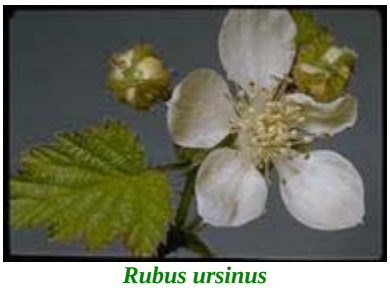
Big Chico Creek Greenline Survey
Existing Condition Report

Sycamore Restoration



Rubus ursinus

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For: City of Chico
Streaminders - Chapter of the Izaak Walton League
Roger Cole, Project Manager

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Sycamore Restoration, Big Chico Creek Greenline Survey

Existing Conditions Report

Introduction. As requested by Streaminders, a riparian vegetation survey was conducted along an urban stretch of Big Chico Creek in Chico, CA. The survey protocol used was the *Greenline Riparian-Wetland Monitoring* method, designed by the U.S. Department of the Interior and the Bureau of Land Management. 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 subsequent to restoration. The following study provides a current analysis of the vegetation existing along Big Chico Creek, east of the pool at One Mile, in Lower Bidwell Park. Both the area surveyed and the surrounding areas are planned to undergo restoration in an attempt to alter the current composition of flora in the following years to a greater percentage of native riparian species and decrease the number of invasive non-native species. In the study, the flora composition was documented for both the North and South bank of the creek, as well as the upland vegetation along cross-section transects. The overall community type of Lower Bidwell Park is riparian forest, categorized as Valley oak series vegetation type in *A Manual of California Vegetation* published by the California Native Plant Society.

Materials & Methods. The plant survey was conducted using the modified *Greenline Riparian – Wetland Monitoring* 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.* The method is divided in to three main components for collection of data: Greenline Transect, Riparian Cross-section Transects, and Woody Species Supplemental Data.

Initially the first cross-section rebar was established 15 ft. from the SCI cross-section marker. The greenline transect is 363 ft. total along one bank, plus another 363 ft. total along the opposite bank. Thus the total North and South bank greenline transect is 726 ft. in length. On each bank the 363 ft length was divided into thirds, equaling three 121 ft. sections, that are directly opposite of one another. Plant community types were recorded for 121 ft. along each bank, with each 121-foot segment beginning at one of the three cross-sections. The cross-sections were designated along the South bank at the following feet: cross-section # 1 at 0 ft., (which is furthest downstream), cross-section # 2 at 239.5 ft., and cross-section # 3, at 1,291 ft. The cross-sections will be referred to as follows: cross-section # 1--Lower reach, cross-section # 2--Mid reach, cross-section # 3--Upper reach. The greenline transect 121 ft. sections from the lower and mid reach were placed going upstream from the cross-sections. The greenline section from the upper reach was downstream from the cross-section.

The boundary of the study area was established using six, 2-foot pieces of rebar, flagging, and permanent physical features of the park. The rebar, called witness-posts, were placed upland perpendicular to the creek, which was determined by using compass bearings. These witness-posts marked the points of cross-section as well as the beginning and end of the reach surveyed. The upland edges of the study area were established as an end point for the cross-section transects. The following physical features designate the edge of the riparian upland zone from the edge of the creek. At the upland edge of the North side is a roadway (N. Park Drive) and on the South side a large dirt path.

All transects were established by laying a measuring tape and then determining the community type composition using a 6 foot rod. The rod was used placed in the center of the transect line with 3 ft. over either side. Data was collected within this area. For the Woody species data, plants were only counted if they were rooted within this area. For each of the transects, the community type composition was determined and recorded by measuring the total feet of each community type.

The Woody Species data was collected from all transects, by tally of individual trees and shrub species. These species were classified in either the age class option (i.e.. seedling, sapling, mature <50% dead, or mature >50% dead) or the height class option (i.e.. 0-3', >3-6', >6-10',or >10'). The class to which the species were placed was based on if they were single-stemmed or multi-stemmed sprouting species. Single stem species were tallied according to their height, while multi-stem species were counted by age classes. Blackberries (*Rubus* sp.) were not included in the woody data, due to inaccessibility and inability to determine where individual plants were rooted.

Following the collection of data, community type length and woody counts were converted to percentages, to use to evaluate the vegetation composition. The community types were determined by considering the dominant species of an area at three levels: trees, shrubs, and herbaceous. A plant species list was also compiled during the survey, based on personal familiarity with the flora as well as collection of specimens for later identification. The community type titled "barren" designates areas along transects where trails exist and no vegetation was growing.

Results. The data collected from the study has been summarized and can be found in the following tables. The actual data collected can be found in the Appendix, Part A. In Table 1, the greenline transect data shows there is a greater percentage of non-native dominated communities (59.7%), than native dominated communities (35.5%). In the data there are community types that are mixed (co-dominate native and non-native species). For these community types the values were divided in half and added in equal parts to the native dominated communities and non-native dominated communities in summarizing the data.

Table 1: Greenline Transect Summary

	Feet	Percent
Total length observed:	727	100.0
Barren:	35	4.8
Native dominated communities:	258	35.5
Non-native dominated communities:	434	59.7

Cross-section Transects Summary

The cross-section transect data reveals a different composition of dominant communities. Table 2 contains the three cross-section transect summaries.

Table 2: Cross-section Transects Summary

Transect # 1 -- "Lower Reach"	**Feet**	**Percent**
Total length observed:	398	100
Water:	26	6.5
Barren:	8	2.0
Native dominated communities:	183	46.0
Non-native dominated communities:	181	45.5
Transect # 2 -- "Mid Reach"		
Total length observed:	312	100
Water:	48	15.4
Barren:	25	8.0
Native dominated communities:	145.5	46.6
Non-native dominated communities:	93.5	30.0
Transect # 3 -- " Upper Reach"		
Total length observed:	407	100
Water:	5	1.2
Barren:	8	2.0
Native dominated communities:	110	27.0
Non-native dominated communities:	284	69.8

The lower reach data shows nearly equal percentages of native and non-native community types. The mid reach data shows there is about 17% more native dominated communities than non-native communities, for this transect. In the upper reach, there were relatively few native plant communities represented, only 27%, in comparison to the large amount of non-native dominated community types making up about 70% of this transect.

The supplemental woody data summary can be found in Table 3. This table contains information of the woody species counted along all transects combined. In the summary, the percentage native verses non-native species observed for each category was determined. Notice that in the age class category the majority of species observed were native species. However in the height class option there were a greater percentage of non-native species seen. The most abundant number of non-native plants are found in the height classes 0-3 ft. at 86.4%, and >3-6 ft. at 80%.

Woody Supplemental Data Summary

Table 3: Woody Supplemental Data Summary					
Part A: Age Class Option	**Total Count**	**Total Percent**		**Percent Native Plants**	**Percent Non-native Plants**
Seedling	3	6.82		100%	0%
Sapling	30	68.18		83.3%	16.7%
Mature <50% dead	11	25		100%	0%
Mature >50% dead	0	0		0%	0%
Part B: Height Class Option					
0-3'	81	53.64		13.6%	86.4%
>3-6'	10	6.62		20.0%	80.0%
>6-10'	7	4.64		42.9%	57.1%
>10'	47	31.13		44.7%	55.3%

All of the data collected during the study has been made into tables and included in the appendix, part A. The complete species list for the area can be found beginning on page 8 in the Appendix. The Greenline transect data can be located in Table A. This data is inclusive of both the northern and southern regions of the site. The next three tables (Tables B, C, & D) include data collected from cross-sections, and are set up the same way as the greenline transect data. For all of the transect data the community types are displayed in both feet and percent composition. Also for each transect, the percent error was determined. The error was determined by the difference between the actual length of each transect and the total feet of the community types observed for each transect. All of the transects were within less than 5% error as recommended in the Greenline protocol. The Woody Species supplemental data can be found in Table F. This table includes woody counts from the greenline and the cross-section data combined.

Following the woody data a greenline stability worksheet has been included. Stability class ratings of community types were determined using ratings originally established by Roger Cole, Paul Maslin, Robin Fallscheer, and David Dziuk during a previous Big Chico Creek Stream Survey (BCCSS). The stability classes for many of the community types were directly used from the BCCSS, however, some community types had to be developed, using the established stability classes for guidance. Community types with no previous stability designation were given a stability rating determined by Roger Cole and Jessica Umbright.

Discussion. The need for a restoration program for this reach along Big Chico Creek in Lower Bidwell Park is evident when considering the abundance of non-native species occurring there. From our observations the stream edge appears to be dominated by non-natives such as *Catalpa speciosa, Ficus carica, Rubus discolor,* and *Phytolacca americana*. There were also native species present (but in fewer numbers compared to the non-natives) such as *Alnus rhombifolia, Rubus ursinus,* and *Platanus racemosa.* The greenline transect data shows that about 60% of the community types along the creek are dominated by non-native species, and there are 40% of the communities dominated by native species. It should be kept in mind that although a given community type may be dominated by native or non-native species; the community type may include both. These communities may be characterized by a native canopy over-lying non-native shrubs or herbs or vice versa.

The transect data also shows an abundance of non-native plant communities for the upper reach transect at about 70%. The percentage for the native dominated communities is nearly equal for both the lower and mid reach data at approximately 46%. However the values of the non-native communities for these two transects are not equal. The lower reach has approximately 46% non-native dominated communities, and the mid reach has 30%. It is uncertain why the composition of the upper reach differs significantly from that of the lower and mid reaches. It is suspected that it may be due to more human disturbance because of increased creek access in the upper reach area, more non-native dominated community types resulted in this area. However, areas such as the lower and mid reach, with less creek access, appear to have sustained more native dominated community types.

The supplemental woody data shows that the greatest percentages of non-native plants observed were trees in the height classes 0-3 ft. (86.4%), and >3-6 ft. (80.0%). In the age class option there was a greater percentage of native plants, but the actual number of plants counted were few. It is thought that the large numbers of non-native plant species is a result of secondary succession occurring along this site with disturbance being caused by humans. Currently it appears that native species are being out-competed by the non-native species that are flourishing in the area. The most abundant woody species seedlings are the following non-native plants: *Catalpa speciosa, Ailanthus altissima,* and *Celtis* sp. The most abundant native woody species seedlings are *Vitis californica,* and *Alnus rhombifolia.* There were no *Acer negundo* (California Box elder) trees seen in the restoration area, and few *Populus fremontii* (Fremont's Cottonwood) and *Fraxinus latifolia* (Oregon Ash). These native trees are significantly underrepresented in comparison to the non-native species inhabiting the area.

Stability ratings rate the stabilizing ability of a community type. Ratings are based on a scale of 1-10 with 10 being the most stabilizing. It is important that species chosen for restorative purposes have the ability to anchor the existing stream bank. Otherwise, serious erosion could occur due to the disturbance caused by restoration. However, non-native species with high stability ratings should still be avoided. The greater the stability of a stream bank ensures a more stable habitat for both plants and animals.
The restoration process is intended to decrease the populations of non-native plant species while increasing populations of native species. By increasing the number of native species the probability for native plants to propagate and flourish naturally should also increase. The restoration process is beneficial not only to the native flora of the area but the fauna as well. A successful restoration program may increase the number of native species of wildlife residing in the park by improving the integrity of the ecosystem itself.

Conclusion: There is an abundance of invasive non-native, a few native, and many mixed native and non-native community types currently existing throughout the 726 ft stretch of the Big Chico Creek. In the future this study will act as a basis in determining change in the vegetation composition due to restoration practices over time and can be used to help evaluate the effectiveness of the restoration methods implemented.

Appendix

Part A: Data

Species List - Big Chico Creek Greenline Survey
July 30-Sept.. 6, 2001
(**Boldface** type indicates a native species.)

SCIENTIFIC NAME	COMMON NAME
WOODY SPECIES:	
Acer negundo* var. *californicum	**California Box-Elder**
Ailanthus altissima	Tree-of-Heaven
Alnus rhombifolia	**White Alder**
Calycanthus occidentalis	**Western Spicebush**
Carya illinoinensis	Pecan
Catalpa speciosa	Northern Catalpa
Celtis sp.	Hackberry
Cephalanthus occidentalis* var. *californicus	**California Button-Willow**
Ficus carica	Edible Fig
Fraxinus latifolia	**Oregon Ash**
Fraxinus sp.	Ash
Juglans californica* var. *hindsii	**Northern California Black Walnut**
Juglans regia	English Walnut
Ligustrum vulgare	Privet
Morus alba	White Mulberry
Parthenoccissus vitacea	Virginia Creeper
Pistacia chinensis	Chinese Pistache
Platanus racemosa	**Western Sycamore**
Populus fremontii	**Fremont's Cottonwood**
Quercus lobata	**Valley Oak**
Rosa californica	**California Rose**
Rubus discolor	Himalayan Blackberry
Rubus ursinus	**California Blackberry**
Sambucus mexicana	**Blue Elderberry**
Umbellaria californica	**California Bay**
Vitis californica	**California Wild Grape**
HERBACEOUS SPECIES:	
Arundo donax	Giant-Reed
Artemesia douglasiana	**Mugwort**
Avena sp.	Oat
Amaranthus sp.	Amaranth
Bidens frondosa	**Sticktight**
Brassica nigra	Black Mustard
Bromus diandrus	Ripgut Brome
Carex barbarae	**Santa Barbara Sedge**
Cirsium sp.	Thistle
Centaurea solstitialis	Yellow Star-Thistle

SCIENTIFIC NAME	COMMON NAME
HERBACEOUS SPECIES:	
Chenopodium ambrosioides var. *ambrosioides*	Mexican Tea
Convovulus arvensis	Bindweed
Conyza sp.	Horseweed

Cynodon dactylon	Bermuda-Grass
Cyperus strigosus	**False Nut-Sedge**
Daucus carota	Queen Anne's-Lace
Digitaria ischaemum	Smooth Crabgrass
Hedera helix	English Ivy
Marrubium vulgare	Horehound
Melilotus alba	White Sweet-Clover
Melissa officinalis	Bee-Balm
Mimulus cardinalis	**Scarlet Monkey-Flower**
Paspalum distichum	**Knotgrass**
Phytolacca americana	American Pokeweed
Plantago lanceolata	English Plantain
Polygonum arenastrum	Common Knotweed
Polygonum punctatum	**Dotted Smartweed**
Polypogon sp.	Beardgrass
Rumex sp.	Dock
Setaria sp.	Bristlegrass
Solanum americanum	**American Black Nightshade**
Sorghum halapense	Johnsongrass
Toxicodendron diversilobum	**Poison-Oak**
Verbascum blattaria	Moth Mullein
Verbascum thapsus	Wooly Mullein
Verbena lasiostachys	**Western Vervain**
Vinca major	Periwinkle
Xanthium strumarium	**Cocklebur**

Table A: Greenline Transect Data Sycamore Restoration

3/02

Expected Greenline Transect Total Length: 726 ft.
Location: North & South Bank
Date surveyed: 10/18/01 & 10/19/01

Community Type	Feet	% Composition
Quercus lobata / Rubus discolor	95	13.1
Rubus discolor	29	4.0
Annual grass	6	0.8
Barren	35	4.8
Catalpa speciosa	26	3.6
Paspalum distichum	48	6.6
Ailanthus altissma-Platanus racemosa	10	1.4
Platanus racemosa / Rubus discolor-Vitis californica	6	0.8
Alnus rhombifolia / Rubus discolor	18	2.5
Morus alba-Alnus rhombifolia / Rubus discolor	13	1.8
Catalpa speciosa / Rubus discolor	47	6.5
Catalpa speciosa / Solanum americanum	3	0.4
Catalpa speciosa / Annual grass	3	0.4
Catalpa speciosa-Morus alba	22	3.0
Phytolacca americana / Annual grass	5	0.7
Celtis sp. / Rubus discolor	10	1.4
Catalpa speciosa-Platanus racemosa	10	1.4
Platanus racemosa	5	0.7
Platanus racemosa / Marrubium vulgare	10	1.4
Platanus racemosa / Phytolacca americana / Rubus discolor	3	0.4
Platanus racemosa / Rubus discolor	59	8.1
Platanus racemosa / Phytolacca americana	4	0.6
Fraxinus sp. / Marrubium vulgare / Vitis californica	6	0.8
Fraxinus sp. / Vitis californica	5	0.7
Fraxinus sp.-Vitis californica / Rubus discolor-Rubus ursinus	5	0.7
Rubus discolor-Rubus ursinus	8	1.1
Juglans regia / Rubus discolor-Rubus ursinus	10	1.4
Platanus racemosa / Rubus discolor-Rubus ursinus	45	6.2
Platanus racemosa / Polygonum punctatum	6	0.8
Cynodon dactylon-Xanthium strumarium	8	1.1
Polygonum arenastrum	4	0.6
Cynodon dactylon	35	4.8
Sorghum halapense	7	1.0
Phytolacca americana / Paspalum distichum	6	0.8
Phytolacca americana / Sorghum halapense	25	3.4
Catalpa speciosa-Platanus racemosa / Rubus discolor	25	3.4
Catalpa speciosa-Quercus lobata / Rubus discolor	38	5.2
Juglans californica var. hindsii / Rubus discolor	27	3.7
Plant Community Total Length:	727	
Percent Error:	0.14	

Note: *Celtis* sp. & *Fraxinus* sp. are thought to be non-native, but uncertain, due to specific species type is unknown. The annual grasses are expected to be a mixture of native and non-native species.

Annual grass species include: *Avena* sp., *Cynodon dactylon, Setaria* sp., *Paspalum distichum, Digitaria ischaenum, & Polypogon* sp. Also, hyphenated species within some of the community types represents codominance.

Table B: Cross-section Transect # 1 Data

Bearing: 329 NW
Total Riparian Width: 408 ft.
Date Surveyed: 9/6/01

Community Type	Feet	% Composition
Quercus lobata / Vitis californica	21	5.28
Quercus lobata / Phytolacca americana	3	0.75
Quercus lobata / Rubus discolor	19	4.77
Water	26	6.53
Catalpa speciosa	4	1.01
Barren	8	2.01
Alnus rhombifolia	3	0.75
Morus alba	5	1.26
Morus alba / Rubus discolor	14	3.52
Alnus rhombifolia / Rubus discolor	18	4.52
Alnus rhombifolia / Vitis californica-Rubus discolor	22	5.53
Phytolacca americana	3	0.75
Phytolacca americana-Vitis californica	10	2.51
Vitis californica / Annual grass	6	1.51
Platanus racemosa / Sambucus mexicana / Vitis californica	20	5.03
Rubus discolor-Vitis californica	7	1.76
Juglans californicus var. hindsii / Rubus discolor-Vitis californica	74	18.59
Juglans californicus var. hindsii / Vinca major	23	5.78
Vinca major	9	2.26
Vitis californica / Vinca major-Rubus discolor	55	13.82
Phytolacca americana / Rubus discolor-Vitis californica	6	1.51
Quercus lobata / Rubus discolor-Vitis californica	42	10.55
Total feet:	398	
Percent error:	2.51	

** Transect # 1 also known as the "lower reach", traversed the greenline at 0 ft., perpendicular to the stream.

Table C: Cross-section Transect # 2 Data

Bearing: 314 NW
Total Riparian Width: 312 ft.
Date Surveyed: 9/6/00

Community Type	Feet	% Composition
Paspalum distichum	8	2.56
Rubus ursinus	9	2.88
Fraxinus sp. / Rubus ursinus	12	3.85
Rubus discolor-Vitis californica	22	7.05
Juglans californica var. hindsii / Rubus discolor-Vitis californica	20	6.41
Juglans californica var. hindsii	31	9.94
Quercus lobata-J. californica var. hindsii / R. discolor-V. californica	9	2.88
Barren	25	8.01
Sorghum halapense	6	1.92
Rubus discolor	38	12.18
Xanthium strumarium	6	1.92
Phytolacca americana	25	8.01
Solanum americanum	26	8.33
Phytolacca americana-Solanum americanum	27	8.65
Water	48	15.38
Total feet:	312	
Percent error:	0	

** Transect # 2 also known as the "mid reach", traversed the greenline at 239.5 ft. perpendicular to the stream.

Table D: Cross-section Transect # 3 Data

Bearing: 316 NW
Total Riparian Width: 409 ft.
Date Surveyed: 9/6/01

Community Type	Feet	% Composition
Rubus discolor	34	8.35
Platanus racemosa / Rubus discolor	3	0.74
Platanus racemosa	11	2.70
Water	5	1.23
Catalpa speciosa	42	10.32
Catalpa speciosa / Rubus discolor	11	2.70
J. californica var. hindsii / Rubus discolor-Vitis californica	24	5.90
Catalpa speciosa / Rubus discolor-Vitis californica	29	7.13
Quecus lobata / Vinca major-Rubus discolor	33	8.11
Fraxinus sp. / Rubus discolor-Vitis californica	25	6.14
Barren	8	1.97
Rubus discolor-Vitis californica	66	16.22
Umbellaria californica-Calycanthus occidentalis	15	3.69
Celtis sp. / Calycanthus occidentalis	12	2.95
Celtis sp. / Vinca major	6	1.47
Juglans californica var. hindsii / Vinca major	9	2.21
Celtis sp. / Rubus discolor-Vitis californica	12	2.95
Platanus racemosa / Rubus discolor-Vitis californica	15	3.69
Pistache chinensis / Rubus discolor-Vinca major	9	2.21
Pistache chinensis-Quercus lobata / Vinca major	38	9.34
Total feet:	407	
Percent error:	0.49	

** Transect # 3 also known as the "upper reach", traversed the greenline at 1.291 ft., perpendicular to the stream.

Table E: Woody Species Supplemental Data

Date surveyed: 10/18/01, 10/19/01, 10/20/01
Note: All transect woody data has been combined in this table.

Part A: Age Class Option

	Species	Seedling	Sapling	Mature <50% dead	Mature >50% dead
Native Species	*Calycanthus occidentalis*	0	16	3	0
	Cephalanthus occidentalis	0	2	0	0
	Rosa californica	0	1	0	0
	Sambucus mexicana	0	0	3	0
	Toxicodenderon diversilobum	0	2	0	0
	Vitis californica	3	4	8	0
Non-Native Species	*Ficus carica*	0	5	0	0
	Total count:	3	30	11	0
	Total %:	6.82	68.18	25.00	0.00

Part B: Height Class Option

	Species	0-3'	>3-6'	>6-10'	>10'
Native Species	*Alnus rhombifolia*	10	1	0	1
	Juglans californica var. hindsii	1	0	1	7
	Juglans regia	0	0	0	3
	Platanus racemosa	0	1	0	7
	Quercus lobata	0	0	2	3
Non-Native Species	*Ailanthus altissma*	9	2	2	0
	Carya illinoinensis	0	0	0	1
	Catalpa speciosa	52	4	1	17
	Celtis sp.	5	1	0	3
	Fraxinus sp.	0	0	0	1
	Ligustrum vulgare	3	1	1	3
	Morus alba	1	0	0	1
	Total count:	81	10	7	47
	Total %:	53.64	6.62	4.64	31.13

Stream Reach: Big Chico Creek in Lower Bidwell Park, Chico, California.

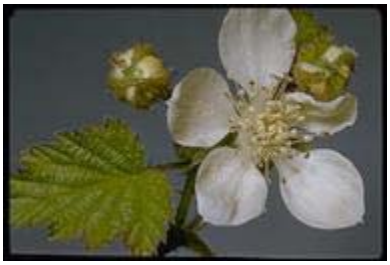
GREENLINE STABILITY RATING WORKSHEET

		STABILITY	
Community Type	**% Composition**	**Class**	**Index**
Quercus lobata / Rubus discolor	13.1	6	0.79
Rubus discolor	4.0	4	0.16
Annual grass	0.8	2	0.02
Barren	4.8	1	0.05
Catalpa speciosa	3.6	7	0.25
Paspalum distichum	6.6	4	0.26
Ailanthus altissma-Platanus racemosa	1.4	9	0.13
Platanus racemosa / Rubus discolor-Vitis californica	0.8	9	0.07
Alnus rhombifolia / Rubus discolor	2.5	8	0.20
Morus alba-Alnus rhombifolia / Rubus discolor	1.8	9	0.16
Catalpa speciosa / Rubus discolor	6.5	7	0.46
Catalpa speciosa / Solanum americanum	0.4	7	0.03
Catalpa speciosa / Annual grass	0.4	7	0.03
Catalpa speciosa-Morus alba	3.0	7	0.21
Phytolacca americana / Annual grass	0.7	5	0.04
Celtis sp. / Rubus discolor	1.4	8	0.11
Catalpa speciosa-Platanus racemosa	1.4	9	0.13
Platanus racemosa	0.7	9	0.06
Platanus racemosa / Marrubium vulgare	1.4	9	0.13
Platanus racemosa / Phytolacca americana / Rubus discolor	0.4	8	0.03
Platanus racemosa / Rubus discolor	8.1	9	0.73
Platanus racemosa / Phytolacca americana	0.6	8	0.05
Fraxinus sp. / Marrubium vulgare / Vitis californica	0.8	8	0.06
Fraxinus sp. / Vitis californica	0.7	7	0.05
Fraxinus sp.-Vitis californica / Rubus discolor-Rubus ursinus	0.7	7	0.05
Rubus discolor-Rubus ursinus	1.1	4	0.04
Juglans regia / Rubus discolor-Rubus ursinus	1.4	6	0.08
Platanus racemosa / Rubus discolor-Rubus ursinus	6.2	9	0.56
Platanus racemosa / Polygonum punctatum	0.8	9	0.07
Cynodon dactylon-Xanthium strumarium	1.1	3	0.03
Polygonum arenastrum	0.6	2	0.01
Cynodon dactylon	4.8	3	0.14
Sorghum halapense	1.0	4	0.04
Phytolacca americana / Paspalum distichum	0.8	5	0.04
Phytolacca americana / Sorghum halapense	3.4	4	0.14
Catalpa speciosa-Platanus racemosa / Rubus discolor	3.4	8	0.27
Catalpa speciosa-Quercus lobata / Rubus discolor	5.2	6	0.31
Juglans californica var. hindsii / Rubus discolor	3.7	6	0.22
Total:	100%	~	**6.21**

Stability Rating: (0-2)=very poor, (3-4)=poor, (5-6)=moderate, (7-8)=good, (9-10)=excellent

Appendix B:

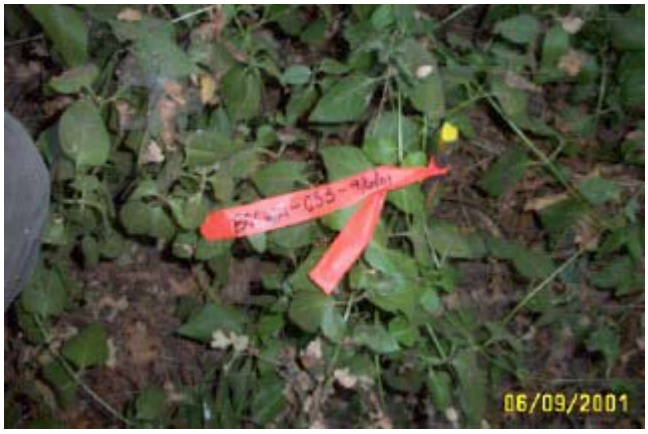
Photos



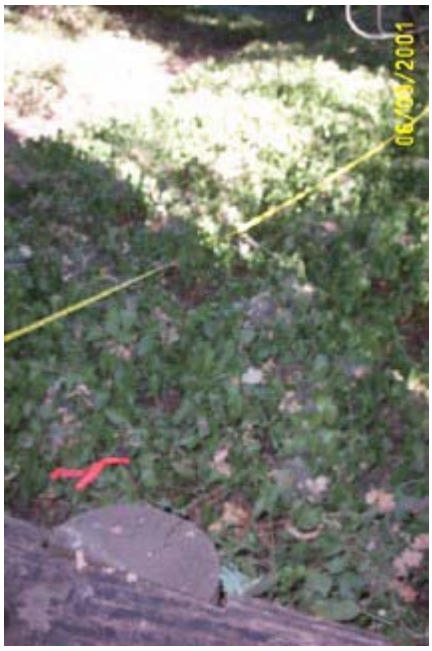
Witness post #1-North bank

Witness post #1-South bank

Witness post #2-South bank



Witness post #3-North bank (example of flagging)



Witness post #3-North bank