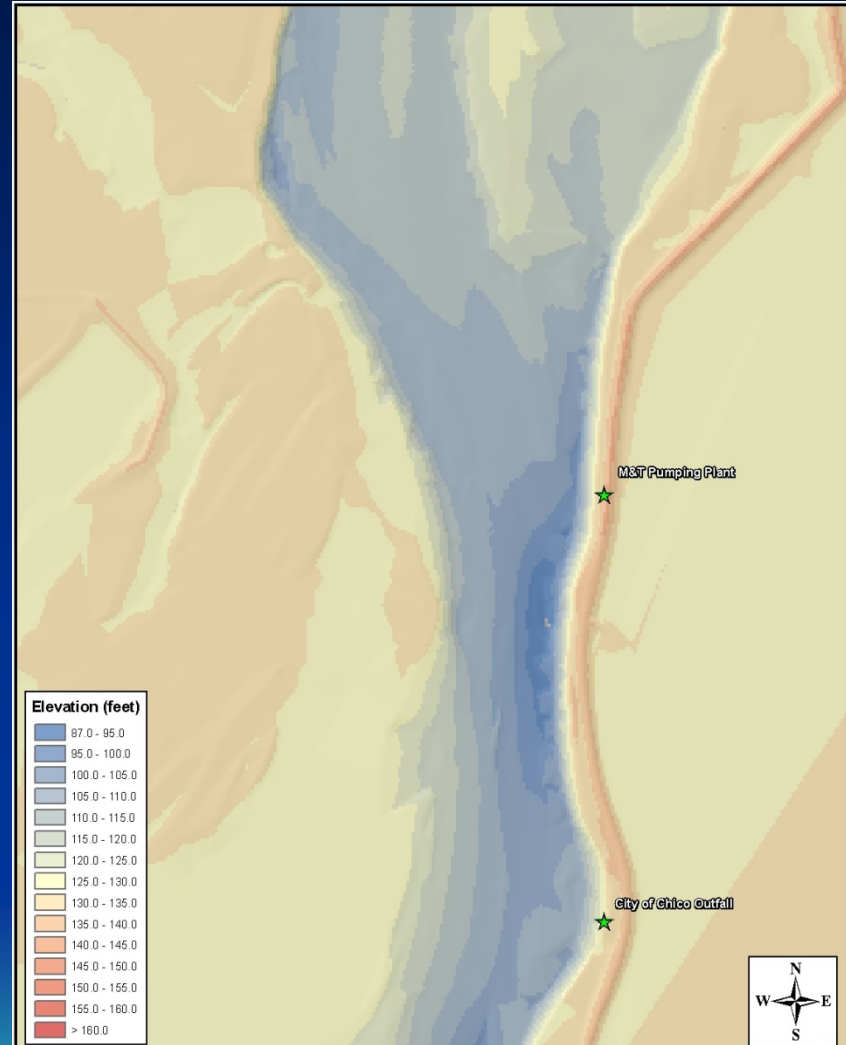
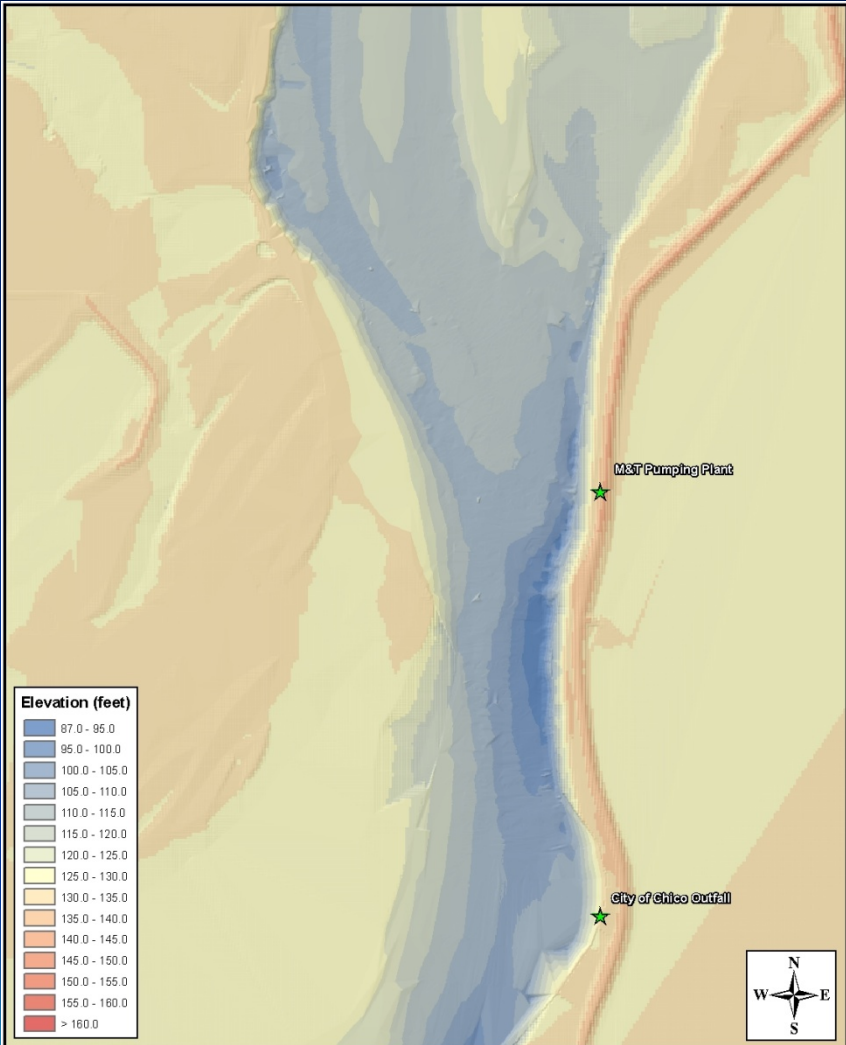


Peak annual flows at the Hamilton City gage between WY1997 and WY2011



2005

2006



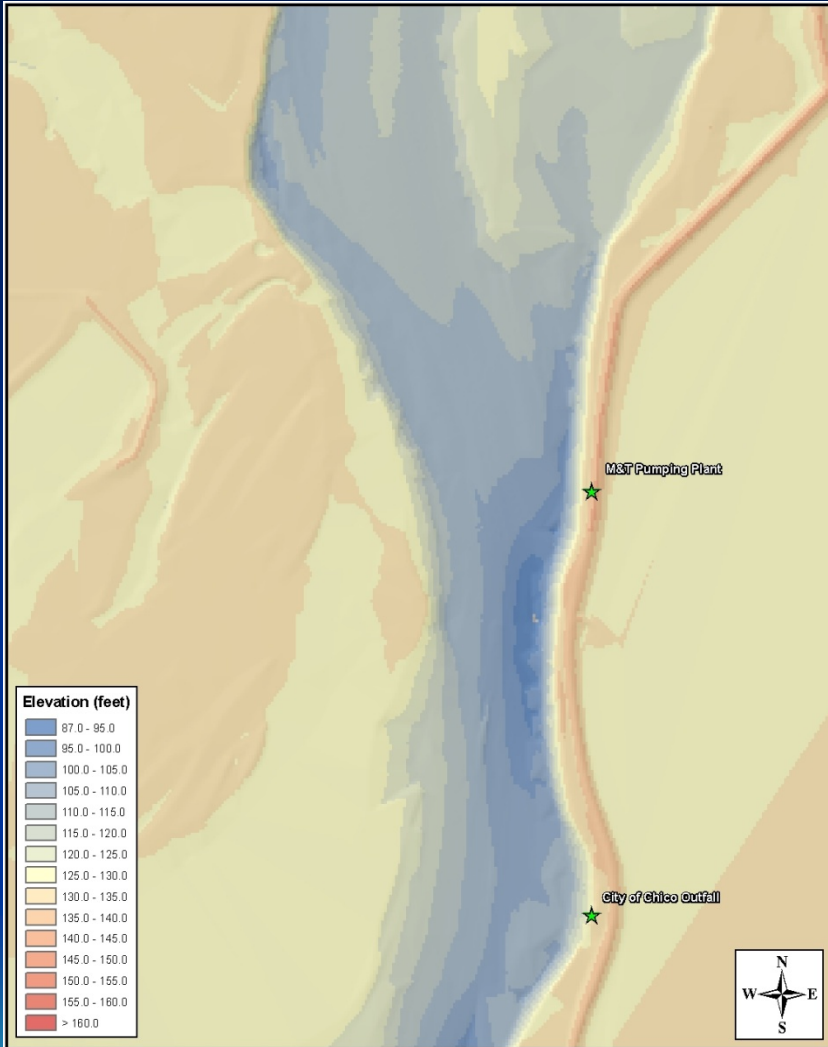
Bed Elevation Surveyed in December 2005



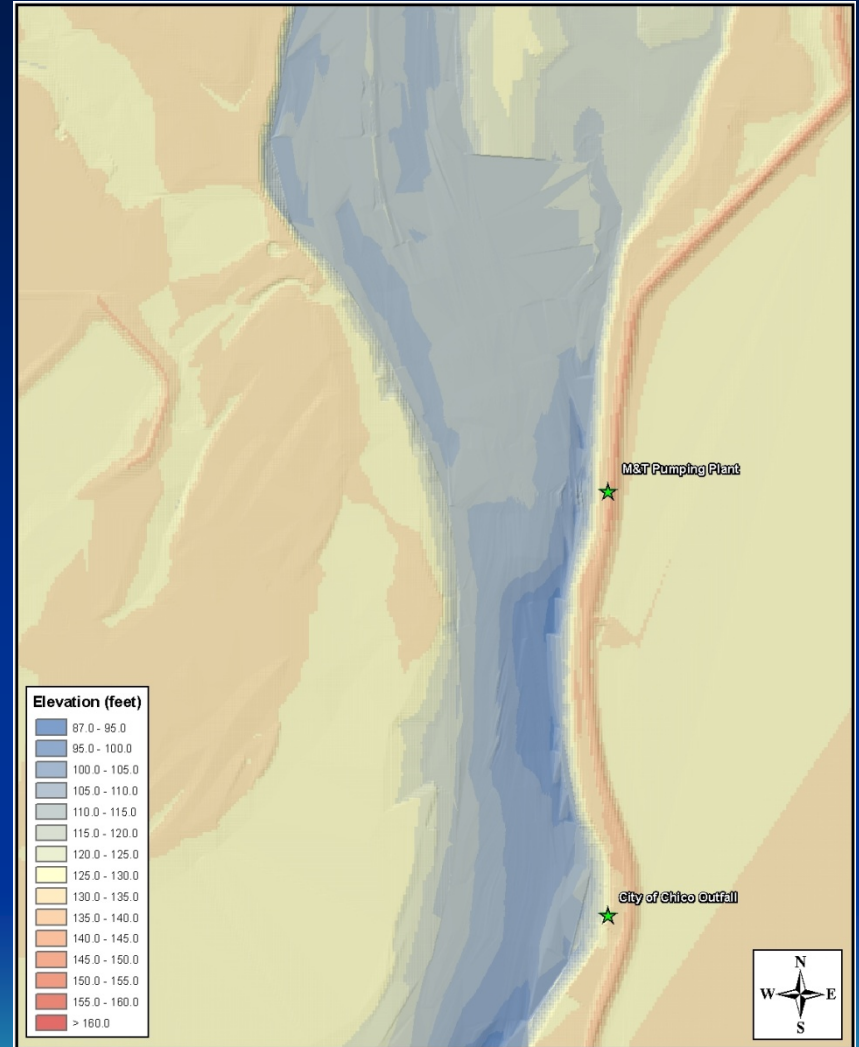
Bed Elevation Surveyed in May 2006



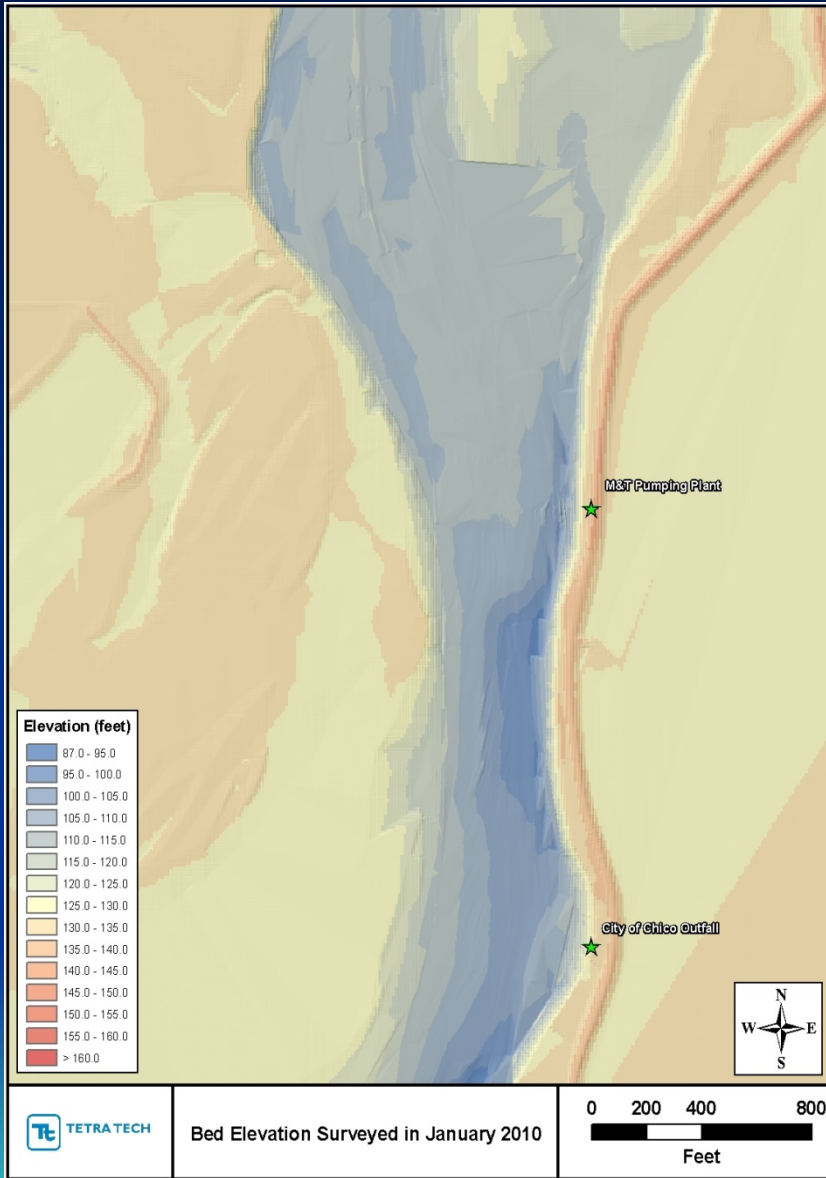
2006



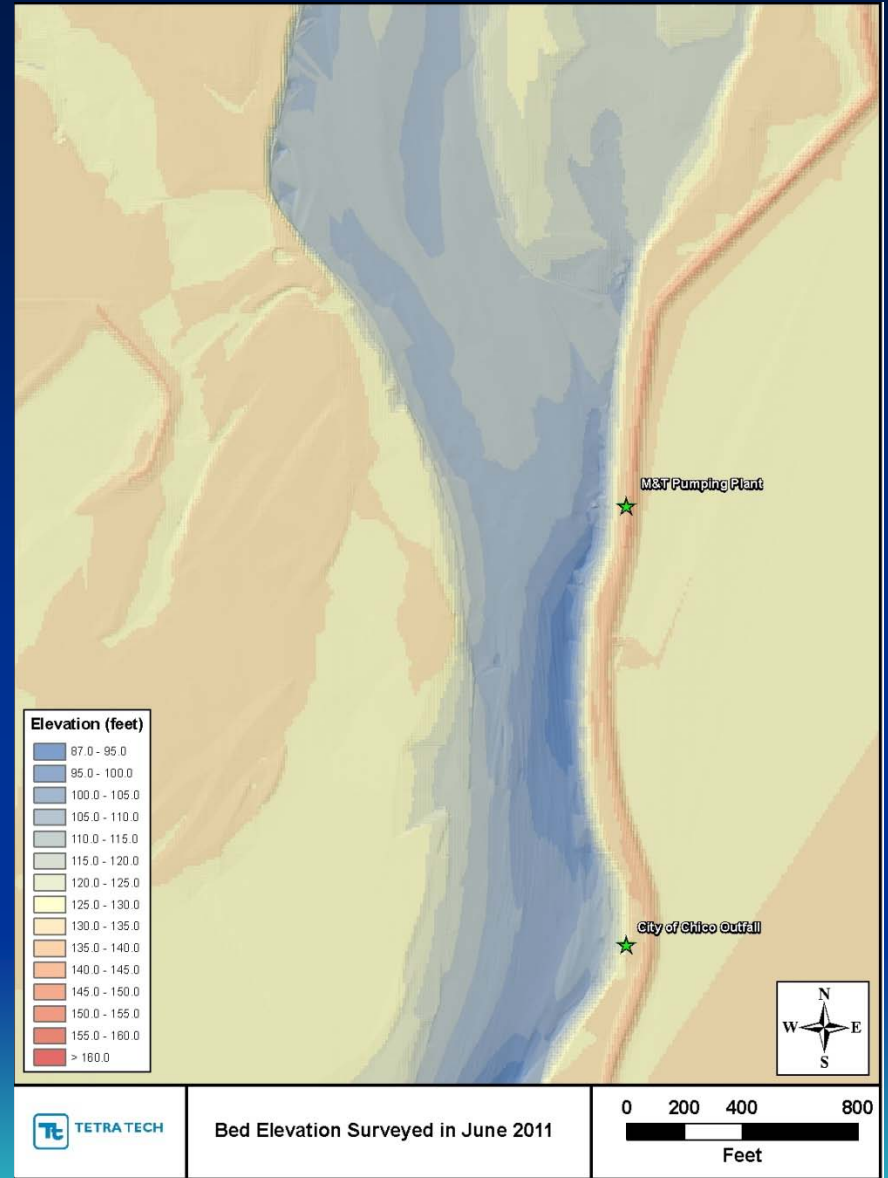
2010



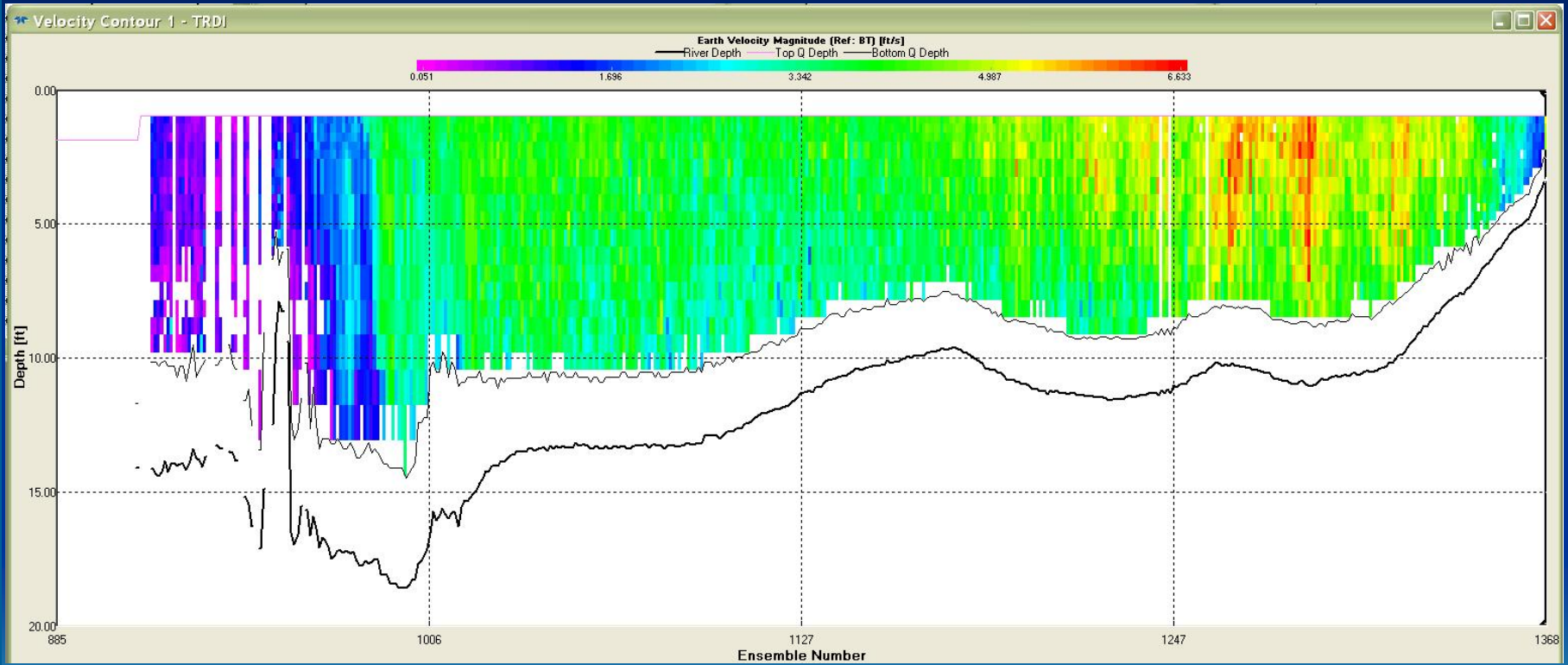
2010



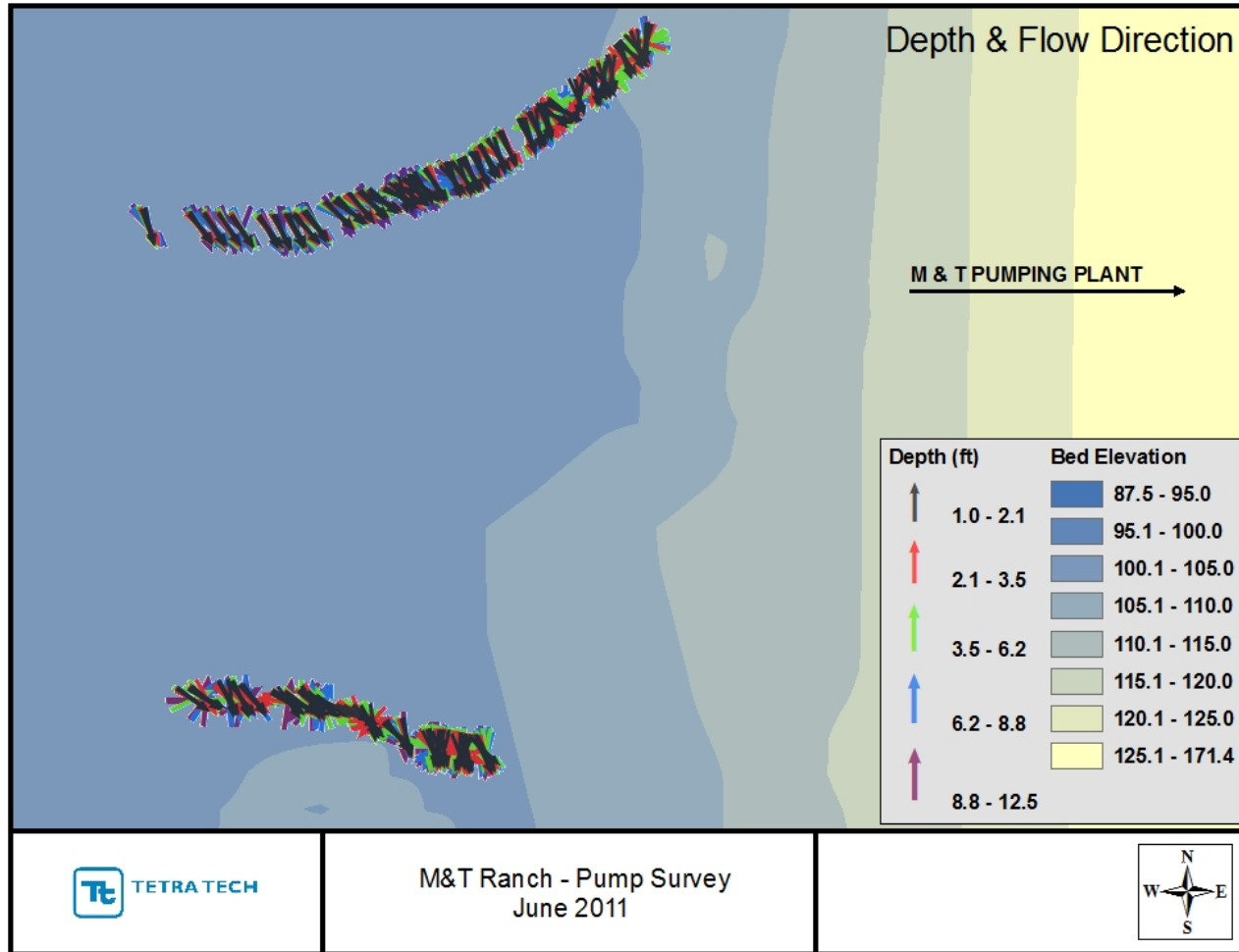
2011



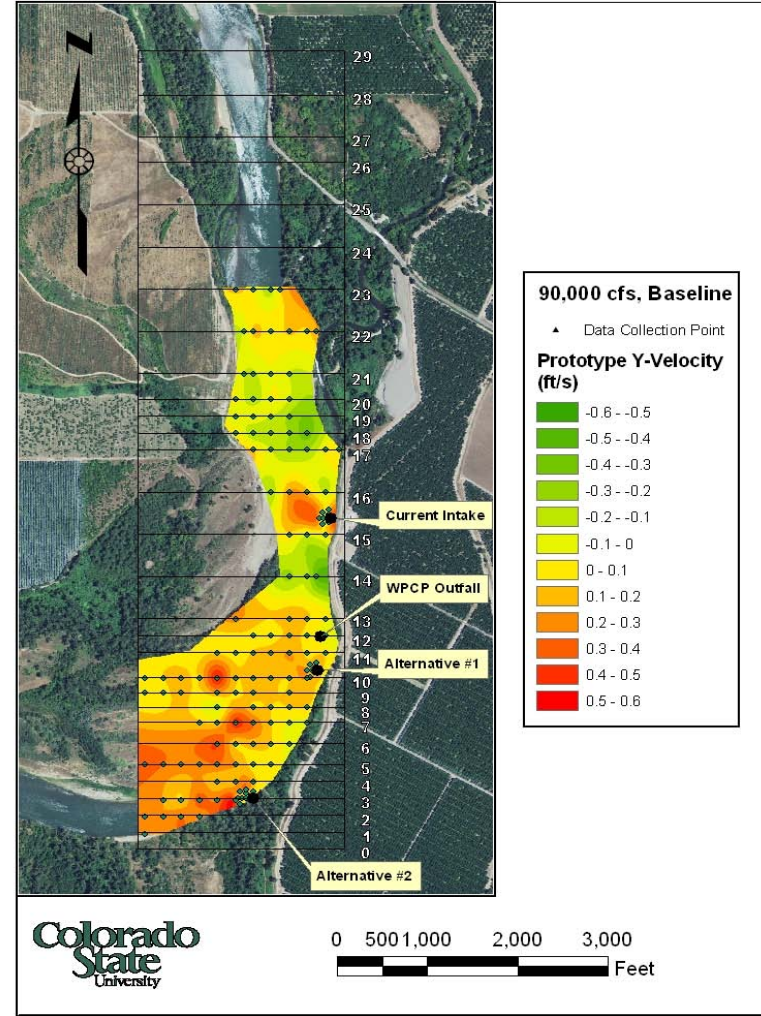
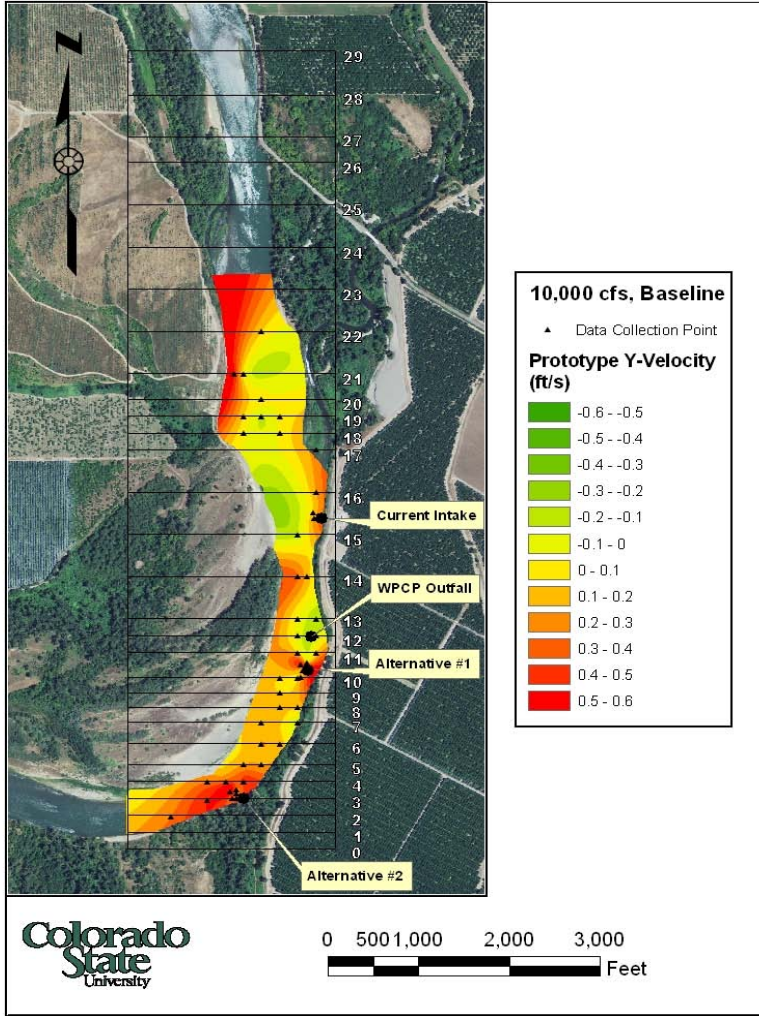
Velocity Profiles at ~ 18,000 cfs



Resolved Velocity Vectors @ ~ 18,000 cfs

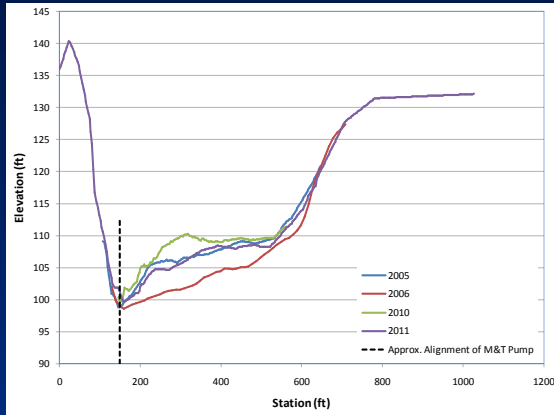


CSU Physical Model

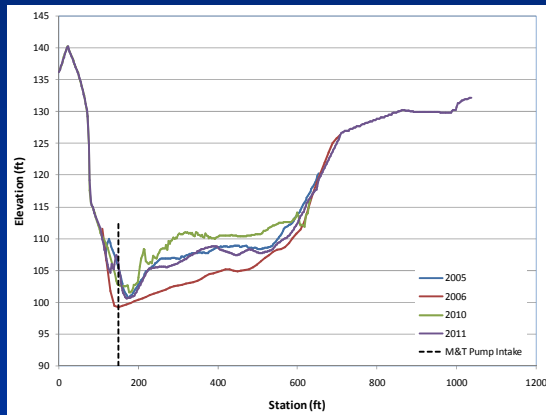


Comparative Cross Sections

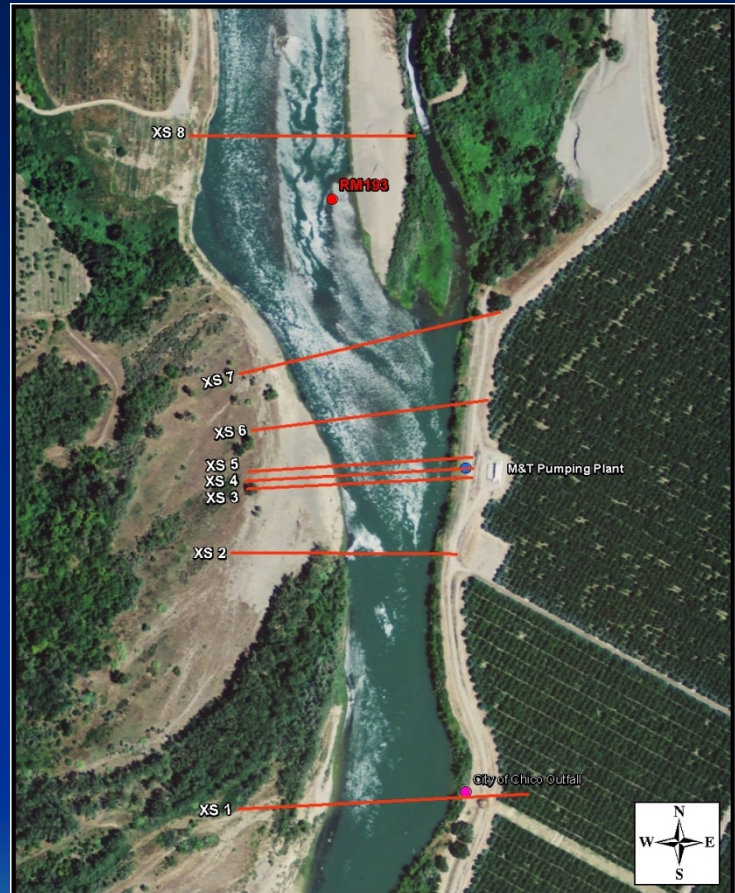
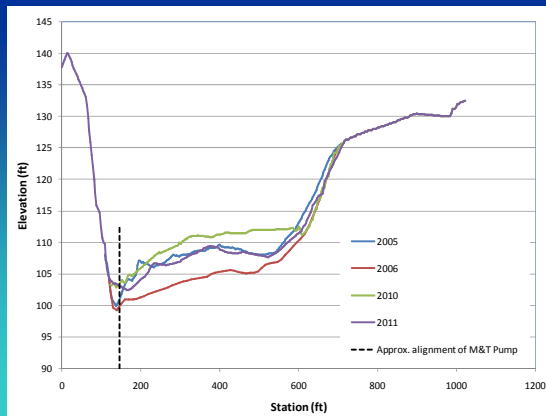
XS 3



XS 4



XS 5



<p>TETRA TECH Date: 06/20/2011</p>	<p>Cross Section Locations</p>	<p>0 500 1,000 Feet Base Photography: 2009</p>
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Potential Alternative

