

HAPPY HOLLOW PARK AND ZOO

First Year Riparian Habitat Monitoring Report

Prepared for
City of San Jose

December 2010



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TABLE OF CONTENTS

Happy Hollow Park and Zoo First Year Riparian Habitat Monitoring Report

	<u>Page</u>
Executive Summary	iii
1. Introduction	1
1.1 Purpose and Background	1
1.2 Mitigation Location and Description	1
1.4 Mitigation Program Goals	5
1.5 Monitoring Purpose	5
1.5 Success Criteria	5
2. Revegetation Monitoring	7
2.1 Background	7
2.2 Methods	8
3. Results	11
3.1 General Site Conditions	11
3.2 Monitoring Results	11
4. Conclusion and Recommendations	14
4.1 Conclusion	14
4.2 Recommendations	14
5. Report Preparation and References	16
5.1 Report Preparation	16
5.2 References	16
List of Figures	
1: Project Location	2
2: Planting Plan, Transect Locations, and Photo Points	3
List of Tables	
1.1 Final Success Criteria for Year 5 and Performance Criteria for Years 1 to 5	6
2.1 Riparian Woodland Planting List	7
2.2 Shaded Riverine Aquatic Habitat Planting List	8
2.3 Plant Health and Vigor Rating System	9

Appendices

A. Monitoring Data Sheets	A-1
B. Photodocumentation	B-1

EXECUTIVE SUMMARY

On behalf of the City of San Jose Environmental Science Associates (ESA) is conducting monitoring of the Happy Hollow Park and Zoo Riparian Habitat Mitigation Project site. The monitoring will occur over a minimum five year period at planting sites located in San Jose, Santa Clara County, California. This report summarizes the first year's monitoring results and provides maintenance recommendations.

In July 2009, 0.09 acre of riparian woodland and 20 linear feet of Shaded Riverine Aquatic (SRA) habitat were planted as mitigation for impacts to 0.03 acre of riparian woodland and 20 linear feet of SRA from the Happy Hollow Park and Zoo Improvement Project. Riparian woodland plants were installed on the upper edges of the Coyote Creek riparian corridor and SRA plantings were installed near the creek ordinary high water (OHW) line.

In September, 2010, the first year's monitoring was conducted at the mitigation area. Overall, the riparian woodland plantings were performing well, with high survival and low invasive species cover. Monthly maintenance at the site has ensured that irrigation was functioning properly and non-native species did not out-compete the native plantings. This level of maintenance should continue at the site to ensure long-term planting success. Overall percent survival is slightly below the required performance standard and some replanting should occur to ensure success by the fifth year.

At the SRA mitigation area, all of the willows were removed and the cottonwoods were trampled by transients. The willows should be planted at another location that is less likely to be disturbed.

SECTION 1

Introduction

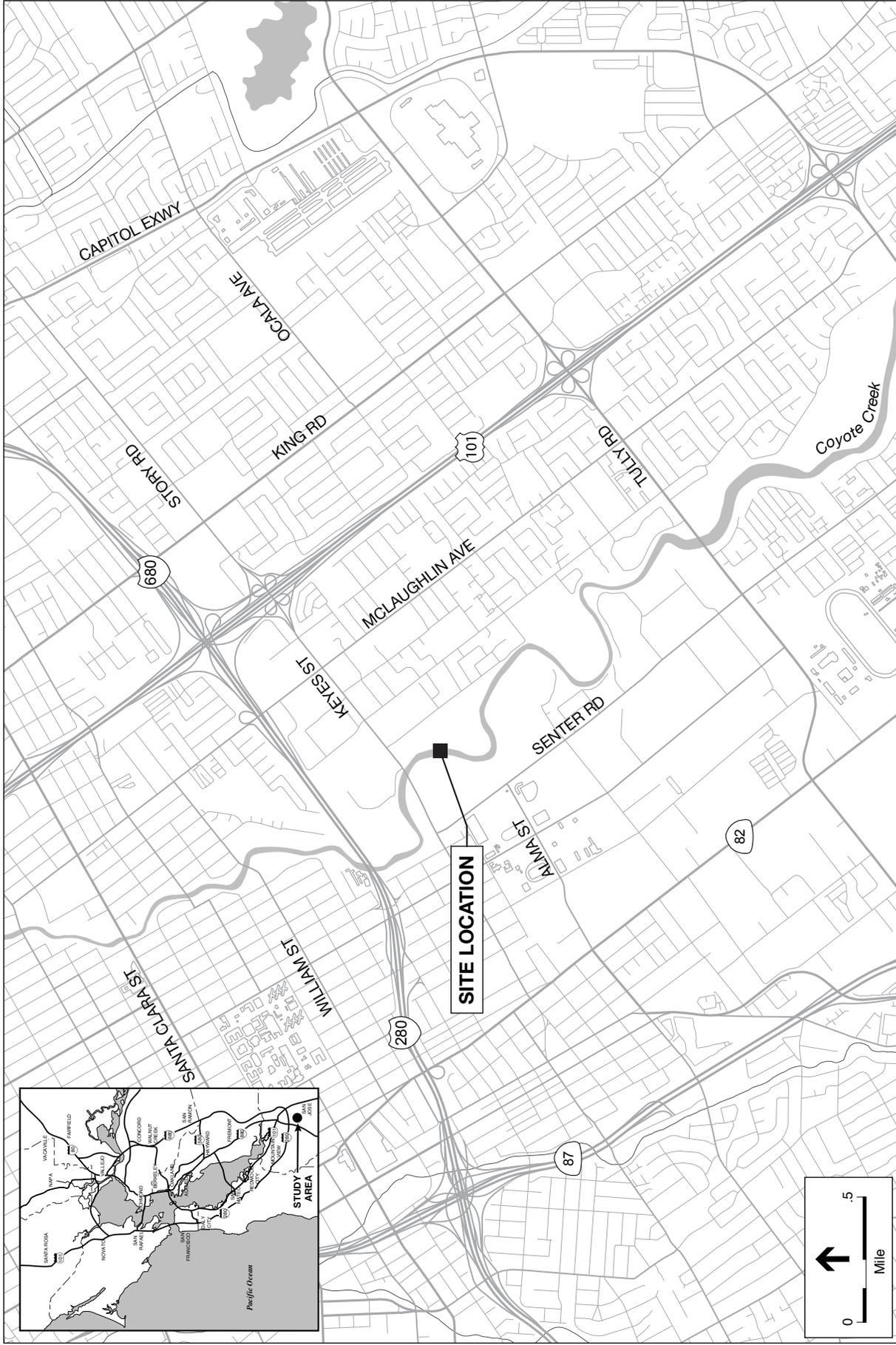
1.1 Purpose and Background

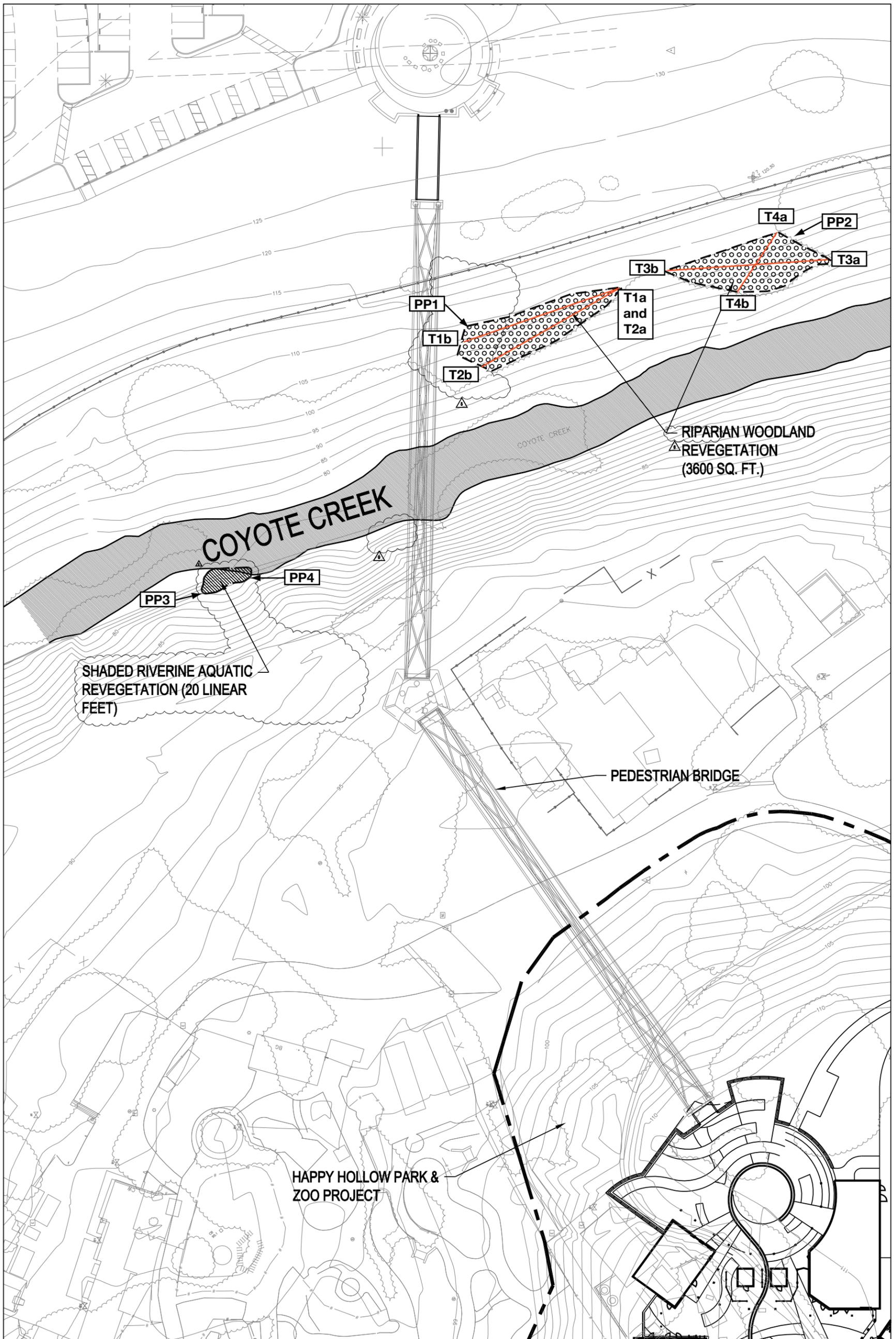
This report details the annual riparian habitat restoration monitoring results conducted on behalf of the City of San Jose (City) by Environmental Science Associates (ESA) for the Happy Hollow Park and Zoo Riparian Habitat Mitigation Project. The Project was executed by the City of San Jose as mitigation for impacts to riparian woodland and shaded riverine aquatic (SRA) habitat from the Happy Hollow Park and Zoo Improvement Project. Restoration was implemented in 2009 in accordance with the *Happy Hollow Park and Zoo Project (City of San Jose) Riparian Habitat Mitigation and Monitoring Program* (HMMP; Biotic Resources Group, 2007) and approval by the California Department of Fish and Game (CDFG Notification No. 1600-2007-0178-3).

The following report documents the first year monitoring results; it includes a description of the mitigation site, monitoring methods, results, conclusions, and recommendations for the project to meet the established performance standards.

1.2 Mitigation Location and Description

Happy Hollow Park and Zoo is located in the City of San Jose, Santa Clara County, California. It is bordered by Story Road, Senter Road, and Roberts Avenue (**Figure 1**). The Happy Hollow Park and Zoo Improvement Project includes construction of a pedestrian bridge across Coyote Creek connecting the park and zoo on the west side of the creek to the new parking lot on the east side of the creek. The bridge is currently under construction. Bridge construction is expected to result in the removal and limbing of trees that comprise approximately 1,400 square feet (0.03 acre) of riparian woodland habitat. The bridge will also impact approximately 20 linear feet of SRA habitat by limbing branches that hang over the creek near the bank edges. As mitigation for impacts to riparian woodland habitat the City implemented riparian woodland revegetation at a 3:1 replacement ratio by planting 0.09 acres of riparian woodland habitat. As mitigation for impacts to SRA, the City implemented SRA revegetation at a 1:1 replacement ratio by planting 20 linear feet of SRA. The riparian woodland vegetation was installed on the eastern slope of Coyote Creek south of the pedestrian bridge and SRA vegetation was installed on the western bank of the creek north of the bridge (**Figure 2**). Vegetation was installed in July, 2009.





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1.4 Mitigation Program Goals

The primary goal of the mitigation program is to create riparian woodland and SRA habitat on the site that provides suitable wildlife habitat and will require little to no maintenance in the long term. The created habitat will provide compensation for impacts to riparian habitat as a result of the pedestrian bridge construction.

Additional goals include minimizing maintenance efforts, minimizing opportunities for invasive, non-native plant species establishment, and minimizing irrigation system operation and maintenance.

1.5 Monitoring Purpose

Monitoring is to be conducted annually for five years (or longer if the success criteria are not met within five years) at the revegetation sites. The purpose of the monitoring is to:

- determine total percent survivorship for the entire installation , as well as on a per species basis;
- determine percent cover for the plantings as a whole and on a per species basis;
- determine percent cover of invasive, non-native species in each planting area;
- determine the average height of each tree species;
- qualitatively evaluate site conditions (e.g., cover of native versus non-native species, areas of significant die-off, areas of erosion, diseases) and make observations about necessary remedial actions (e.g., refuse removal, weed control, irrigation repairs, plant replacement); and
- photodocument the site at permanent photopoints.

1.5 Success Criteria

During the five year monitoring period the mitigation areas will be monitored and evaluated against established success criteria. The final success criteria for this project were established in the HMMP¹ and consist of the following:

- At least 80% survival of all installed plants in Years 1 through 5 (all surviving plants must have a rating of “good” or better);
- At least 12% tree cover and 8% shrub cover by Year 5;

¹ CDFG approval for this project did not include any additional success criteria .

- Less than 5% cover of invasive, non-native species; and
- Attainment of specified tree height standards provided below in **Table 1.1**.

Annual performance criteria were also established in the HMMP and are provided in Table 1.1.

TABLE 1.1
FINAL SUCCESS CRITERIA FOR YEAR 5 AND PERFORMANCE CRITERIA FOR YEARS 1 TO 5

Monitoring Parameter	Year 1	Year 2	Year 3	Year 4	Year 5 (Final)
Tree Cover (%)	N/A	3%	5%	10%	12%
Shrub Cover (%)	N/A	3%	5%	6%	8%
Plant Survival	80%	80%	80%	80%	80%
Invasive Non-native Plant Cover	<5%	<5%	<5%	<5%	<5%
Tree Height (feet)					
Box Elder	N/A	3	4	5	6
Coast Live Oak	N/A	2	3	4.5	5
Blue Elderberry	N/A	2	3	5	7
Valley Oak	N/A	2	3	4.5	5
Sycamore	N/A	2	3	5	6

SECTION 2

Revegetation Monitoring

2.1 Background

All riparian woodland and SRA mitigation plantings were installed in July, 2009. Seventy-nine trees and shrubs were installed in the 0.09-acre riparian woodland planting area. Species included coast live oak (*Quercus agrifolia*), box elder (*Acer negundo*), blue elderberry (*Sambucus mexicana*), California rose (*Rosa californica*), snowberry (*Symphoricarpos albus*), and coyote brush (*Baccharis pilularis*). **Table 2.1** below details the number of plants installed of each species.

All installed plants were staked and caged above ground to prevent herbivore damage. Drip irrigation was installed and an emitter was supplied to each plant. The irrigation system is controlled automatically by a solar-powered controller.

TABLE 2.1
RIPARIAN WOODLAND PLANTING LIST

Scientific Name	Common Name	# Installed 2009
Shrubs		
<i>Artemisia douglasiana</i>	mugwort	7
<i>Baccharis pilularis</i>	coyote brush	14
<i>Heteromeles arbutifolia</i>	toyon	7
<i>Rhamnus californica</i>	coffeeberry	2
<i>Rosa californica</i>	California rose	10
<i>Symphoricarpos albus</i>	snowberry	18
Total Shrubs		58
Trees		
<i>Acer negundo</i>	box elder	3
<i>Platanus racemosa</i>	sycamore	4
<i>Quercus agrifolia</i>	coast live oak	4
<i>Quercus lobata</i>	valley oak	6
<i>Sambucus mexicana</i>	blue elderberry	4
Total Trees		21
TOTAL		79

Eight plants were installed in the 20-linear foot SRA mitigation area. Four willow (*Salix* sp.) stakes were installed just above the ordinary high water (OHW) line and four Fremont cottonwood (*Populus fremontii*) plants were installed slightly higher than the willows. **Table 2.2** below details the number of plants installed of each species.

The mitigation site is close enough to the creek that supplemental irrigation was not necessary for these plantings.

TABLE 2.2
SHADED RIVERINE AQUATIC HABITAT PLANTING LIST

Scientific Name	Common Name	# Installed 2009
<i>Populus fremontii</i>	Fremont cottonwood	4
<i>Salix</i> sp.	willows	4
TOTAL		8

2.2 Methods

The mitigation site will be monitored annually for a period of five years or until all success criteria have been met. This is the first year of monitoring and the methods implemented generally followed the methods established in the HMMP. Where methods were not established by the HMMP, typical and appropriate monitoring methods were utilized.

General Site Conditions

The general condition of each planting site was qualitatively evaluated for the presence of invasive species, erosion, vandalism, animal damage, etc.

Percent Survival, Height, Health, and Vigor

All installed plants in the riparian woodland and SRA were examined, their condition noted (dead or alive), and their health and vigor were assessed. Each living plant was given a code (1 through 4) for each health and vigor based on the rating provided in **Table 2.3**. For example, a plant that had both 100% healthy foliage and new growth observed throughout the plant would be given both a health code of 4 and a vigor code of 4. Percent survival was specified as the percent of surviving plants with an average rating of 3 (“good”) or better. Percent survival was determined by dividing the total number of plants with an average rating of 3 or better by the total number installed, then multiplying by 100. Additionally, all trees were measured for height.

TABLE 2.3
PLANT HEALTH AND VIGOR RATING SYSTEM

Code	Rating	Health Characteristics	Vigor Characteristics
4	Excellent	75 – 100% healthy foliage	Vigorous new growth observed throughout plant
3	Good	50 – 74% healthy foliage	Vigorous new growth observed only at terminal bud
2	Fair	25 – 49% healthy foliage	No new growth evident
1	Poor	0 – 24% healthy foliage	Stem dieback observed

Percent Cover

The HMMP did not include percent cover survey methods, so the line-intercept, a standard method for estimating percent cover, was implemented. Four transects were established within the riparian woodland mitigation area. Transects were not established in the SRA installation because at the time of the survey all willows had been removed and replaced by a homeless encampment.

The four transects were placed in locations that provided a representative sample of the planting areas. Both ends of each transect were marked with labeled wooden stakes and recorded using Trimble GeoXT Global Positioning System (GPS) with sub-meter accuracy. The locations of all transects are provided in Figure 2 and a description of each transect location is provided in Appendix A.

To measure percent cover, a measuring tape was extended between the start and end point of each transect. The distance that the canopy of each plant intercepted the measuring tape was recorded in the field. This data was later entered into Microsoft Excel and total cover for each species was determined by summing each intercept for that species, dividing the sum by the length of the transect, and multiplying that result by 100. Although there was no percent cover standard specified for the first monitoring year we collected this data to establish a baseline for future monitoring.

Photomonitoring

Permanent photo points were established at the mitigation site during monitoring in September 2010. Two photo points were established within the riparian woodland revegetation area and two in the SRA. Permanent photo points are located on the edge of the planting areas looking in towards them; their locations are depicted in Figure 2 and a description of their locations is provided in **Appendix B**. Appendix B also contains photographs from all point photos from 2010.

Photos were also taken of every transect as it was installed. The location, vantage point, and proximity to each transect are not consistent throughout the mitigation site because the function of these photos is to assist in finding the transects for future monitoring. These photos are not included in the photo appendix but are available upon request.

SECTION 3

Results

On September 15 and 22, 2010, ESA conducted the annual mitigation monitoring of the Happy Hollow Mitigation Site. This was the first year of monitoring, following planting in 2009.

3.1 General Site Conditions

Coyote Creek and its narrow riparian woodland corridor support a number of well-developed native and non-native trees including willow (*Salix* sp.), cottonwood (*Populus fremontii*), and California pepper tree (*Schinus molle*), dense patches of Himalayan blackberry (*Rubus discolor*), and a non-native annual grassland understory. The riparian woodland restoration plantings were installed on non-native annual grassland-dominated slopes with few trees or shrubs. In general, the plants appear to be doing well, supporting lush leaves and exhibiting little die-off. Non-native invasive species within the planting area have been kept short through regular maintenance efforts. In the SRA planting area, all of the willows were removed a few months prior to monitoring as a result of a homeless encampment, and the four installed cottonwoods appear to have been trampled.

3.2 Monitoring Results

Percent Survival, Health, Height, and Vigor

Percent survival for the installation as a whole was determined by dividing the total number of plants rated “good” or better by the total number installed (87 plants) and then multiplying the result by 100. Overall percent survival for this first year of monitoring is 78%, which is just below the 80% performance standard. **Table 3.1** below details the percent survival of each species planted. The only species that lost individuals were toyon (*Heteromeles arbutifolia*), mugwort (*Artemisia douglasiana*) and willow (*Salix* sp.), all individuals of the remaining species survived. Some individuals from other species such as coffeeberry (*Rhamnus californica*), snowberry, and blue elderberry had ratings below 3 and were not included in the total surviving plants.

Most surviving trees and shrubs were healthy and vigorous with a rating of 3.2 or higher, which signifies either “good” or “excellent.” Overall, the average health rating was 3.6 and average vigor was 3.7. Table 3.1 details the average health and vigor rating for each species. Toyon (*Heteromeles arbutifolia*) and coyote brush (*Baccharis pilularis*) had the highest average health

and vigor ratings (both had an average health rating of 3.9 and vigor rating of 4.0), while Fremont cottonwood had the lowest average ratings of surviving species with a health rating of 3.3 and vigor rating of 3.2.

Table 3.1 shows the average height of each tree species and their final success criteria. No height performance standards were established for the first year of monitoring, but the average heights of all trees have already surpassed the second year performance standard. The average height of each species was at least 0.5 feet above the second year performance standard.

**TABLE 3.1
SPECIES SURVIVAL, HEALTH, VIGOR, AND HEIGHT**

Scientific Name	Common Name	# Installed 2009	# Alive with "good" or better rating 2010	Percent Survival	Average Health	Average Vigor	Average Height Performance Standard for Year 2	Average Height (feet) 2010
Shrubs								
<i>Artemisia douglasiana</i>	mugwort	7	2	29%	3.5	3.5	N/A	3.5
<i>Baccharis pilularis</i>	coyote brush	14	14	100%	3.9	4.0	N/A	4.1
<i>Heteromeles arbutifolia</i>	toyon	7	2	28%	3.9	4.0	N/A	2.2
<i>Rhamnus californica</i>	coffeeberry	2	0	0%	N/A	N/A	N/A	N/A
<i>Rosa californica</i>	California rose	10	10	100%	3.7	3.7	N/A	3.1
<i>Symphoricarpos albus</i>	snowberry	18	17	94%	3.3	3.5	N/A	3.8
TOTAL SHRUBS		58	45	78%				
Trees								
<i>Acer negundo</i>	box elder	3	3	100%	3.5	3.7	3	5.2
<i>Platanus racemosa</i>	sycamore	4	4	100%	3.8	3.9	2	5.3
<i>Populus fremontii</i>	Fremont cottonwood	4	4	100%	3.3	3.2	N/A	2.9
<i>Quercus agrifolia</i>	coast live oak	4	4	100%	3.6	3.6	2	2.5
<i>Quercus lobata</i>	valley oak	6	6	100%	3.8	3.8	2	2.7
<i>Salix sp.</i>	willows	4	0	0%			N/A	
<i>Sambucus mexicana</i>	blue elderberry	4	2	50%	3.2	3.5	2	8.0
TOTAL TREES		29	23	79%				
TOTAL		87	68	78%				

Percent Cover

This year percent cover was only measured within the riparian woodland and not in the SRA, since most of the SRA plantings were destroyed. The first year percent cover results, which only

include the riparian woodland planting area, are presented below in **Table 3.2**. The average cover of all planted species was 21%, the average shrub cover was 12.7 % and tree cover was 8.3 %. There are no established percent cover performance standards for the first monitoring year, but the second year standards are 3% cover for trees and 3% cover for shrubs. The riparian woodland planting area has already surpassed these second year standards. Table 3.2 also details the percent cover of each species per transect and the average percent cover of species of all four transects. These first year percentages will be useful as comparison in subsequent monitoring years to determine if planted species are increasing or decreasing in cover.

Invasive species were absent from all four transects due to monthly weed maintenance of the site. Therefore, the riparian woodland met its performance standard of less than 5% cover of invasive, non-native species.

TABLE 3.2
PERCENT COVER

Scientific Name	Common Name	Average Percent Plant Cover
Shrubs		
<i>Artemisia douglasiana</i>	mugwort	1.1
<i>Baccharis pilularis</i>	coyote brush	3.7
<i>Heteromeles arbutifolia</i>	toyon	0
<i>Rhamnus californica</i>	coffeeberry	1.2
<i>Rosa californica</i>	California rose	1.4
<i>Symphoricarpos albus</i>	snowberry	5.3
Total Shrub Cover		12.7
Trees		
<i>Acer negundo</i>	box elder	0.6
<i>Platanus racemosa</i>	sycamore	3.4
<i>Populus fremontii</i>	Fremont cottonwood	0
<i>Quercus agrifolia</i>	coast live oak	0
<i>Quercus lobata</i>	valley oak	0
<i>Salix sp.</i>	willows	0
<i>Sambucus mexicana</i>	blue elderberry	4.3
Total Tree Cover		8.3
Total Cover		21
Invasive Non-Native Species Cover		0

SECTION 4

Conclusion and Recommendations

4.1 Conclusion

Overall, the riparian woodland mitigation area is performing well with high cover of native species and low invasive species cover. Some of the installed plantings died or had low ratings and the overall percent survival was just below the 80% survival performance standard.. The reason for this loss is unknown since the plants receive regular irrigation and frequent weed maintenance. The surviving plants are very healthy and vigorous and do not show sign of disease or water stress. The cages and support stakes at each plant have worked well to prevent herbivory. Many plants are beginning to outgrow their cages both in height and diameter and cages should be removed in these instances. Monthly weed maintenance within the planting areas has prevented competition with invasive species and weedy annuals. These results show that monthly maintenance has worked to ensure survival.

Since all of the willow plantings within the SRA mitigation area were removed, this area is not performing well. The cottonwoods at the site have also been trampled from human disturbance. Although percent plant cover was not formally assessed this year, it was visually very low and would have drastically brought down the total percent cover over the entire mitigation site.

The HMMP states that if plant survival (defined as plants with a rating of “good” or better) falls below 80%, then replanting will be undertaken the following fall. To meet this criterion, lost plants should be replaced and additional plants should be installed as compensation for “poor” or “fair” condition plants. This is discussed further in the next section.

4.2 Recommendations

ESA recommends the following actions be taken to aid in the success of the Happy Hollow Park and Zoo Habitat Mitigation Project. The following measures should be implemented to ensure the site meets its final success criteria.

- Since the site did not meet the 80% survival performance standard, supplemental plants should be installed. Within the riparian woodland, all plants that died should be replaced and additional plants should be installed along the edge of the site or in open areas to compensate or replace for plants with “poor” or “fair” ratings. These replacement plantings will exceed the 80% survival requirement, but will provide an adequate buffer for potential plant loss

before Year 5. The following plants should be installed within the riparian woodland to replace dead plants:

- 5 toyon
- 4 mugwort

The following plants should be added to the riparian woodland to compensate or replace “poor” or “fair” rated plants:

- 1 mugwort
 - 2 coffeeberry
 - 1 snowberry
 - 2 blue elderberry
- Since all willows in the SRA area have been lost, they need to be replanted. At least four willow poles should be installed at an alternate site where there is less chance of disturbance from a homeless encampment. Successful willow replanting is necessary for the site to be considered successful.
 - The remainder of the site is performing extremely well for the first year of monitoring. This success is largely attributable to monthly maintenance efforts at the site. To maintain this level of success, the site should continue with the existing maintenance regime. This includes:
 - *Proper irrigation of the site.* Installed plants should be kept properly irrigated. Plants should begin to be weaned from the irrigation with the goal of eliminating irrigation by the end of the third dry season.
 - *Weed maintenance.* Continue weed whipping and hand removal of invasive species such as thistle and mustard and other non-native annuals that may interfere with the growth of establishing plants on a monthly basis throughout the year.
 - *Plant maintenance.* Cages and support stakes should be removed around plants that have outgrown these support structures.

SECTION 5

Report Preparation and References

5.1 Report Preparation

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5.2 References

Biotic Resources Group, 2007. *Happy Hollow Park and Zoo Project (City of San Jose) Riparian Habitat Mitigation and Monitoring Program*. Prepared for Denise Duffy & Associates and City of San Jose Department of Public Works. Soquel, California. April 6.

APPENDIX A

Monitoring Data Sheets

Happy Hollow Park and Zoo Permanent Transect Locations

Date Established: 09/15/10 and 9/22/10

By: M. Giolli, ESA

Transect 1: General description: Located in the northern riparian woodland planting area. Start point is at the southern corner of the planting area, at a pepper tree and the same start point as Transect 2. Transect runs from the southern corner to approximately the northeastern corner.

Start point: Southern corner of planting area, same start as Transect 2
Bearing along transect: 345° NNW
Transect length: 24.3 meters

Transect 2: General description: Located in the northern riparian woodland planting area. Start point is at the southern corner of the planting area, at a pepper tree, and the same start point as Transect 1. Transect runs from the southern corner to approximately the northwestern corner.

Start point: Southern corner of planting area, same start as Transect 1
Bearing along transect: 325° NW
Transect length: 25 meters

Transect 3: General description: Located in the southern riparian woodland planting area. Start point is at southern corner of planting area within cement post holders. It is south of a rose bush and north of a walnut tree. Transect runs from southern corner to the northern corner.

Starting point: Southern corner of planting area
Bearing along transect: 350° NNW
Transect length: 25 meters

Transect 4: General description: Located in the southern riparian woodland planting area. Start point is at the eastern corner of the planting area. Transect runs from the western corner to the eastern corner.

Starting point: Western corner of planting area
Bearing along transect: 302° NW
Transect length: 12 meters

Happy Hollow Tree and Shrub Height and Survival Data Sheet

Happy hollow area of transects 334

Date: 9/22/10
 Surveyors: M. G. Wall, J. L. Thompson
 Time: 8:30 AM
 Weather Conditions: clear

Planted Species	Height (trees)	Health Code	Vigor Code	Comments (volunteer?)	Planted Species	Height (trees)	Health Code	Vigor Code	Comments (volunteer?)
QULO	3.2	3.8	4		SYAL	3.8	3.8	4	
ARDO	4.3	3.7	4		PLRA	4.8	3.8	3.8	
ARDO	N3	0	0	dead	BAPI	4	3.9	4	
ARDO	N3	0	0	dead	BAPI	4.2	3.8	4	
SYAL	2.9	2.9	3		QULO	2.9	3.9	4	
QULO	3.1	3.9	4		BAPI	3.8	3.8	4	
SYAL	4.6	3.8	3.6		QULO	3.1	3.7	3.9	
SYAL	2.8	3.9	3.9		BAPI	3.6	3.9	4	
SYAL	3.9	3.6	3.8		BAPI	3.9	3.9	4	
SYAL	4.1	3.3	3.6		BAPI	4.2	3.9	4	
PLRA	7.6	3.9	3.9						

Health Code	Rating	Health Characteristics	Vigor Characteristics
4	Excellent	75-100% healthy foliage	Vigorous new growth overall
3	Good	50-74% healthy foliage	Vigorous new growth only at terminal buds
2	Fair	25-49% healthy foliage	No new growth evident
1	Poor	1-24% healthy foliage	Stem dieback observed

- (box elder) Acer negundo: ACNE
- (mugwort) Artemisia douglasiana: ARDO
- (coyote brush) Baccharis pilularis: BAPI
- (toyon) Heteromeles arbutifolia: HEAR
- (Sycamore) Platanus racemosa: PLRA
- (Fremont cottonwood) Populus fremontii: POFR
- (coast live oak) Quercus agrifolia: QEAG
- (valley oak) Quercus lobata: QULO
- (coffeeberry) Rhamnus californica: RHCA
- (gooseberry) Ribes californica: RICA
- (CA rose) Rosa californica: ROCA
- (willow) Salix spp.: SASP
- (elderberry) Sambucus mexicana: SAME
- (figwort) Scrophularia californica: SCCA
- (snowberry) Symphoricarpos albus: SYAL

Notes: Some of wine produced during
 needs to be removed. Is inhibiting
 growth, potentially harming
 long term
 weed cover low. Mowing helpful
 Coyote brush looks least
 Sycamore too.

Happy Hollow Tree and Shrub Height and Survival Data Sheet

Date: 9/15/15 Surveyors: JM Galt, B L Thompson Location: transects 1 & 2
 Time: 2:00 PM Weather Conditions: hot, clear Coyote Creek

Planted Species	Height (trees)	Health Code	Vigor Code	Comments (volunteer?)	Planted Species	Height (trees)	Health Code	Vigor Code	Comments (volunteer?)
BAPI	3.2	3.8	4		BAPI	3.8	3.8	3.8	
ROCA	3.8	3.8	3.8		QUAG	2.9	3.2	3.3	yellowish leaves
ROCA	3.2	3.9	4		BAPI	4.0	3.5	3.7	
BAPI	4	4	4		SAME	9	4	4	excellent
HEAR	-	0	0	Dead	BAPI	4.2	3.8	3.8	
RHCA	2.8	0.1	0.1	Dead?	APDO	3.0	0	0	Dead - completely
RHCA	4.3	1	1	Dying/Dead	ACNE	5.5	3.5	3.5	
BAPI	5.2	4	4		HEAR	0.1	0	0	Dead
BAPI	3.8	4	4		QUAG	1.4	3.9	3.8	
QUAG	4.1	3.8	3.7		HEAR	1.2	4	4	
BAPI	4.0	3.8	4		SAME	6.9	2.5	3	scraggly

Health Code	Rating	Health Characteristics	Vigor Characteristics
4	Excellent	75-100% healthy foliage	Vigorous new growth overall
3	Good	50-74% healthy foliage	Vigorous new growth only at terminal buds
2	Fair	25-49% healthy foliage	No new growth evident
1	Poor	1-24% healthy foliage	Stem dieback observed

- (box elder) Acer negundo: ACNE
- (mugwort) Artemisia douglasiana: ARDO
- (coyote brush) Baccharis pilularis: BAPI
- (toyon) Heteromeles arbutifolia: HEAR
- (Sycamore) Platanus racemosa: PLRA
- (Fremont cottonwood) Populus fremontii: POFR
- (coast live oak) Quercus agrifolia: QEAG
- (valley oak) Quercus lobata: QULO
- (coffeeberry) Rhamnus californica: RHCA
- (gooseberry) Ribes californica: RICA
- (CA rose) Rosa californica: ROCA
- (willow) Salix spp.: SASP
- (elderberry) Sambucus mexicana: SAME
- (figwort) Scrophularia californica: SCCA
- (snowberry) Symphoricarpos albus: SYAL

APPENDIX B

Photodocumentation

Happy Hollow Park and Zoo Permanent Photopoint Locations

Date Established: 09/15/10 and 9/22/10

By: M. Giolli, ESA

Photopoint # 1:

General description: At the northeastern corner of the northern riparian woodland planting area near the end of Transect 1. Photo is facing south

Bearing toward object being photographed: 180° S

Photopoint # 2:

General description: At the southeastern edge of the southern riparian woodland planting area near the start of Transect 4. Photo is facing northwest.

Bearing toward object being photographed: 330° NW

Photopoint # 3:

General description: At northern end of the SRA planting area. Photo is facing south.

Bearing toward object being photographed: 138°

Photopoint # 4:

General description: At the southern end of the SRA planting area. Photo is facing north.

Bearing toward object being photographed: 328° NW



Photo 1: Riparian Woodland Restoration Area from Photo Point 1 (September, 2010)



Photo 2: Riparian Woodland Restoration Area from Photo Point 2 (September, 2010)



Photo 3: Shaded Riverine Aquatic Habitat Restoration Area from Photo Point 3 (September, 2010)



Photo 4: Shaded Riverine Aquatic Habitat Restoration Area from Photo Point 4 (September, 2010)