LANDSCAPE PERFORMANCE SERIES

Tassajara Creek Restoration Project – Dublin, CA
Methodology for Landscape Performance Benefits
Prepared by:

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Environmental

Created a floodplain that contains the 100-year flood event (peak flows of 5,200 cfs) while largely halting chronic incision that had resulted in a degraded channel.

An analysis completed in 1996 during project planning found the 100-year flood event at the downstream end of Tassajara to be 4,800 cfs. The project team then designed the creek restoration for 5,200 cfs to be conservative.

A 2006 Environmental Planning dissertation by Mark Robert Tompkins from the University of California, Berkeley collected incision data, finding that the project largely halted chronic incision. Detailed information can be found within the dissertation, including on pages 234-251:

https://sunsite.berkeley.edu/WRCA/restoration/pdfs/MTompkins_phd06.pdf

Prevented 208 cubic yards of concrete from entering a landfill by repurposing material from a former military bridge and a drop structure as buried riprap along the channel. This saved an estimated $8,500 in material costs and $10,300 in disposal costs.

Cubic yards of concrete from the bridge were estimated from the construction documents. Length and width were measured using a scale, and depth of the bridge was estimated using a factor of 15 to 1. According to the Surplus Property Authority, an additional 40% of material came from bridge abutments. So, once cubic yards of the main bridge were determined, 40% of this value was added to the total. The Surplus Property Authority did not recall any material being trucked away, however, it was deemed highly unlikely that 100% of the material was reusable, so a 90% reuse rate was used.

The research assistant collected data from the construction documents for the project, measuring length and width of buried riprap and calculating depth based on instructions in the document (either width/2.5 or 4ft, which was greater).

In order to determine what percent of the riprap was repurposed from the bridge, 90% of the total volume of bridge and abutment material was divided by the total amount of riprap estimated above. The research assistant then found that 18% of the total volume of riprap buried along the channel for bank protection was repurposed.

Using an online price calculator based on cubic yards of material moved, the research assistant derived the cost of materials transportation and disposal from the site. Rates indicated on the price calculator were manually compared to quoted prices for construction debris removal around the Bay Area in order to confirm accuracy.

Sources:

- Construction documents
- Alameda County Surplus Property Authority
- Price calculator: http://www.homewyse.com/services/cost_to_remove_construction_debris.html

Social

Provided recreational opportunities for over 200 walkers, joggers, bikers, and dog walkers on a given Sunday in the summer.

On Sunday, June 9th, the CSI 2013 research assistant observed trail use at a single point along the project reach. The observing point was set on the eastern edge of the creek at the low-flow crossing, so that use of both the trail and the low-flow crossing could be gauged simultaneously. The user count occurred over five daytime hours, from 11:05am until 4:10pm and included notes on the number of people using the trail together, as well as how they were using the trail (jogging, walking, dog-walking). Users who passed by multiple times were noted in the record but only counted as part of the total during their first pass by the observer. Sex and a rough age group were also noted for each user in order to illustrate the diversity of users.

It is important to note that while this data illustrates use on a typical summer weekend day, it does not include peak hours (the cooler morning and evening hours) when people are likely to be out exercising, nor is it reflective of weekday activity. Nevertheless, active use of the site by a multitude of disparate users on a single day suggests that this trail, at least along the northern reach (between Dublin and Gleason Blvds) sees frequent recreation.

Increased regional trail connectivity and non-motorized recreational opportunities by adding a mile of paved trails that link the Tassajara Creek Regional Park to the 300-mile East Bay Regional Trail network.

According to East Bay Regional Parks District mileage reports, the net miles of existing trail is 299.73. One mile of trail on the west bank of the Tassajara Creek Restoration project provides additional recreational opportunities for the public.

Also according to the East Bay Regional Parks District mileage reports for Tassajara Creek, 1.4 miles of trail connects the Iron Horse Trail to Tassajara Creek, 0.1 mile of which runs from I-580 to Dublin Blvd. Two tenth miles (.2) miles of paved trail exist on the east side of the creek from Dublin Blvd to Central Pkwy and 1.18 miles of paved trail runs from Central Pkwy north to Somerset Lane, 0.7 of which is within the project boundaries. An additional 0.26 miles of trail runs from Somerset Lane north. Subtracting 0.7 miles of project trail from 1.18 miles reported from Central to Somerset, and adding the additional trail miles north of Somerset Lane, we find that 0.76 miles of additional trail are linked to the East Bay Regional Trail Network by the project site.

Sources:

- http://www.ebparks.org/Assets/files/trails/MileageSummaryRpt.pdf
- http://www.ebparks.org/Assets/files/trails/TassajaraCreek.pdf

Economic

Created additional value for homes along the creek. Between June 2004 and June 2013, homes adjacent to the creek had estimated market values 135-158% of the city median for 4- and 5-bedroom homes and 111-126% for 2-and 3-bedroom homes. In comparison, homes along the Alamo Creek flood control channel — a non-vegetated, straightened, trapezoidal channel — had estimated market values 90-116% of the city median for 4- and 5-bedroom homes and 82-107% for 3-bedroom homes during the same period.

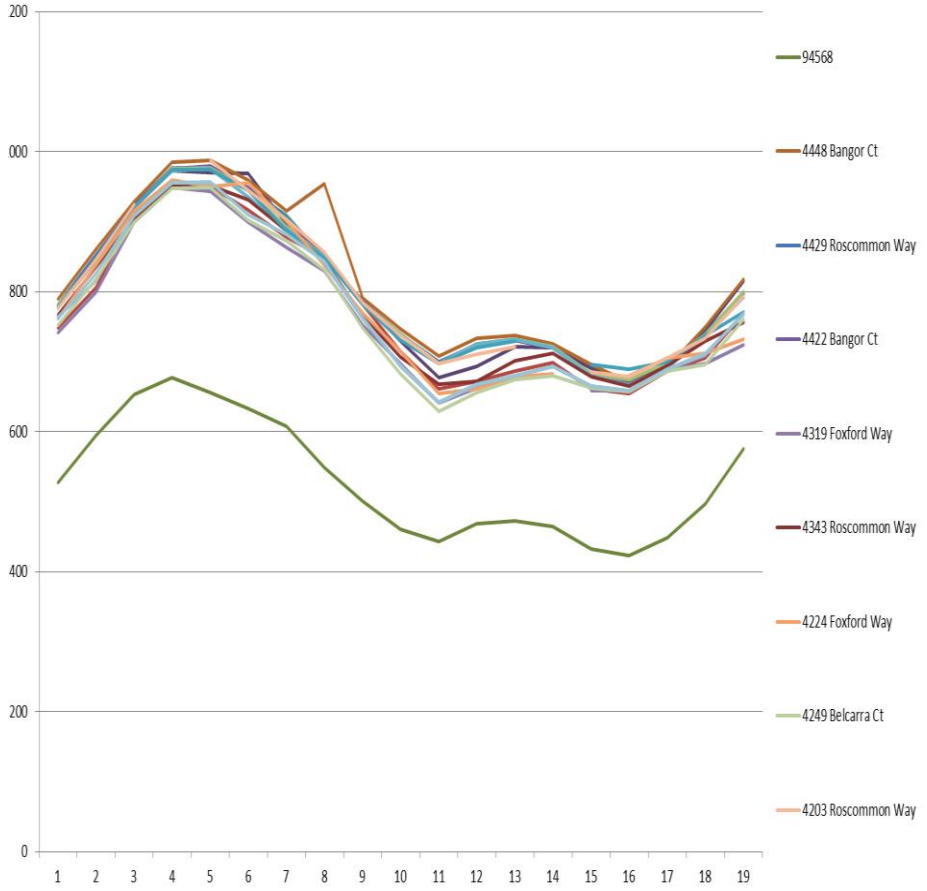
Utilizing the real estate website Zillow, the researchers established a database of home values for four home types in the city of Dublin: large homes (4 to 5 bedrooms) along the restored Tassajara Creek, small homes (2 to 3 bedrooms) along Tassajara Creek, large homes along the Alamo Creek flood control channel (a trapezoidal channel devoid of vegetation) and small homes along the Alamo Creek flood control channel. The researchers sampled homes from each of four categories, recording the value of the property reported on Zillow every June and December, from June 2004 through June 2013. Eleven samples were taken for three of the four categories, while 30 samples were taken for the large homes along Tassajara Creek, as there was a larger population of these homes in this area.

The percent variation from the median Dublin home value was then derived by dividing the sample property value for a given month by the mean Dublin property value for that same month. A monthly average for each sample set was then calculated. It should be noted that until June 2013, semi-annual housing values for large homes along Tassajara Creek only varied an average of 17.6%, while small home values along Tassajara varied by 15%. In contrast average home values varied by 26% for large homes along Alamo Creek and by 25% for small homes along Alamo Creek. Though June 2013 saw the widest variation in home values along Tassajara Creek for our recording period, this variation was still 3% less than the Alamo Creek variation.

Note: variations in Alamo Creek housing values from the mean Dublin value were more erratic than Tassajara Creek values, making it harder to predict the value of Alamo Creek homes. (see graphs)

Another important caveat to this data is home age. Homes along Alamo Creek were built in 1965, while homes along Tassajara Creek were built in 2000-2001. In order to identify if this affected our study, the researchers also completed a quick sample of homes along a different restored creek in Dublin. These homes were built in 1988, and illustrated a similar stability to homes along Tassajara Creek (values fluctuated consistently with the median).

Source: Zillow.com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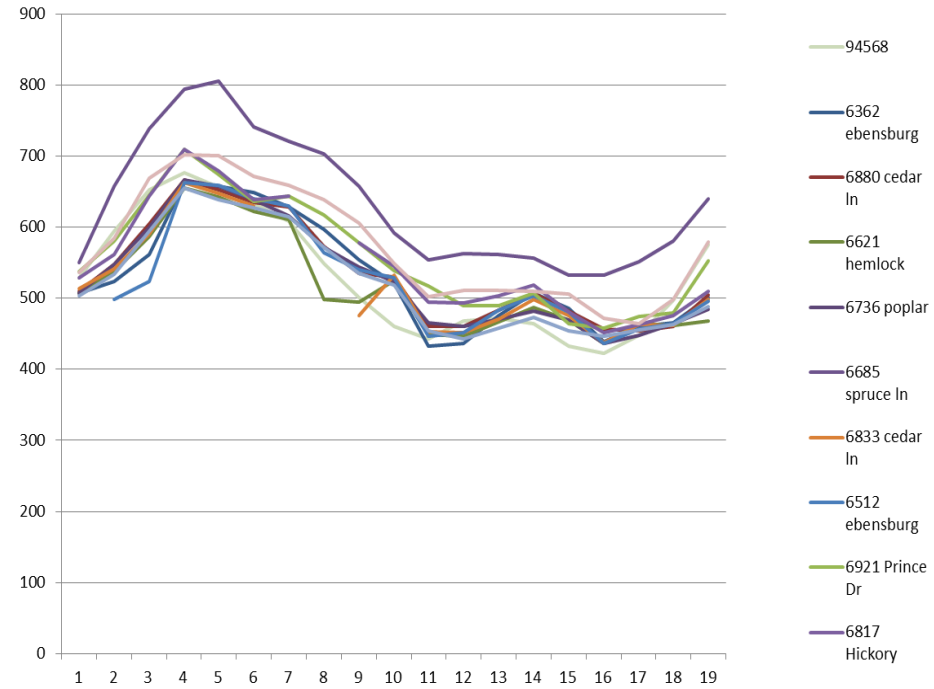
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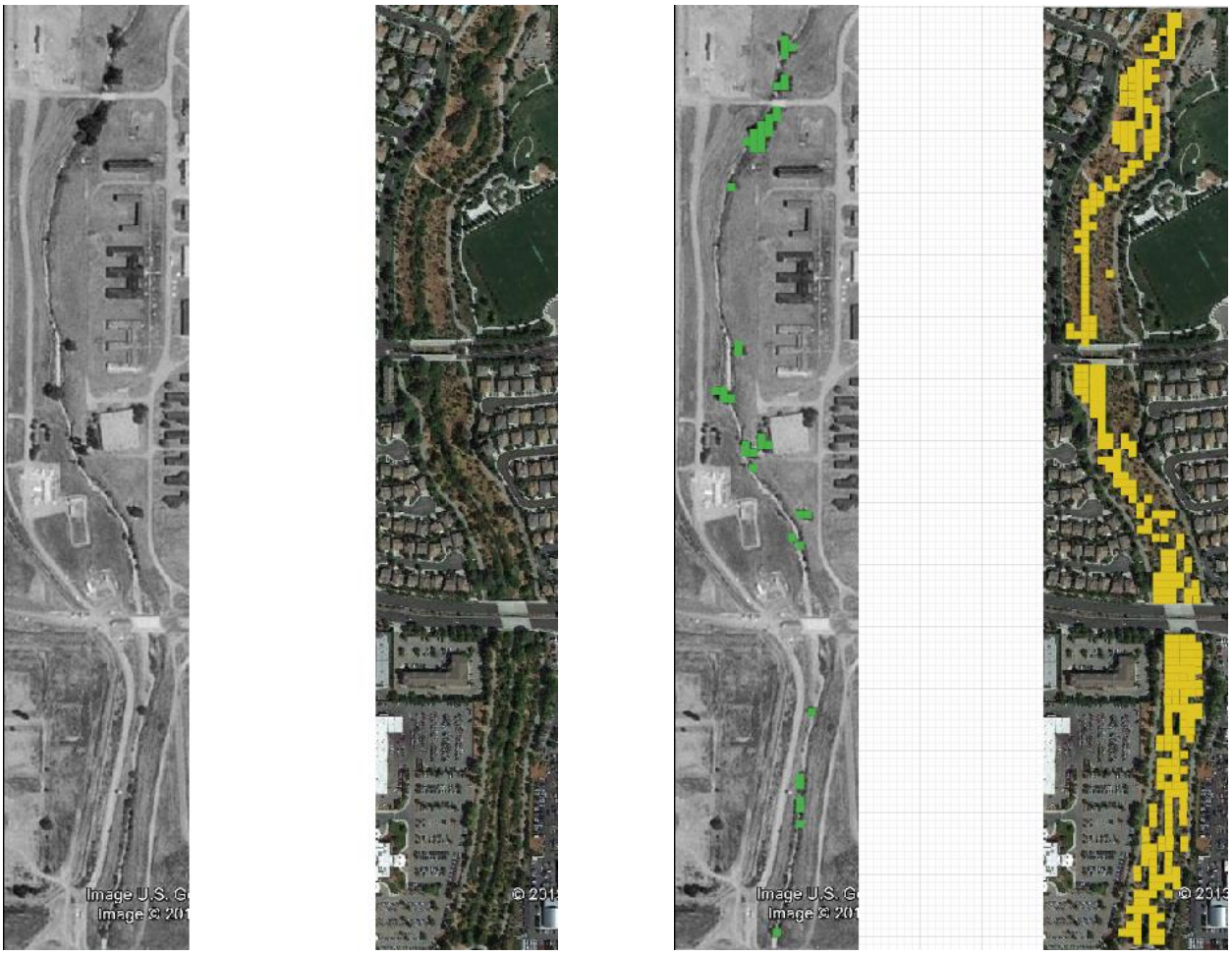
6685 spruce ln
6833 cedar ln
6512 ebensburg
6921 Prince Dr
6817 Hickory

Other Research Pursued

Increased woody vegetative cover along the upper reach of the riparian corridor from 6.3% in 1993 to 31% in 2012, and along the lower reach from 3.5% in 1993 to 72% in 2012.

The research assistant performed an aerial image analysis of vegetative cover to identify the change in vegetative cover – as a percentage – as a result of the restoration. She utilized a 2012 orthoimage from Google Earth and a 1993 orthoimage from the USGS to perform her analysis. She performed a raster analysis of each image, manually identifying cells within each image with over 50% vegetation. Cells with less than 50% vegetation were given a value of 0, while cells with over 50% vegetation were given a value of 1. The boundary of the riparian corridor is defined by the paths on either side of the restored creek, as seen in the image below.



In order to derive the total number of grid cells that comprise the riparian corridor, the site was divided along Dublin Blvd, which is the boundary for the upper and lower reaches of the project. The upper reach had an average width of 8 cells, while the lower reach had an average width of five cells. Using this information, the area of the riparian corridor (in cells) was calculated as seen below.

	Width (in cells)	Length (in cells)	Area of Riparian Corridor
Upper Reach	8	76	608

Lower Reach	5	40	200
Total	--	--	808

	Upper Reach	Lower Reach	Total
1993	38	7	45
2012	191	145	336

Identifying the number of vegetated cells in each reach for 1993 and 2012, the researchers then derived the percent of land area covered by woody vegetation for each reach in 1993 and 2012:

(Area of vegetated cells/total number of cells) x 100 = percent vegetated cover
1993 – Upper Reach: 38/608 x 100 = 6.25%
– Lower Reach: 7/200 x 100 = 3.5%
2012 – Upper Reach: 191/608 x 100 = 31.4%
– Lower Reach: 145/200 x 100 = 72.5%

Cost Comparison Methods

According to staff at the Alameda County Flood Control District's Zone 7 Water Agency, maintenance of the channel along the restored section of Tassajara Creek costs an estimated $18,000 - $35,000 per year, while maintenance of a traditional trapezoidal channel of the same length costs an estimated $40,000 - $60,000 per year. This has resulted in an estimated savings of $22,000 - $25,000 per year for Zone 7 of the Alameda Flood Control District.

Cost estimates for maintenance were provided by Zone 7 of the Alameda Flood Control District. These are estimates based on staff expertise and do not reflect figures in their accounting records.

LOW	Traditional			Tassajara		
	$	frequency (/yrs)	cost per year	$	frequency (/yrs)	$ per year
Sediment removal	$50,000	5	**$10,000**	$0	1	**$0**
Slide repair	$30,000	1	**$30,000**	$30,000	5	**$6,000**
Tree maintenance	$0	1	**$0**	$25,000	5	**$5,000**
Debris	$0	1	**$0**	$5,000	1	**$5,000**
Homeless	$0	1	**$0**	$2,000	1	**$2,000**
		TOTAL	**$40,000**		**TOTAL**	**$18,000**

HIGH	Traditional			Tassajara		
	$	frequency (/yrs)	$ per year	$	frequency (/yrs)	$ per year
Sediment removal	$50,000	5	$10,000	$0	1	$0
Slide repair	$50,000	1	$50,000	$50,000	5	$10,000
Tree maintenance	$0	1	$0	$25,000	5	$5,000

Debris	$0	1	$0	$10,000	1	$10,000
Homeless	$0	1	$0	$10,000	1	$10,000
		TOTAL	$60,000		**TOTAL**	$35,000

	Traditional	Tassajara	Difference
LOW	$40,000	$18,000	$22,000
HIGH	$60,000	$35,000	$25,000

The full range of savings is then $5,000 (Low traditional-High Tassajara, or $40,000-$35,000) to $42,000 (High traditional-Low Tassajara, or $60,000-$18,000).

Reusing 208 cubic yards of concrete from a bridge demolished on site as buried riprap resulted in an estimated savings of $8,500 in material as well as eliminated disposal costs associated with the rubble.

Cost of material was estimated at $23.50 per cubic yard based on cost data found at allcostdata.info, a construction supply information website.