

**2004 Greenline Survey
Big Chico Creek, Bidwell Avenue Reach
Chico, California**

Report on vegetation composition and change since 1998.



July 01, 2004: Orene Owen marks the zero point for the upper reach right bank Greenline.

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Table of Contents

Introduction	page 1
Materials & Method	1 - 3
Results	3 - 5
Table 1: Greenline Transect Summary 2004	3
Table 2: Cross-section Transect Summary 2004 and 1998	4
Table 3: Woody Supplemental Data Summary 2004 and 1998	4
Discussion	5
Appendix A. Data.	7 - 11
Table A: Greenline Transect Data and Stability Ratings 2004 and 1998	7 - 8
Table B: Cross-section Transect, Upper Reach Data 2004 and 1998	9
Table C: Cross-section Transect, Middle Reach Data 2004	9
Table D: Cross-section Transect , Lower Reach Data 2004 and 1998	10
Table E: Woody Species Supplemental Data 2004 and 1998	11
Appendix B. Species List	12 - 13
Appendix C. Bidwell Avenue reach 1998 survey summary from the Existing Conditions Report, Big Chico Creek Watershed Project (2000)	14 - 16

Introduction.

This report characterizes vegetation along a part of Big Chico Creek in Chico, California, and summarizes changes in this vegetation from 1998 to 2004. The project area extends one third of a mile downstream from the Nord Avenue bridge over Big Chico Creek, parallel to Bidwell Avenue.

This report serves to document initial vegetation conditions prior to stream alteration work and invasive plant control as part of an Urban Streams Grant project to improve water quality, fisheries and riparian wildlife habitat.

Prior vegetation conditions at this location were recorded through a survey performed during November 1998 by Robin Fallscheer and Dave Dziuk for the Existing Conditions Report (ECR) of the Big Chico Creek Watershed Project (D. Holtgrieve, Editor, 2000; CSU Chico Research Foundation). Summary 1998 data from this ECR, together with incomplete copies of original survey field notes, provide a basis for evaluating vegetation changes as compared to the survey data collected in July and September 2004 by James Dempsey, assisted by Orene Owen, Robin McCollum, and Kristin McHenry.

The survey protocol used was the *Greenline Riparian-Wetland Monitoring* method, U.S. Bureau of Land Management Technical Reference 1737-8 (Cagney, 1993). This protocol was previously modified in order to be used in conjunction with the USFS Stream Conditions Inventory (SCI) protocol. The intent of the protocol is to produce baseline data that can later be used to measure change in the vegetation. The survey documented plant community composition in transects parallel to the north and south banks, as well as in cross-section transects perpendicular to the channel.

This is a mixed riparian forest, consisting of remnant mature native riparian trees in the process of being succeeded by invasives, including tree-of-heaven, catalpa, silver maple, edible fig, walnut, privet, and other exotic species. The Northern California black walnut (*Juglans hindsii* x.) is not native to this part of California, and is likely to be hybrid progeny of historic horticultural introductions. This area has declined from what was at one time probably Sycamore Series and Valley Oak Series vegetation types (*A Manual of California Vegetation*, California Native Plant Society, 1998).

Materials and Methods.

The plant survey was conducted using the modified *Greenline Riparian – Wetland Monitoring* protocol (U.S.D.I. Bureau of Land Management Technical Reference 1737-8, Cagney, 1993). In addition, *Monitoring the Vegetation Resources in Riparian Areas* (U.S.D.A. Forest Service General Technical Report RMRS-GTR-47, Winward, 2000) was used as a reference in conjunction with the greenline protocol. According to the protocol, the greenline is defined as *that specific area where a more or less continuous cover of vegetation is encountered when moving away from the center of an observable channel*. Three components of data are collected: Greenline Transects, Riparian Cross-section Transects, and Woody Species Supplemental Data.

Initially the first cross-section rebar was established 15 feet from the SCI cross-section marker. The greenline transect is 363 feet total along each bank, so the total north bank plus south bank greenline transect length is 726 feet. On each bank 363 feet was divided into thirds, each of three 121-foot sections encompassing both banks directly opposite of one another. Plant community types were recorded for 121 feet along each bank, with each 121-foot segment beginning at one of the three cross-sections. The three cross-sections are numbered starting from the furthest upstream: cross-section # 1 is the upper reach, cross-section # 2 is the middle reach, and cross-section # 3 is the lower reach. The upper reach greenline 121-foot transects were placed going downstream from the cross-section, while the middle and lower reach greenline transects were placed going upstream from the cross-sections.

Study area boundaries were established using the 1998 location descriptions of reference landmark features and rebar witness posts. Rebar witness posts were placed upland perpendicular to the creek along the cross-section transects using compass bearings to record each location in order to relocate both cross-section and greenline transects for accurate comparison of before and after conditions. The upland edges of the study area were established as an end point for the cross-section transects. The following features designate the edge of the riparian upland zone from the edge of the creek: the upland end on each north bank cross-section transect is the witness post (not far from Bidwell Avenue pavement). The south bank upland cross-section transect ends were redesignated by descriptions of assumed property bounds (fence or maintained landscape edge).

All transects were established by laying a measuring tape with zero at the intersection of the greenline and cross-section transects, and then determining the community type composition by identifying all plants within three feet of the transect line by holding a six-foot rod centered over the line. Woody species data were counted for each plant canopy dripline overlapping the rod survey zone, i.e. plants were only counted if they were considered to be rooted within this area. For each of the survey transects, the community type composition was determined and recorded by measuring the total linear feet of each community type with a resolution of one foot.

Stability class ratings for the greenline composition data were determined using ratings originally established by Roger Cole, Paul Maslin, Robin Fallscheer, and David Dziuk during a previous Big Chico Creek Stream Survey. Stability ratings estimate the ability of a community type to stabilize the bank based on a scale of one to ten, with ten the most stable. For each community type within the greenline transect, the percent composition was multiplied by stability class and divided by 100, providing a stability index number. Stability index numbers for each community were then summed to rate stability for the entire greenline transect. Results may be characterized by a stability rating of (0-2) as very poor, (3-4) poor, (5-6) moderate, (7-8) good, and (9-10) is excellent.

The woody species data were collected from all transects, by tally of individual trees and shrubs. These were classified according to four development classes: seedling (typically under three feet tall), sapling (3'-10'), mature (<50% dead limbs), and decadent (>50% dead limbs). Vining plants such as Himalayan blackberry (*Rubus discolor*) or grape (*Vitis*) were not included in the woody data.

Following the collection of data, community type lengths and woody counts were converted to percentages to evaluate the overall composition of vegetation. Community types were determined by considering the dominant species. A plant species list was also compiled during the survey. The community type “barren” designates where cobble, sandbars, or bare soil is exposed and there was no plant cover. For this survey area barren areas occurred only as creek bed scour zone that was not covered with water during the time the survey was conducted. The community type “annual grass” includes non-native grasses and annual herbs, such as riggut brome (*Bromus diandrus*), annual ryegrass (*Lolium perenne*), wild oat (*Avena fatua*), thistles, etc.

Results.

Tables 1, 2 and 3 summarize and compare data collected in 2004 (July and September) and 1998 (November).

Table 1 compares composition of native-dominated vegetation communities and exotic-dominated communities within the study area. Community types in which native and non-native species are co-dominant are attributed evenly (divided in half) between native- and exotic-dominated communities in this summary. The ‘annual grass’ community is not considered native. All 2004 survey data is included in Appendix A, Table A.

Table 1 - Greenline Transect Summary	2004		1998*
	feet	percent	
	native-dominated communities	315	43%
non-native -dominated communities	411	57%	39% *
barren	0	0%	
total length observed	726	100%	

*1998 figures based on assuming a typographical error in the BCCWP ECR, that “88% of the communities are woody” should have read “78%”. The complete text: *“The coverage of the transect by woody community types is 88%. Of this coverage, 69% is still dominated by native trees and shrubs. This high percentage of native plants reflects the long-lived valley oaks that remain on this site. Only 32% of the 22% in herbaceous coverage are native. This native coverage is one native species, rice cutgrass.”* i.e.: $88\% + 22\% = \mathbf{110\%}$. As the 1998 survey was conducted in early November when the creek had lowest flow, more creek bed scour zone with rice grass growth would be shown in the survey data, given the season, than that of the July 2004 data – so I assume that the 22% herbaceous cover is correct and the 88% is incorrect, making the result a bit more comparable to 2004 percentages that otherwise.

The Greenline vegetation composition appears to have changed from 1998 to 2004, with ten percent more invasives having replaced native dominant plant coverage.

Table 2 summarizes cross-section transect data for 1998 and 2004.

Table 2 - Cross-section Transect Summary				
	2004		1998	
	feet	percent	feet	percent
Transect # 1 - Upper Reach				
native-dominated communities	59	32%	60	33%
non-native -dominated communities	87	48%	87	48%
barren or water	36	20%	34	19%
total length observed	182	100%	181	100%
Transect # 2 - Middle Reach				
native-dominated communities	26	31%	no data	
non-native -dominated communities	17	20%		
barren or water	41	49%		
total length observed	84	100%		
Transect # 3 - Lower Reach				
native-dominated communities	81	49%	53	43%
non-native -dominated communities	31	19%	27	22%
barren or water	52	32%	44	35%
total length observed	164	100%	124	100%

Table 3 summarizes the supplemental woody data collected for all survey transects combined (Greenline and cross-sections).

Table 3 : Woody Supplemental Data Summary						
		seedling or 0-3'	young or 3-10'	mature or >10', <50% dead limbs	decadent, i.e. >50% dead limbs	total
2004	individuals	293	121	124	2	540
	percent of total	54%	22%	23%	0%	100%
	percent native	3%	7%	33%	0%	10%
	percent exotic	97%	93%	67%	100%	90%
1998	individuals	354	61	32	1	448
	percent of total	79%	14%	7%	0%	100%
	percent native	no data				
	percent exotic					

Complete data collected during 2004 is listed in Appendix A. Appendix B includes a list of observed species. Appendix C is the Bidwell Avenue summary text from the Existing Conditions Report for the Big Chico Creek Watershed Project (2000).

Discussion.

Greenline transect data shows that between 1998 and 2004, non-native-dominated communities have exceeded native-dominated communities over the study area. Supplemental woody data suggest an abundance of exotic seedlings in place to succeed mature trees falling from the overstory, and scarce native seedlings. What were once probably Sycamore Series and Valley Oak Series native vegetation communities appear to be well in process of succession to invading exotic species, including silver maple (*Acer saccharinum*), northern California black walnut hybrids (*Juglans hindsii* x.), tree-of-heaven (*Ailanthus altissima*), and northern catalpa (*Catalpa speciosa*).

Vegetation bank stability ratings were still evaluated as moderate (5.82) in 2004, changing little from 1998 (5.64).

Data of this report can serve to evaluate future change in riparian vegetation along this Bidwell Avenue stretch of Big Chico Creek with future Greenline surveys.

Appendices

Appendix A.

Table A: Greenline transect data and stability ratings.

Bidwell Avenue reach of Big Chico Creek surveyed July 01, 02, and September 19, 2004.
Stability Rating: 0-2=very poor, 3-4=poor, 5-6=moderate, 7-8=good, 9-10=excellent

Community	Feet	% Composition	Stability	
			Class	Index
<i>Acer negundo</i> / <i>Alnus rhombifolia</i>	8	1.1	8	0.09
<i>Acer negundo</i> / <i>Sambucus mexicana</i>	14	1.9	6	0.12
<i>Acer negundo</i> / <i>Vinca major</i>	3	0.4	6	0.02
<i>Acer negundo</i> / <i>Vitis californica</i>	14	1.9	6	0.12
<i>Acer saccharinum</i> / <i>Ailanthus altissima</i>	12	1.7	6	0.10
<i>Acer saccharinum</i> / <i>Catalpa speciosa</i>	15	2.1	6	0.12
<i>Acer saccharinum</i> / <i>Ficus carica</i>	11	1.5	6	0.09
<i>Acer saccharinum</i> / <i>Juglans hindsii</i> x.	23	3.2	6	0.19
<i>Acer saccharinum</i> / <i>Vitis californica</i>	4	0.6	6	0.03
<i>Ailanthus altissima</i>	3	0.4	4	0.02
<i>Ailanthus altissima</i> / <i>Ligustrum lucidum</i>	13	1.8	4	0.07
<i>Ailanthus altissima</i> / <i>Vitis californica</i>	20	2.8	4	0.11
<i>Alnus rhombifolia</i>	5	0.7	9	0.06
<i>Alnus rhombifolia</i> / <i>Catalpa speciosa</i>	12	1.7	8	0.13
<i>Alnus rhombifolia</i> / <i>Ficus carica</i>	8	1.1	8	0.09
<i>Alnus rhombifolia</i> / <i>Rubus discolor</i>	7	1.0	8	0.08
<i>Alnus rhombifolia</i> / <i>Sambucus mexicana</i>	7	1.0	8	0.08
annual forbs (native)	2	0.3	2	0.01
annual grass	14	1.9	2	0.04
<i>Artemisia douglasiana</i>	9	1.2	3	0.04
<i>Catalpa speciosa</i> / <i>Hedera helix</i>	3	0.4	8	0.03
<i>Catalpa speciosa</i> / <i>Vitis californica</i>	17	2.3	7	0.16
<i>Ficus carica</i> / <i>Rubus discolor</i>	10	1.4	4	0.06
<i>Ficus carica</i> / <i>Vitis californica</i>	16	2.2	4	0.09
<i>Fraxinus latifolia</i> /	4	0.6	8	0.04
<i>Fraxinus latifolia</i> / annual grass	6	0.8	7	0.06
<i>Fraxinus latifolia</i> / <i>Calycanthus occidentalis</i>	3	0.4	8	0.03
<i>Fraxinus latifolia</i> / <i>Carex nudata</i>	1	0.1	8	0.01
<i>Fraxinus latifolia</i> / <i>Catalpa speciosa</i>	2	0.3	7	0.02
<i>Fraxinus latifolia</i> / <i>Vitis californica</i>	8	1.1	8	0.09
<i>Juglans hindsii</i> x.	2	0.3	6	0.02
<i>Juglans hindsii</i> x. / <i>Acer negundo</i>	5	0.7	6	0.04
<i>Juglans hindsii</i> x. / <i>Ailanthus altissima</i>	11	1.5	6	0.09
<i>Juglans hindsii</i> x. / annual grass	1	0.1	6	0.01
<i>Juglans hindsii</i> x. / <i>Catalpa speciosa</i>	17	2.3	6	0.14
<i>Juglans hindsii</i> x. / <i>Sambucus mexicana</i>	34	4.7	6	0.28
<i>Juglans hindsii</i> x. / <i>Vinca major</i>	13	1.8	6	0.11
<i>Juglans hindsii</i> x. / <i>Vitis californica</i>	11	1.5	6	0.09

<i>Ligustrum lucidum</i> / <i>Vitis californica</i>	17	2.3	4	0.09
<i>Platanus racemosa</i> / <i>Catalpa speciosa</i>	1	0.1	8	0.01
<i>Platanus racemosa</i> / <i>Juglans hindsii</i> x.	27	3.7	8	0.30
<i>Platanus racemosa</i> / <i>Vitis californica</i>	25	3.4	8	0.28
<i>Populus fremontii</i> / annual grass	1	0.1	6	0.01
<i>Quercus lobata</i> / <i>Acer negundo</i>	61	8.4	6	0.50
<i>Quercus lobata</i> / <i>Acer saccharinum</i>	7	1.0	6	0.06
<i>Quercus lobata</i> / <i>Ailanthus altissima</i>	24	3.3	6	0.20
<i>Quercus lobata</i> / <i>Alnus rhombifolia</i>	47	6.5	6	0.39
<i>Quercus lobata</i> / annual grass	2	0.3	6	0.02
<i>Quercus lobata</i> / <i>Catalpa speciosa</i>	16	2.2	6	0.13
<i>Quercus lobata</i> / <i>Celtis occidentalis</i>	14	1.9	6	0.12
<i>Quercus lobata</i> / <i>Ficus carica</i>	6	0.8	6	0.05
<i>Quercus lobata</i> / <i>Fraxinus latifolia</i>	8	1.1	6	0.07
<i>Quercus lobata</i> / <i>Juglans hindsii</i> x.	20	2.8	6	0.17
<i>Quercus lobata</i> / <i>Morus alba</i>	17	2.3	6	0.14
<i>Quercus lobata</i> / <i>Vitis californica</i>	9	1.2	6	0.07
<i>Vitis californica</i>	28	3.9	4	0.15
<i>Vitis californica</i> / annual grass	3	0.4	4	0.02
<i>Vitis californica</i> / <i>Artemisia douglasiana</i>	2	0.3	4	0.01
<i>Vitis californica</i> / <i>Hedera helix</i>	17	2.3	4	0.04
<i>Vitis californica</i> / <i>Vinca major</i>	6	0.8	4	0.03
Total :	726	100		5.82

vs. 1998: 5.64

Table B : Cross-section Transect, Upper Reach 2004 Data

Total Riparian Width: 182 feet

Date surveyed: July 02, 2004

Community Type	Feet	% Composition
<i>Acer negundo ssp.californica / Juglans hindsii</i>	13	7.1
<i>Acer negundo ssp.californica / Vinca major</i>	7	3.8
<i>Acer negundo ssp.californica / Vitis californica</i>	2	1.1
<i>Ailanthus altissima / Catalpa speciosa</i>	14	7.7
<i>Ailanthus altissima / Juglans hindsii</i> x.	4	2.2
<i>Ailanthus altissima / Platanus racemosa</i>	10	5.5
<i>Ailanthus altissima / Vinca major</i>	11	6.0
<i>Ailanthus altissima / Vitis californica</i>	34	18.7
barren	8	4.4
<i>Catalpa</i>	5	2.7
<i>Juglans hindsii / Vitis californica</i>	12	6.6
<i>Juglans hindsii</i> x. / <i>Vinca major</i>	3	1.6
<i>Quercus lobata / Ailanthus altissima</i>	40	22.0
<i>Quercus lobata / Juglans hindsii</i> x.	1	0.5
water	18	9.9
Total :	182	100.0
<p>Location: Relocated L bank wooden fence/berm-restraint and 10"dbh reference <i>Juglans</i> (9' at 17 degrees from start of transect), and R bank 34"dbh <i>Q.lobata</i> (5' upstream to transect end point); transect at 173 degrees. Neither L bank nor R bank rebar was found.</p>		

Table C : Cross-section Transect # 2, Middle Reach 2004 Data

Total Riparian Width: 84 feet = 17 (L X-upland) + 41 (scour channel) + 26 (R X-upland)

Date surveyed: R July 02 and L Sept 19, 2004

Community Type	Feet	% Composition
barren	2	2.4
<i>Juglans hindsii</i> x. / <i>Ailanthus altissima</i>	4	4.8
<i>Juglans hindsii</i> x. / annual grass	2	2.4
<i>Juglans hindsii</i> x. / <i>Catalpa speciosa</i>	11	13.1
<i>Quercus lobata / Acer negundo</i>	26	31.0
water	39	46.4
Total feet:	84	100.0
<p>Location: Right bank rebar located 8' SE of large <i>Quercus lobata</i> along road, and 8' NE from fork-trunk <i>Acer negundo</i>. X-section bears 192 degrees from rebar, ends left bank at black chainlink fence 14' upstream from the fence downstream corner.</p>		

Table D : Cross-section Transect # 3, Lower Reach 2004 Data

Total Riparian Width: 164 feet (= 112 + 52 scour channel)

Date surveyed: July 02, 2004

Community Type	Feet	% Composition
<i>Alnus rhombifolia / Catalpa speciosa</i>	3	1.8
<i>Alnus rhombifolia / Ficus carica</i>	5	3.0
<i>Alnus rhombifolia / Ligustrum vulgare</i>	22	13.4
<i>Alnus rhombifolia / Sambucus mexicana</i>	15	9.1
<i>Alnus rhombifolia / Vitis californica</i>	4	2.4
barren	38	23.2
<i>Platanus racemosa / Catalpa speciosa</i>	1	0.6
<i>Quercus lobata</i> / annual grass	2	1.2
<i>Quercus lobata / Juglans hindsii</i> x.	1	0.6
<i>Quercus lobata / Vitis californica</i>	9	5.5
<i>Rubus discolor</i>	15	9.1
<i>Sambucus mexicana</i>	25	15.2
<i>Vitis californica</i>	10	6.1
water	14	8.5
Total feet:	164	100.0

Location: R side: West of power pole, a large *Q. lobata*, then 12' south to nail is zero point. X-section perpendicular to creek through L side 16" d.b.h. *Alnus* carved "Party Hardy".

Table E : Woody Species Supplemental Data 2004

Date surveyed: July 01 and 02, and September 19, 2004

All greenline and cross-section transect woody data has been combined in this table.

	Species	Seedling	Sapling	Mature <50% dead	Mature >50% dead
Native species	<i>Acer negundo</i>	3	2	12	
	<i>Alnus rhombifolia</i>		2	10	
	<i>Calycanthus occidentalis</i>		1		
	<i>Fraxinus latifolia</i>	1		4	
	<i>Platanus racemosa</i>	2	3	6	
	<i>Populus fremontii</i>	1			
	<i>Quercus lobata</i>	1		10	
	<i>Salix lasiolepis</i>		1		
Non-native species	<i>Acer saccharinum</i>	25	6	3	
	<i>Ailanthus altissima</i>	127	54	22	
	<i>Catalpa speciosa</i>	48	31	15	
	<i>Celtis occidentalis</i>	46	2	3	
	<i>Ficus carica</i>	11	14	18	1
	<i>Juglans hindsii</i> x.	8	4	14	1
	<i>Ligustrum lucidum</i>	16		9	
	<i>Morus alba</i>		2	1	
	<i>Robinia pseudoacacia</i>	5			
Total count:		294	122	127	2
Total %:		53.9	22.4	23.3	0.4

Appendix B. Species list.

Bidwell Avenue, Big Chico Creek survey of July and October, 2004. Checked and modified from 11/25/98 Bidwell Avenue survey by Robin Fallscheer and Dave Dziuk.

Boldface type indicates a non-native species.

SCIENTIFIC NAME

COMMON NAME

WOODY PLANTS

<i>Acer negundo ssp. californica</i>	California boxelder
<i>Acer saccharinum</i>	silver maple
<i>Ailanthus altissima</i>	tree-of-heaven
<i>Albizia julibrissin</i>	silk tree
<i>Alnus rhombifolia</i>	white alder
<i>Aristolochia californica</i>	California pipevine
<i>Baccharis salicifolia</i>	mule's-fat
<i>Calycanthus occidentalis</i>	western spicebush
<i>Catalpa speciosa</i>	northern catalpa
<i>Celtis occidentalis</i>	common hackberry
<i>Cephalanthus occidentalis var. californicus</i>	California button-willow
<i>Eriobotrya japonica</i>	loquat
<i>Faxinus latifolia</i>	Oregon ash
<i>Ficus carica</i>	edible fig
<i>Hedera helix</i>	English ivy
<i>Juglans hindsii</i> x.	northern California black walnut hybrids
<i>Juglans regia</i>	English walnut
<i>Laurus nobilis</i>	sweet bay, Grecian laurel
<i>Ligustrum lucidum</i>	glossy privet
<i>Lonicera sp.</i>	evergreen honeysuckle (non-native)
<i>Morus alba</i>	white mulberry
<i>Pistacia chinensis</i>	Chinese pistachio
<i>Platanus racemosa</i>	Western sycamore
<i>Prunus cerasifera</i>	cherry plum
<i>Quercus lobata</i>	valley oak
<i>Robinia pseudoacacia</i>	black locust
<i>Rosa californica</i>	California wild rose
<i>Salix exigua</i>	sandbar willow
<i>Salix goodingii</i>	black willow
<i>Salix lasiolepis</i>	arroyo willow
<i>Sambucus mexicana</i>	blue elderberry
<i>Toxicodendron diversilobum</i>	western poison-oak
<i>Vitis californica</i>	California wild grape
<i>Woodwardia fimbriata</i>	giant chain fern

HERBACEOUS PLANTS

<i>Amaryllis belladonna</i>	naked lady
<i>Anthriscus caucalis</i>	bur-chervil

<i>Artemisia douglasiana</i>	mugwort
<i>Arum italicum</i>	Italian arum
<i>Avena</i> sp.	wild oats (all non-native species)
<i>Bromus diandrus</i>	ripgut brome
<i>Carex barbarae</i>	Santa Barbara sedge
<i>Carex nudata</i>	torrent sedge
<i>Centaurea solstitialis</i>	yellow star-thistle
<i>Chenopodium strictum</i> var. <i>glaucophyllum</i>	glaucus-leaf goosefoot
<i>Chenopodium ambrosioides</i>	Mexican-tea
<i>Conyza floribunda</i>	many-flowered horseweed
<i>Cynodon dactylon</i>	Bermudagrass
<i>Cyperus eragrostis</i>	tall cyperus
<i>Cyperus strigosus</i>	false nutsedge
<i>Digitaria</i> sp.	crabgrass
<i>Galium</i> sp.	bedstraw sp.(some native species)
<i>Hordeum murinum</i>	barley
<i>Iris</i>	iris (non-native cultivar)
<i>Juncus patens</i>	spreading rush
<i>Lactuca serriola</i>	prickly lettuce
<i>Leersia oryzoides</i>	rice cutgrass
<i>Lolium multiflorum</i>	annual ryegrass
<i>Lunaria annua</i>	moonwort
<i>Marah</i> sp.	manroot sp.(all native species)
<i>Marrubium vulgare</i>	horehound
<i>Melilotus alba</i>	white sweet clover
<i>Mentha arvensis</i>	American wild mint
<i>Oenothera elata hirsutissima</i>	hairy evening-primrose
Orobanche vallicola	valley broom-rape
<i>Oxalis</i> sp.	wood-sorrel
<i>Paspalum dilatatum</i>	dallisgrass
<i>Phytolacca americana</i>	American pokeweed
<i>Polygonum hydropiper</i>	water-pepper
<i>Polygonum persicaria</i>	lady's thumb
<i>Pyracantha koidzumii</i>	firethorn
<i>Rubus discolor</i>	Himalayan blackberry
<i>Rubus ursinus</i>	California blackberry
<i>Setaria pumila</i>	yellow bristlegrass
<i>Solanum americanum</i>	American black nightshade
<i>Sorghum halepense</i>	Johnsongrass
<i>Torilis arvensis</i> ssp. <i>purpure</i>	purple hedge-parsley
<i>Urtica dioica</i> ssp. <i>Holosericea</i>	hoary creek nettle
<i>Verbascum thapsus</i>	woolly mullein
<i>Vinca major</i>	periwinkle
<i>Xanthium strumarium</i>	cockleburr

Appendix C. Bidwell Avenue survey reach extract from the Existing Conditions Report for the Big Chico Creek Watershed Project (2000, Don Holtgrieve, editor; CSU Chico Research Foundation).

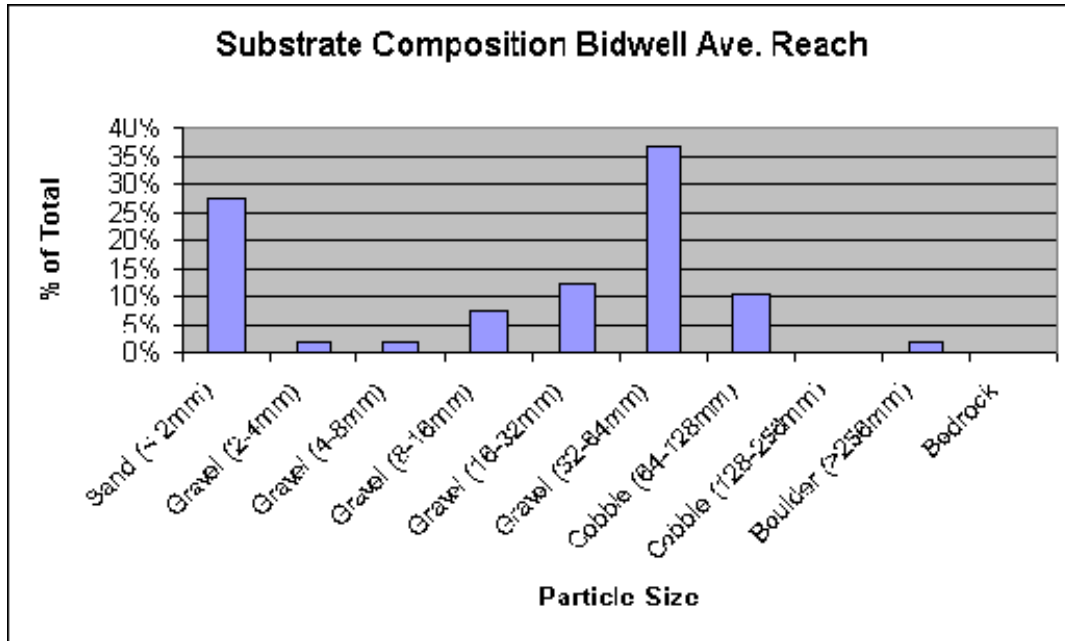
BIG CHICO CREEK - BIDWELL AVENUE REACH

The Bidwell Avenue Reach begins 72 m downstream of the Nord Avenue Bridge, and extends 534 m. Big Chico Creek is more entrenched here than in other reaches, with floodwater unable to access a floodplain. This sensitive reach is actually less entrenched than downstream towards Rose Avenue. Banks are generally fine soil particles or riprap.

Table Average SCI inventory for Big Chico Creek - Bidwell Ave. Reach

Reach	Length (m)	Stream Type	% fines in pool tails	Gradient	Bankfull Width	W/D ratio	Streambank stability (% stable)	Shading (%)
Bidwell Ave.	534	B4c-F4	16.8	.6	11.4	29.3	25	72.1

The reach cross-sections are on the cusp between B4c and F4. This reflects the F4 stream type process of forming a new geomorphic floodplain at its current level. Overall cross-section characteristics correspond with Rosgen's description of the F4 stream type, "...incised in alluvial valleys resulting in the abandonment of former floodplains... slopes less than 2%, ...and have width/depth ratios that are high to very high" (Rosgen 1996, pg5-154). Width/depth ratios though, fall slightly higher than the mean for an F4 stream.



The pebble count showed significant concentration of fines in this reach (particles < 2mm). In fact, 27% of the total substrate was surveyed as fines, second only to the Sycamore Creek Reach for fine levels. This is indicative of the reach's deep entrenchment in fine depositional soils. Rosgen describes F4 sediment supply as "moderate to high depending on stream bank stability. " Stream bank erosion rates are very high due to side slope rejuvenation and mass wasting processes, "...unless, riparian vegetation ... covers the entire slope face of the channel banks"

(Rosgen, pg. 5-154). Pebble size here is smaller than Lower Park. LWD count for this reach was 113 pieces/mile, and could be regarded as generally good.

This reach is 57% pools, higher than the USFS ratio for transport reaches. The stream is well shaded. The percentage of wood formed pools is also high at 75%. Large wood contributes to pool formation. Residual pool depths are substantially greater than Lower Park's, averaging 0.9 m deeper. This may be partially because of the additional storm drain flows added to the creek between the two reaches, and may also reflect the additional confinement of this reach which is over 1.6 m more entrenched in valley soils.

In this reach only 15% of the banks are stable. Since it tends to form a new geomorphic floodplain at its lower level, the creek cuts into its banks. The high width/depth ratio is indicative of and contributes to this process. The stream tends to be shallow and wide, especially at riffles and runs, putting more erosive pressure (shear stress) on its banks. The percentage of unstable banks is also evidence of the process of floodplain formation. According to Region 5 USFS data, a problem of stream bank stability exists if the percentage of stable banks is less than 75% in transport reaches (generally B streams), which include the F4 stream type.

The stream is bound by Bidwell Avenue to the north. Since Butte County is obligated to protect the road from undercutting, riprap has been placed at several locations, making the bank progressively "harder" and more resistant to erosion. That riprap design does not usually provide for vegetation or soil in the voids, riparian canopies are usually absent. It was difficult to locate riffles for the cross-section and still avoid north bank riprap. Private property owners to the south have backyards that are deep and thus far have not hardened their banks with riprap. This has allowed the stream to create some streamside floodplain to the south and has limited down cutting.

Significant levels of fines were discovered in this reach. It is second only to the Sycamore reach in terms of fines. Additionally, 85% of its banks rated unstable or vulnerable.

Rosgen describes the F4 stream type as, "...extremely sensitive to disturbance with a poor recovery potential, ... a very high sediment supply and stream bank erosion, ...vegetation's controlling influence on stream bank erosion and stream stability is moderate due to the difficulty of vegetation growing up the entire inner banks." Therefore, preliminary indications show that Big Chico Creek is very sensitive to changes in stream flow magnitude, timing, and/or sediment increases.

A critical problem that complicates the analysis of the Bidwell Avenue Reach and the Lower Park Reach is the altering of the natural water flow cycles below the Five-Mile Diversion Dam. The peaks are cut off. The diversion structure only allows flows up to 1500 cfs to pass. Determining bankfull flow level is difficult because the water volume never exceeds a certain level.

Standard bankfull determination methods were used. One difference between the Lower Park Reach and the Bidwell Avenue Reach is that a number of storm drains enter the creek upstream of the Bidwell Avenue Reach, ultimately increasing water levels.

Riparian Inventory

This reach is the lowest site on Big Chico Creek, located immediately downstream from the Nord Avenue Bridge (State Route 32). It is surrounded by residential development. The northwest side is bound by Bidwell Avenue with residences immediately behind it. There is also a small area of abandoned floodplain on this side. The southeast side has residential development often reaching to the top of the bank, and a short stretch of commercial development just off of Nord Avenue. In this reach the banks are very steep.

The vegetation can be described as riparian forest, though only a few mature specimens of native trees remain. Like the Upper Park Reach, this reach would best be described as a community of exotic invasive vegetation including the Tree-of-Heaven (*Ailanthus altissima*) which is moving aggressively into the mix from the upper end of the reach.

Greenline Transect

The coverage of the transect by woody community types is 88%. Of this coverage, 69% is still dominated by native trees and shrubs. This high percentage of native plants reflects the long-lived valley oaks that remain on this site.

Only 32% of the 22% in herbaceous coverage are native. This native coverage is one native species, rice cutgrass.

The stability rating was 5.69. This is a moderate level of stability in terms of the vegetation's ability to protect the banks from erosion or disturbance.