Ballona Creek Trail and Bikeway
Environmental and Recreational Enhancement Study

Report to the Legislature
(as required by SB 259, Chapter 3, Section 32556)

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Executive Summary

INTRODUCTION

The Baldwin Hills Conservancy's (BHC) jurisdiction includes a five-mile stretch of Ballona Creek, including property 50 yards adjacent to the Creek, between Interstate 10 (Santa Monica Freeway) and Interstate 90 (Marina Freeway). Parallel to Ballona Creek is the Class I trail and bikeway, which traverses Culver City and the City and County of Los Angeles, and terminates in Marina Del Rey at the Coastal Trail and Pacific Ocean. The trail is the only non-vehicular inland walking and bicycle trail that exists to serve approximately three million people who reside within three miles of the amenity.

Under Public Resources Code Section 32556 Subdivision (e), the BHC is charged with studying the potential environmental and recreational uses of Ballona Creek, and providing an accompanying report to the Legislature. This report, compiled by the BHC and a research team from Loyola Marymount University, explores the existing and potential environmental and recreational opportunities along the Ballona Creek. Studies of the Ballona Creek and Bike Path, including Culver City's Ballona Creek and Trail Focused Special Study (2003) and the current Ballona Creek Watershed Task Force Management Plan provide a valuable foundation for this report's findings and recommendations. The research here focuses on defining the existing conditions, constraints, proposed plans, public use and the projected biological, environmental, sociological, and educational impacts of implementing enhancements along the Ballona Creek and its Trail and Bikeway. The body of the report consists of four sections: social impact assessment, opportunities for restoration, water quality issues, and environmental education opportunities.

REPORT FINDINGS

Ballona Creek Social Impact Assessment

A team of social scientists and students developed a Social Impact Assessment of Ballona Creek by conducting interviews, establishing demographic profiles of residents in close proximity to the Creek, analyzing the Creek within its urban and civic context, and examining development opportunities and their constraints.

Between July 7 and 18, 2003, interviews were conducted with 161 individuals using the Ballona Creek Bike Path. The timing and location of the interviews was systematically scheduled throughout weekdays and weekends, mornings and afternoons so as to gather opinions representative of those who typically use the Bike Path. In conjunction with this survey, 105 interviews were conducted with residents in neighborhoods adjacent to the Ballona Creek Bike Path. Thirty-five interviews were completed in each of three census tracts randomly selected from the nine census tracts adjacent to the Bike Path. The interviews included questions about the respondents' length of residence, age, knowledge and use of the Ballona Creek and Bike Path, and degree of support for several proposed improvements to the Creek environment. Key findings are:

- Bike Path users are nearly as likely to be male as female, drawing from a wide age range. Nearly one-fifth live in coastal cities some distance from the Bike Path, although the majority are residents of Los Angeles or Culver City. Seventy-five percent of those traveling the Bike Path live within three miles of a Creek entry point.
- Although 60% of the neighbors surveyed indicated that they had previously used the Bike Path, a surprisingly sizeable minority of neighbors was not familiar with it. Lack of signage contributes to the unawareness.

- Despite a positive response to the possibility of improvements, many Bike Path users expressed concerns about attracting more people, and therefore more crime, to their neighborhoods. Actual crime statistics do not support their perceptions.
- Respondents from the Bike Path Survey voiced strong support for the idea of connecting Ballona Creek Bike Path to Baldwin Hills Park.

A demographic profile of three geographic areas of varying proximity to the Ballona Creek Bike Path was constructed based on 1990 and 2000 U.S. Census data. The three geographic areas include ninety-seven census tracts located within three miles of the creek, thirty-seven tracts south and east of Baldwin Hills that are at the eastern end of the Creek, and nine census tracts contiguous to Ballona Creek and its Bike Path. Among the findings are:

- The racial composition of the 37 census tracts south and east Baldwin Hills (hereafter S.E. Baldwin Hills Tracts) is distinct from the other two areas of comparison. The S.E. Baldwin Hills tracts are 62% Black, while the Black population of the other two areas is about 20%. Since 1990, the racial balance of S.E. Baldwin Hills has changed, with a 10% decline in the Black population and a 10% increase in the Hispanic population.
- Enrollment in public and private schools (elementary and secondary) grew by 25% in S.E. Baldwin Hills, 12% in the Wide Creek Perimeter, and 6% in the Adjacent Creek Perimeter.
- Family income (unadjusted) during the 1990s grew about 25% for both the Wide Creek Perimeter and the Adjacent Creek Perimeter. S. E. Baldwin Hills family income increased by 21%. However, each of the three areas experienced an increase in the proportion of its population with earnings less than 50% of the poverty level.
- Residential stability, measured by the proportion of the population that has lived in the same residence for five years, is strongest in the Adjacent Creek Perimeter (60%), followed by the S.E. Baldwin Hills (57%) and the Wide Creek Perimeter (50%).

Within its urban context, the Ballona Creek Bike Path is a potential gateway to a myriad of local activities and historical attractions. The Bike Path offers a direct route to the ocean free from cars and traffic for inland residents. Also, from the Bike Path one can easily commute to the nearby public facilities and recreational areas, visit historical landmarks such as the 1915 Colonnade building, and connect to local community events, like the weekly Culver City Farmer's Market. However, these and other opportunities within riding and walking distance from the Bike Path have gone mostly unrealized by its users because of existing and potential development constraints.

Barriers to increasing the Bike Path's usage and enhancing this community asset are primarily institutional. Because many government agencies share jurisdictional responsibility for Ballona Creek, there is no uniform approach to its operation or maintenance. For example, no signage exists indicating the length of the Bike Path or its access or termination points, which fails to promote its use as a recreational or commuter facility. As well, many of the proposed improvements to the Ballona Creek Bike Path will require approval by the government agencies and municipalities which may have inconsistent regulations, codes and ordinances.

Opportunities for Restoration

Through site analysis and soil sampling, researchers investigated the opportunities for and constraints to environmental enhancement through the use of native Southern Californian plant species that would attract native fauna. Observations of existing flora and fauna were used with biological data from the Ballona Wetlands and the Baldwin Hills to determine which communities could be present in a transitional ecosystem linking these two areas. Coastal sage scrub, grassland, riparian and wetland communities could exist through restoration efforts using a native plant palette. With minimal construction, revegetation of

the Ballona Creek will create a corridor between the Baldwin Hills and Ballona Wetlands, develop floral and faunal communities, and foster educational and recreational opportunities.

The concrete-lined Ballona Creek presents several different profiles along its length from the Interstate 10 to the Interstate 90 with varying amounts of exposed soil available for plant growth. The eastern section is straight sided, while the mid and western sections are sloped. To the west of Centinela, the creek becomes soft-bottomed and is subjected to tidal influence. The Ballona Creek Bikeway parallels the Creek on its north side, and is wide enough for a large vehicle. With the exception of the soft bottom, all areas considered for restoration occur above the concrete limits of the channel.

The soil collected at several sites along the length of the Creek was analyzed for organic content, pH, and nutrient availability (nitrate nitrogen, phosphorous, potassium, chlorine, calcium, and ferric iron). The organic content (humus) of the soil was higher where vegetation already exists, and lower on the open sites. The pH did not differ significantly between sites and was in the range of 7 to 8, which is not unusual for soils that support chaparral type vegetation. The high chlorine, calcium, and ferric iron concentrations distinguished the tidally influenced soils of the soft-bottomed channel. Unexpectedly, there were high concentrations of nitrogen from the two sites with very little vegetation cover, which may be attributed to nitrogen input from dogs walked in this area.

Less than one percent of the plant cover observed along the Ballona Creek could be classified as native species. The non-native species fall into two categories: those planted to enhance the environment; and those associated with disturbed or degraded landscapes. Some non-native plants have the potential to spread, (e.g., invasive). Several Creek-adjacent properties have been landscaped using non-native plant species, which may be attributed to inadequate education of the

neighbors about native southern Californian plant species and the invasive nature of non-native species.

Few birds, mammals (non-domesticated) and reptiles were observed along the Creek. The low diversity of birds, invertebrates, mammals, reptiles and amphibians observed could be attributed to the lack of suitable habitat along the Creek, including few native plant species. Native plants provide the building block of an ecosystem by providing food, shelter, and oxygen; the Creek lacks this integral component. The only area in which bird life was consistently observed, other than seabirds, was at the eastern end of the study area which had a significant vegetation cover (although largely non native species).

Restoration is not always easy, and the Ballona Creek has several constraints. The area surrounding the Creek currently contains little native vegetation and many weeds. The total area being considered for biological restoration is small, linear, discontinuous, and has limited access to ground water due to heavy hardscaping. Additionally, there is a potential conflict between maximizing pedestrian and bikeway area and expanding the planting area. Increased lighting desired by some bike commuters would constitute light pollution for these habitats. Restoration is expected to be patchy due to these constraints and initial heavy maintenance.

Water Quality

The Ballona Creek drains the Ballona Watershed that totals about 130 square miles, with land uses consisting of 64% residential, 8% commercial, 4% industrial, and 17% open space. The Creek and its tributaries are mostly underground, serving as the watershed's storm drain system, with the last 6.5 miles an open channel containing a sediment bottom in the estuary portion. Generally, water quality is poor because of the watershed's urban runoff. In fact, the open portion of the Creek has been listed on the State's Section 303(d) list of

Impaired Bodies of Water for the following water-borne contaminants: Copper (dissolved), Enteric viruses, Coliform bacteria, Lead (dissolved), pH (low), Selenium (dissolved), Toxicity, Zinc (dissolved). These contaminants render the water in the Creek system unfit for contact by people, mainly due to the potential presence of harmful bacteria and viruses. Because of human contact issues and elevated levels of metals, the water also would not meet standards for irrigation and other recycling uses.

Regulations to implement Total Daily Maximum Loads (TMDLs) for constituents on the State's Section 303(d) list are now being prepared for Ballona Creek. These regulations are being developed by the State, approved by EPA, and will be promulgated via municipal storm water permits issued to Los Angeles County and associated cities in the watershed. Once implemented, the goal of each TMDL is to reduce loading of its target contaminant into Ballona Creek so that its water meets State standards set forth in the Basin Plan for the Los Angeles Region.

The goal of this study is to obtain additional water quality data from Ballona Creek to supplement occasional monitoring performed by the County and City of Los Angeles. From July 7 to September 8, 2003, weekly samples were collected at sites located at bridges spanning the Creek at Rodeo Road, Duquesne Avenue, Overland Avenue, and Sawtelle Avenue. A fifth sampling site was located on the north bank of the Creek, due south of the foot of McConnell Avenue. Samples were measured for temperature, salinity, dissolved oxygen, pH, and indicator bacteria (coliforms, E. coli and enterococci).

Bacterial densities exceeded State water quality parameters for bathing waters at most sites during nearly every sampling event, especially during wet weather. Specifically, bacterial counts consistently were greater at the McConnell Avenue sampling site, where the site's sediment bottom may be acting as a bacterial sink, increasing water column loads of bacteria with any resuspension of

sediment particles. Overall, levels of the four metals measured by the City of Los Angeles generally met State standards established through the California Toxics. Spikes periodically occurred, and most likely were associated either with wet weather or illegal dumping of waste materials in the storm drains.

Use of Ballona Creek Corridor As An Outdoor Classroom and Educational Resource

In a region of relatively few parks or accessible natural areas, Ballona Creek, with its proximity to Baldwin Hills Park, the Ballona Wetlands, and the Pacific Ocean, has enormous potential to be an environmental education resource for the area's schools. Already utilized in its current degraded state by several local schools and various environmental organizations, Ballona Creek could be developed into a more formalized educational site, serving as a laboratory for local environmental education programs.

Responding to questions in the Social Impact Assessment survey, local teachers overwhelmingly supported proposed improvements to the Ballona Creek area directed at education. The proposed addition of native plants and potential return of indigenous wildlife, accompanied by explanatory signposts and/or interpretive exhibits, would provide an important teaching aid to instructors seeking to augment classroom learning through outdoor educational activities and field trips. Accordingly, the educational research team developed the Ballona Creek Education Project, a program and curriculum that would parallel restoration activities.

With the goals of educating students and the public about the Creek's history and ecological value, and fostering an ethic of environmental stewardship, the Ballona Creek Education Project will enlist a few flagship schools and members of the community in the restoration itself. Those involved in the restoration will be asked to document and catalog their work, enabling them to follow changes in real time.

A student, who took part in a restoration project in fourth grade by planting a particular shrub, will be able to watch it grow, reproduce and serve as a food source for other organisms in the community. Not only will this provide valuable personal experience, but the children will also see how their work contributes to a body of knowledge and becomes a resource for future students. Investigations that begin locally, at the Creek, will ultimately extend to include field trips to other parts of the watershed, including the Ballona Wetlands' freshwater marsh, which is in the process of restoration.

The creation of a natural corridor from Baldwin Hills to the ocean, where students can explore and experience the wonders of nature and gain an appreciation of the environment, represents a substantial commitment to preparing the next generation for the responsibility of sustainably managing our natural resources.

Report Recommendations

The following recommendations reflect the findings and analysis of the Social Impact Assessment, water quality issues, restoration opportunities, and environmental education opportunities.

1. **Construct an on-grade connection or elevated bridge from the Baldwin Hills Park to Ballona Creek.** The Bike Path now ends abruptly at National Boulevard, and runs adjacent to a portion of Baldwin Hills Park with a distance of only 200 yards separating the two facilities. This connection would potentially increase both the number and the diversity of people using Baldwin Hills Park and the Ballona Creek Bike Path, and could open up a myriad of new recreational resources for local residents. Also, creating a connection between the Ballona Creek Bike Path and Baldwin Hills Park has the potential to help create a sense of regional community by connecting disparate populations through their use of a common recreational facility.

2. **Install better signage for the Bike Path.** Improved signage would give the Bike Path more visibility, thereby increasing the likelihood of its use by residents and commuters. Appropriate directional signage, including listings of local attractions and amenities, may encourage bicycling as an alternative mode of transportation. As well, signage may help provide a sense of security and enhance public perceptions about the safety of the Bike Path. As enhancements proceed, signage relating to the restored habitat and wildlife communities may also be added.

3. **Identify parcels for significant habitat restoration, development of enhanced recreational opportunities, and/or the creation of interpretative centers.** Planting native species along the channel will create a corridor from the Ballona Wetlands to Baldwin Hills. An appropriate plant palette will consider drought tolerant species that attract birds and butterflies, and reflect the wetland, riparian, grassland, and coastal sage scrub ecosystems. This greater transitioning ecosystem will demonstrate the Ballona Creek's depth and diversity for its inhabitants.

4. **Remove weeds in the Ballona Creek corridor and educate adjacent neighbors about invasive, non-native species.** Manual removal is the best method, rather than the use of chemicals. Minimum tainting of the soil will provide a better environment for the new native plants, although monitoring of highly invasive species will be required.

5. **Implement a monitoring program to evaluate the Ballona Creek's water quality.** Such work will likely include the efforts underway to establish TMDLs for a variety of contaminants causing the impairment of the Ballona Creek.

6. **Establish the Ballona Creek Education Project.** This project provides an opportunity for students, teachers, parents and other members of the

community to utilize Ballona Creek as an educational resource that will encourage the preservation and improvement of our natural environment by fostering an appreciation and enhanced understanding of our natural ecosystem.

Introduction

PURPOSE OF THE STUDY AND BACKGROUND

The Baldwin Hills Conservancy's (BHC) jurisdiction includes a five-mile stretch along Ballona Creek between Interstate 10 (Santa Monica Freeway) and Interstate 90 (Marina Freeway). SB 259, an amendment approved by the Governor in January 2002, requires the BHC to perform a study of the potential environmental and recreational uses of Ballona Creek and adjacent property. This study reports on the work done by a multidisciplinary research group at Loyola Marymount University, in conjunction with the BHC, to address such environmental and recreational use opportunities.

The Class I Ballona Creek Trail and Bikeway runs parallel to Ballona Creek, traversing the Culver City and the City and County of Los Angeles terminating in Marina Del Rey at the Coastal Trail and Pacific Ocean. The trail is the only non-vehicular inland walking and bicycle trail that exists to serve approximately three million people who reside within three miles of the amenity. The trail serves residents from the many surrounding communities including Baldwin Hills, Windsor Hills, Ladera Heights, Crenshaw District, Leimert Park, Blair Hills, Westchester, Palms, Mar Vista, Playa Del Rey and Marina Del Rey. It is increasingly used as a bike commuter route for area residents employed in entertainment and multimedia industries that exist in the Marina and Culver City. Currently, there are two additional, ongoing studies of the Ballona Creek Trail and Bikeway. One study is being carried out by the Ballona Creek Watershed Task Force (BCWTF), which is developing a watershed management plan for the creek under a Proposition 13 grant from the Regional Water

Quality. The second study is Culver City's Focused Special Study, a requirement of the City's General Plan, funded through a grant from the California Coastal Conservancy.

DESIGN OF THE STUDY

The Baldwin Hills Conservancy worked with Loyola Marymount University to gather and analyze data of the existing and potential environmental and recreational opportunities along the Ballona Creek. The research focused on defining the existing conditions, constraints, proposed plans, public use and the projected biological, environmental, sociological, and educational impacts of implementing enhancements along the Ballona Creek and its Trail and Bikeway. The study included the production of a video to support and enhance the written report.

The research group at Loyola Marymount University consisted of a multidisciplinary group of faculty and students from the Departments of Natural Science and Biology within the Frank R. Seaver College of Science and Engineering; the Department of Sociology and Urban Studies Program within the Bellarmine College of Liberal Arts; and the Film Production Program within the School of Film and TV.

CONTENTS OF REPORT

The body of the report consists of four sections: social impact assessment, opportunities for restoration, water quality issues, and science education opportunities. Each section presents the data collected, results obtained, and an analysis of the results. The sections end with a set of recommendations regarding the environmental and recreational use opportunities for the both the Ballona Creek Trail and

Bikeway as well as a 100 yard wide corridor along Ballona Creek within the BHC's jurisdiction for the five-mile stretch between Interstate 10 (Santa Monica Freeway) and Interstate 90 (Marina Freeway). Additional pertinent information is included at the end of the report in Appendices.

Ballona Creek Social Impact Assessment

The Social Science Research Team focused on assessing the feasibility of implementing various proposed environmental restoration projects and recreational developments in the study area. Using a variety of research methods, the Team sought to obtain a representative sample of local residents, recreational users, local educational institutions, and local governmental agencies to assess support and solicit recommendations for the proposed improvements of the study area.

METHODOLOGICAL ISSUES: BIKE PATH USER AND RESIDENTIAL SURVEYS

Between July 2, 2003 and July 18, 2003, interviews were conducted with 161 individuals traveling along the Ballona Creek Bike Path. The timing and location of the interviews was systematically scheduled throughout weekdays and weekends, mornings and afternoons so as to gather opinions representative of those who typically use the Bike Path. In addition, 15 members of local bike clubs completed the questionnaire on-line. The survey questions (fixed response and open ended) reflected a variety of issues, including frequency and purpose of use, entrance and exit points, destination of travel, city of residence, and perhaps most importantly, user concerns.

In conjunction with the Bike Path survey, between July 7, 2003 and July 18, 2003, 105 interviews were conducted with residents in neighborhoods adjacent to the Ballona Creek Bike Path. The respondents for this survey were selected through a multi-stage process. The steps in the process involved: (1) randomly selecting three of the nine census tracts adjacent to the Bike Path; (2) randomly selecting streets and street locations where interviews would be sought; (3) interviewing a maximum of three residential household respondents on a given street. Thirty-five interviews were completed in each census tract. The

demographic characteristics of the respondents, e.g., age, sex, ethnicity and length of residence, closely match those of the population of the census tracts from which they were selected (Table 1.1). The interviews included questions about the respondents' length of residence, age, knowledge and use of the Ballona Creek and Bike Path, and degree of support for several proposed improvements to the Creek environment.

HIGHLIGHTS FROM THE TWO SURVEYS

- Bike Path users are nearly as likely to be male as female and are drawn from a wide age range. Nearly one-fifth live in coastal cities some distance from the Bike Path, although the majority are residents of Los Angeles or Culver City. Any improvements to the Bike Path environment would clearly benefit a geographically and socially diverse population (Table 1.2).

- Seventy-five percent of those who travel the Bike Path live within three miles of a Creek entry point (Table 1.3).

- The status of the Bike Path and Creek area as a community resource is confirmed by the fact that 60% of the neighbors indicated that they had previously used it.
- Although a substantial majority of the residents surveyed supported the idea of improving the Bike Path environment, those living near the eastern reach of the Ballona Creek were most vocal in their desire to initiate enhancements of the area (Table 1.4).

- Both neighbors and Bike Path users expressed concern about maintaining safety along the Creek. However, Bike Path users were nearly as interested in seeing improvements to the landscape as they were to achieving increased safety.

Table 1.1: Comparison of Characteristics of Neighborhood Survey Respondents (2003) and 2000 Census Data for Their Three Combined Census Tracts (in percent)*

	Sample	2000 Census
Sex		
Male	46	48
Female	54	52
Age[1]		
15 - 34	22	26
35 - 44	16	23
45 - 61	36	29
62 and older	26	22
Ethnicity		
White	61	64
African American	3	4
Hispanic	13	10
Asian-Pacific	9	14
Other	8	10
No Response	7	xx
Length of Residence[2]		
1995 - 2003[3]	35	40
1990 - 1994	13	13
1970 - 1989	32	33
Before 1970	20	14

*Because of rounding column percentages may not sum to 100.

[1] Median age = 47

[2] Median residence = 15 years

[3] The census category width is 1995 - 2000.

Table 1.2

Selected Social and Economic Characteristics of Census Tracts Proximate to Ballona Creek, 1990 and 2000 Census

	9 Census Tracts Adjacent to Ballona Creek		37 Census Tracts East and South of Baldwin Hills		97 Census Tracts Within Three Miles of Ballona Creek	
	1990	2000	1990	2000	1990	2000
Population	43,137	41,363	169,079	173,807	414,736	429,547
Race:						
% White	49.1	47.6	9.9	12.6	55.5	50.7
% Black	24.7	20.0	72.0	62.1	24.3	20.6
% Native Am	.004	.004	.003	.007	.004	.007
% Asian-Pacific	10.2	10.5	1.8	1.2	8.8	10.0
% Other Race	15.6	15.3	16.1	19.8	11.0	12.6
% 2+ Races	----	6.2	----	3.6	----	5.3
% Hispanic	25.4	30.9	22.8	32.1	19.6	25.2
Population 3+	41,418	39,997	160,025	165,986	399,305	414,433
Preprimary:						
Public	390	865	1,499	5,072	2,776	7,662
Private	247	484	1,242	2,051	3,508	5,326
Elementary or High School:						
Public	5,949	6,324	27,103	33,863	44,427	49,736
Private	811	808	4,177	4,371	9,782	11,008
Population 16+	34,631	32,495	127,599	126,059	344,348	349,566
Males in Civilian Labor Force	12,611	10,595	40,526	34,015	125,707	118,689
% Employed	94.5	92.9	88.3	87.1	94	93.0
Females in Civilian Labor Force	11,412	10,397	40,029	37,863	114,295	110,634
%Employed	93.9	94.4	90	87.7	93.9	92.7
Median Household Income ($)	39,353	48,497	27,426	32,747	38,398	47,957
Median Family Income ($)	44,727	56,019	31,748	38,377	45,252	56,905
Population	42,756	41,098	166,797	171,591	408,413	424,586

Ratio of Income to Poverty Level						
% Under .50	6.1	6.8	8.3	10.5	5.6	7.3
% .50 - .74	2.7	3.6	4.8	6.6	2.8	3.7
% .75 - .99	4.1	3.7	5.5	6.2	3.8	4.1
% 1.00 - 1.24	4.5	4.6	5.8	6.3	4.2	4.8
% 1.25 - 1.49	3.2	3.1	5.9	6.6	4.2	4.2
Occupation for Employed Civilian Population, 16+ (Total)	22,666	19,670	71,807	62,834	224,763	212,929
% Management, Professional and Related Occupations	34.0	43.8	21.9	26.1	38.1	46.9
% Sales and Office Occupations	33.6	27.3	35.2	31.9	34.5	27.9
% Service Occupations	11.1	14.2	16.6	19.1	11.4	13.6
% Construction, Production, Transportation and Maintenance	21.3	14.7	26.4	22.9	15.9	11.5
Residence Five Years Earlier for Population 5+ (Total)	40,250	38,951	154,202	159,952	389,562	404,082
% Same House	57.1	60.4	55.3	57.1	49.7	50.1
% Different House, Same County	32.2	31.4	34.8	36.5	33.5	34.1
Population (Total)	43,137	41,363	169,083	173,807	414,737	429,547
% Native	75.0	72.4	81.4	77.4	74.8	70.3
% Foreign Born Naturalized	8.7	12.1	4.4	7.2	8.8	11.9
% Foreign Born, Not a Citizen	16.3	15.5	14.2	15.3	16.5	17.8

Table 1.3: Neighborhood Support for Proposed Ballona Creek Enhancements (in percent)*							
	Establish New Trail Connections	Install Interpretive Exhibits	Install Inflatable Dam	Improve Landscaping	Install Trail Maps	Develop Small Parks	Widen Pedestrian Bridge
Agree Strongly	52	47	31	54	42	53	39
Agree Slightly	26	22	12	21	26	15	20
Neutral	10	14	14	12	12	9	15
Disagree Slightly	2	6	11	8	11	10	8
Disagree Strongly	7	8	31	1	8	11	11
DK/NR	5	4	3	4	2	2	7
N=	(105)	(105)	(105)	(105)	(105)	(105)	(105)

* Because of rounding column percentages may not sum to 100.

Table 1.4

		Location User Entered						
		National & La Cienega	Duquesne & Overland	Sepulveda & Slauson	Centinela & Lincoln	South Beach Cities	North Beach Cities	Total
Location User Will Exit	National & La Cienega	18	1	1	1	3	0	24
		69.20%	1.30%	4.80%	7.70%	9.40%	0.00%	14.00%
	Duquesne & Overland	0	54	1	1	12	0	68
		0.00%	69.20%	4.80%	7.70%	37.50%	0.00%	39.80%
	Sepulveda & Slauson	0	4	15	2	2	0	23
		0.00%	5.10%	71.40%	15.40%	6.30%	0.00%	13.50%
	Centinela & Lincoln	2	3	0	9	1	0	15
		7.70%	3.80%	0.00%	69.20%	3.10%	0.00%	8.80%
	South Beach Cities	6	14	4	0	14	0	38
		23.10%	17.90%	19.00%	0.00%	43.80%	0.00%	22.20%
	North Beach Cities	0	2	0	0	0	1	3
		0.00%	2.60%	0.00%	0.00%	0.00%	100.00%	1.80%
Total		26	78	21	13	32	1	171
		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

- Surprisingly, a sizeable minority of neighbors adjacent to Ballona Creek is not familiar with it. Therefore, increased signage—a relatively minor improvement—would make the Creek a recreational or travel option for more people.

- Although there was a positive response to the possibility of improvements, many Bike Path users expressed concerns about interruption of regular use. In addition, residents were wary of improvements attracting more people, and therefore more crime, to their neighborhoods.

- Regular Bike Path users prefer that any trail designs that are adopted should contribute to a respectful attitudes among different types of users.

OPPORTUNITIES TO SERVE LOCAL AND REGIONAL RESIDENTS: CENSUS PROFILE OF THREE PERIMETERS AROUND BALLONA CREEK

A demographic profile of three geographic areas of varying proximity to the Ballona Creek Bike Path was constructed based on 1990 and 2000 U.S. Census data. Neighborhood and Bike Path surveys established that most users live less than three miles from the path itself (Table 5). Any plans to alter the Creek environment for public benefit should take account of the likely needs of these distinct populations. The three geographic areas (Figure 1) include ninety-seven census tracts located within three miles of the creek, thirty-seven tracts south and east of Baldwin Hills that are at the eastern end of the Creek, and nine census tracts contiguous to Ballona Creek and its Bike Path.

Table 1.5: Distance Bike Path Users Live From the Bike Path			
	Frequency	Percent	Cumulative Percent
One Mile or Less	79	44.9	44.9
2 to 3 Miles	32	18.2	63.1
4 to 6 Miles	28	15.9	79
7 or More Miles	37	21	100
Total	176	100	

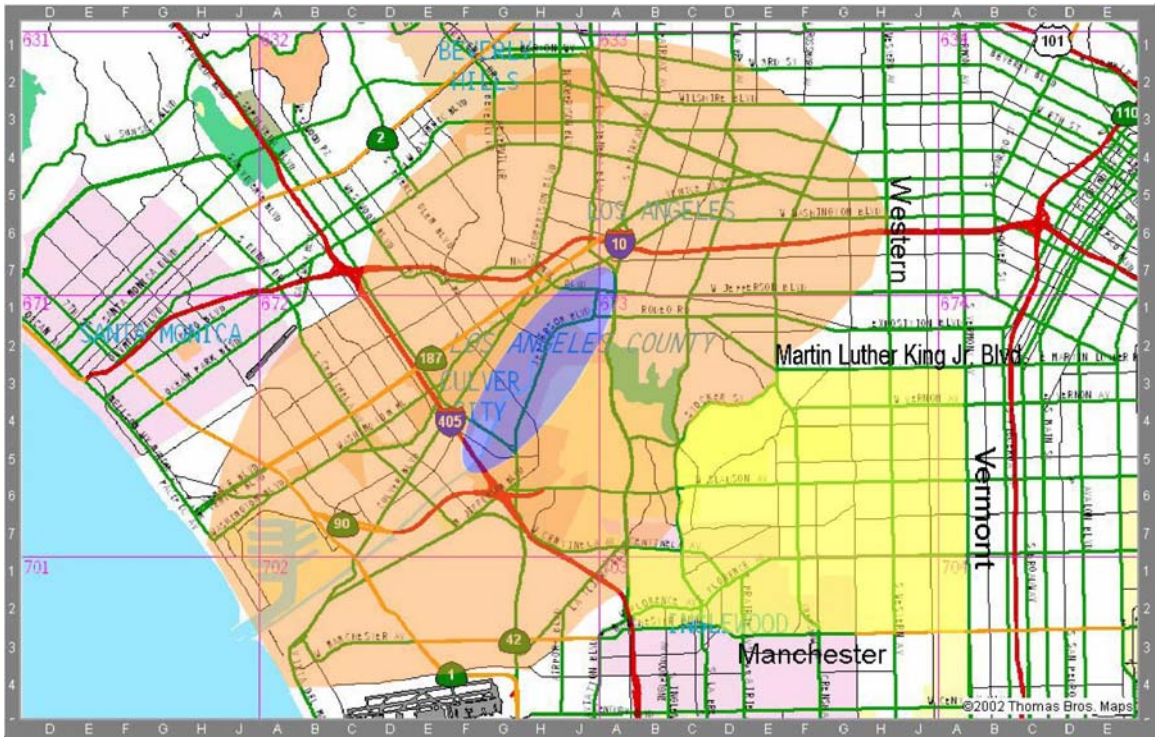

Figure 1.1. Map of geographic areas with proximity to Ballona Creek Bike Path.

Several points serve to highlight the nearby population that is likely to benefit from improvements to the Ballona Creek area.

- The racial composition of the 37census tracts south and east Baldwin Hills (hereafter S.E. Baldwin Hills Tracts) is distinct from the other two areas of comparison. The S.E. Baldwin Hills tracts are 62% Black, while the Black population of the other two areas is about 20%. It should be noted that the racial balance of S.E. Baldwin Hills has begun to change since 1990, as is reflected in a 10% decline in the Black population and a 10% increase in the Hispanic population.

- The Wide Creek Perimeter (97 census tracts) and the Adjacent Creek Perimeter (9 census tracts) also experienced a less dramatic decadal change that is reflected in a five percent decline in the Black population and a five percent increase in the Hispanic population.

- The percent foreign born, non-citizens stands at 15.5% for the Adjacent Creek Perimeter, 15.3% for S.E. Baldwin Hills and 17.8% for the Wide Creek Perimeter.

- Enrollment in public and private schools (elementary and secondary) grew by 25% in S.E. Baldwin Hills, 12% in the Wide Creek Perimeter, and 6% in the Adjacent Creek Perimeter.

- Labor force participation declined slightly for both males and females in S.E. Baldwin Hills, which is mirrored by similar losses in the other two areas for males.

- Family income (unadjusted) during the 1990s grew about 25% for both the Wide Creek Perimeter and the Adjacent Creek Perimeter. S. E. Baldwin Hills family income increased by 21%.

- Each of the three areas experienced an increase in the proportion of its population with earnings less than 50% of the poverty level. In 2000 S.E. Baldwin Hills had 10.5% of its population at that level.

- The occupational location of residents in the three geographic areas also point to differences in their populations. For example, the percent of workers employed in “management, professional and related occupations” in the Adjacent Creek Area is 44%, in S.E. Baldwin Hills 26% and in the Wide Creek Perimeter 47%.

- Residential stability, measured by the proportion of the population that has lived in the same residence for five years, is strongest in the Adjacent Creek Perimeter (60%), followed by the S.E. Baldwin Hills (57%) and the Wide Creek Perimeter (50%).

- The data extracted from the last two censuses identify distinguishing characteristics of a population whose life experiences could benefit from enhanced publicly available facilities, such as a more attractive and functional recreation corridor associated with Ballona Creek and its Bike Path.

OPPORTUNITIES FOR LINKAGES TO BALDWIN HILLS PARK

Creating a direct connection between the Ballona Creek Bike Path and Baldwin Hills recreation area is a natural and obvious proposal. The Bike Path, which now ends abruptly at National Boulevard, runs adjacent to a portion of Baldwin Hills Park with a distance of only 200 yards separating the two locations. Constructing an on-grade connection or elevated bridge to traverse this distance would potentially increase both the number and the diversity of patrons using both Baldwin Hills Park and Ballona Creek Bike Path. Additionally, such a connection would have benefits for efforts to enhance and restore the natural environment of the creek bed and park.

- The Ballona Creek Bike Path is the only non-street walking and bicycle trail in this area of Los Angeles County. It is also the only trail providing direct access to the 25-mile Beach Bike Trail that forms its western terminus.
- According to the “One Big Park” concept discussed in the Baldwin Hills Master Plan, “the expanded park will extend into adjacent park-poor communities with greenways, pedestrian and bicycle

trails, and will connect to important existing and planned regional trail systems including the Ballona Creek Trail…and could provide additional wildlife connections along the creek to the Ballona Wetlands."

- As revealed by the data collected, there is a significant subset of the local population that currently is neither aware of, nor has direct access to, the Ballona Creek Bike Path and its recreational opportunities. Therefore, the proposed connection to Baldwin Hills could open up a myriad of new recreational resources for local residents, in addition to those offered at Baldwin Hills.
- Creating a connection between the Ballona Creek Bike Path and Baldwin Hills Park has the potential to help create a sense of regional community by connecting disparate populations through their use of a common recreational facility.
- Respondents from the Bike Path Survey voiced strong support for the idea of connecting Ballona Creek Bike Path to Baldwin Hills Park.

OPPORTUNITIES FOR ENVIRONMENTAL EDUCATION

There are a number of characteristics that make the Ballona Creek and Bike Path a viable environmental education resource for the approximately twenty local area schools. In a region of relatively few parks or accessible natural areas, Ballona Creek, with its proximity to Baldwin Hills Park, the Ballona Wetlands, and the Pacific Ocean, has enormous potential to be an environmental education resource for the area's schools. Already utilized in its current degraded state by several local schools and various environmental organizations, Ballona Creek could be developed into a more formalized educational site, serving as a laboratory for local environmental education programs. The proposed addition of native plants, which would encourage the return of indigenous wildlife, accompanied by explanatory signposts and/or interpretative exhibits would

provide an important teaching aid to instructors seeking to enhance classroom learning through outdoor educational activities and field trips.

Readily accessible teaching aids and other reference materials on riparian vegetation, stream dynamics, and habitat restoration could be employed by educators to develop site-specific lesson plans at the improved Ballona Creek.

A survey of local teachers indicated that there is unanimous support for proposed improvements to the Ballona Creek area directed at education, especially those that include the installation of interpretive sites and/or the provision of trained docents or park rangers.

- All of the respondents confirmed that with such improvements, Ballona Creek would be utilized more frequently as a field trip destination. Use of the Creek would entail minimal costs in an era of fiscal limits.
- Respondent suggestions included creating a designated bird watching site, in addition to exhibits/interpretive sites geared toward environmental stewardship, wildlife, and the general history of the area.
- Culver City Unified School District currently organizes a 5th grade Service Learning Program, which encourages environmental protection by taking students to Ballona Creek for litter pick-ups.
- Areas of possible study along Ballona Creek include: wetlands, history of the stream and adjacent area, the environmental challenges of cleaning up industrial wastes and toxic sediments, general environmental processes, aquatic ecosystems, and water management and treatment.
- Developing Ballona Creek into an environmental education resource may encourage the preservation and improvement of our natural environment by fostering an appreciation and enhanced understanding of responsible use of the natural ecosystem.

- The attraction of organized groups and student classes to Ballona Creek and the Bike Path may disrupt Bike Path users who are resistant to increased traffic along the Creek. Provisions for managing conflicting uses must be incorporated into the design and selection of sites for interpretative exhibits and educational points along the Creek.

OPPORTUNITIES TO ACCESS LOCAL ATTRACTIONS AND AMENITIES

The Ballona Creek Bike Path is a potential gateway to a myriad of local activities and historical attractions. The Bike Path offers a direct route to the ocean free from cars and traffic for inland residents. However, other opportunities within riding and walking distance from the Bike Path have gone mostly undiscovered by its users. From the Bike Path one can easily commute to the nearby public facilities and recreational areas, visit historical landmarks such as the 1915 Colonnade building, and connect to local community events, like the weekly Culver City Farmer's Market.

A selected list of local and regional attractions, easily accessed from the Bike Path provides an indication of the role a redeveloped and enhanced Bike Path, with appropriate directional signage, might serve in providing an alternative mode of transportation to local amenities:

Selected activities and attractions within walking or biking distance from the Ballona Creek Bike Path (from the access points traveling West to East along the trail) include:

Slauson:

- Culver/Slauson Park (5070 S Slauson Ave.)
- Fox Hills Mall (294 Fox Hills Mall @ the 405 fwy. and Jefferson)
- Fox Hill Park (6161 Buckingham Parkway)

- Pepperdine Univ. Grad. School of Education and Psychology (400 Corporate Pointe)
- GMT Studios (5751 Buckingham Pkwy.)
- Vencor Los Angeles County Hospital (5525 W Slauson Ave.)
- Mar Vista Gardens Recreation Center (4901 Marionwood Dr.)

Sawtelle Blvd.

- Blanco Park (10915 Sawtelle Blvd.)
- El Marino Park and Recreation Center (5301 Berryman Ave. @ Diller Ave.)

Sepulveda Blvd.

- Culver City Ice Arena (4545 Sepulveda Blvd.)
- Allied Model Trains (4411 Sepulveda Blvd.)
- Lindberg Park (5041 Rhode Way @ Studio Dr.)
- Tellefson Park (Washington Place and Bentley Ave.)
- La Ballona School Playground (10915 Washington Blvd.)
- Studio Village****** (On Jefferson @ Sepulveda Blvd.)

Overland Ave.

- West Los Angeles College (4800 Freshman Ave.)
- Culver City Julian Dixon Library (4975 Overland Ave.)
- Kaizuka Meditation Garden (4975 Overland Ave. @ Library)
- Culver City Chambers of Commerce (4249 Overland Ave.)
- Sony Studios****** (10202 Washington Blvd.)
- St. Augustine Church** (3850 Jasmine Ave. across from Sony Studios)
- Veteran's Memorial Park (4117 Overland Ave.)
- Dr. Paul Carson Memorial Park (Braddock Dr. and Motor Ave.)

- Raintree Plaza** (On Jefferson @ Overland Ave.)
- Culver City Commercial Center (On Jefferson @ Cota St.)

Duquesne Ave.

- Culver City Park (9800 Jefferson Blvd.)
- Ince Studios** (9336 Washington Blvd.)
- Museum of Jurassic Technology (9341 Venice Blvd.)
- Media Park (@ Venice Blvd. and South Canfield Ave.)
- Farmer's Market Tuesdays from 3-7 PM (@ Media Park)
- Ivy Substation** (Adjacent to Media Park @ 9070 Venice Blvd.)
- Brotman Medical Center (3828 Delmas Terrace)
- Linwood E. Howe School Playground (4100 Irving Place)

National Blvd.

- Syd Kronenthal Park (3459 McManus Ave. @ National)
- Washington Boulevard's "Walk of Fame" (on Washington Blvd. from National Blvd. to La Cienega)
- The Jazz Bakery with live jazz (@ 3233 Helms Ave.)
- Higuera Home on Helms** (located on Helms Ave.)
- Gascon Center Theater (8737 Washington Blvd.)

** Sites of Local/Regional Historical Significance

OPPORTUNITIES FOR UTILIZING UNDEVELOPED AND UNUSED PARCELS

The potential redevelopment and enhancement of Ballona Creek and the adjacent Bike Path may be facilitated by the presence of numerous parcels along the route—some in public and some in private ownership—that are currently undeveloped or unused. These parcels offer the potential for significant habitat restoration, the development of enhanced recreational opportunities, and/or the creation of interpretative centers. Over twenty usable parcels were

photographed and recorded during the month of June, 2003. The parcels predictably include undeveloped and neglected natural sites, but also include developed areas of pavement sufficiently large to be redeveloped and restored to a more natural condition without compromising their apparent functions in flood control and service access. Photographic evidence also demonstrated a significant number of improvements made by adjacent residents to apparently public parcels along the Creek. Documentation was also made of the existing access points along the Creek and of the fences that control and limit access along most of the Bike Path. The deteriorated state of many of these access points and fences reveals the necessity of enhancing this critical resource.

- The evidence of improvements made to the unused parcels of land by local residents reflects the local residents' vested interest in improving the areas surrounding the Creek.
- The number of vacant parcels that exist within or around the Bike Path provides substantial land and opportunities for proposed improvements.
- Photographs of official and unofficial access points leading to the Ballona Creek Bike Path reveal an absence of adequate signage. The signage that currently exists does not always clearly establish that the access point leads to both a bike and pedestrian trail.
- No signage exists indicating the length of the Bike Path or where the Bike Path begins and ends.
- Photographs of deteriorated fences show the effects of time and weather. Some fences between the Bike Path and the Creek are structurally unstable, and in other cases essentially non-functional. In many cases it appears that the fences and access points have become hazards themselves, rather than barriers effectively limiting access to hazardous sites within the creek side area.
- Some undeveloped parcels are situated within or adjacent to the Bike Path right-of-way. These parcels are hazardous to bikers and

pedestrians due to the presence of loose gravel and debris spreading on to adjacent paved surfaces.

JURISDICTIONAL CONSTRAINTS: SIGN CODE ORDINANCES

As the eight-mile Ballona Creek Bike Path extends inland from National Boulevard to the ocean, it is significant to note that it passes through many jurisdictions. Many of the proposed improvements to the Ballona Creek Bike Path will require approval by the city or cities that have jurisdictional responsibility. Thus, changes or additions may be subject to the authority of different laws, and codes/ordinances.

- According to the La Ballona Jurisdictional Responsibilities Matrix, bike path maintenance, landscaping and signage are all the primary responsibility of Culver City. Thus, many of the proposed improvements to the Ballona Creek and Bike Path would be subject to Culver City's local codes and ordinances.
- As the Bike Path passes through both residential and nonresidential zones, the proposed improvements in directional and interpretative signage is complicated by the differing policies typical of residential and non-residential zoning ordinances.
- Despite the multitude of restrictions in Article XVII.A., the Culver City Sign Code Ordinance states, "a public information sign required by a government agency shall be exempt from these restrictions." This provision of the Culver City ordinance suggests that the proposed signage may be more feasible than some local residents have suggested.

PERCEPTUAL CONSTRAINTS: CRIME--PERCEPTION VS. REALITY

Although survey results indicate that Bike Path users and residents of the area surrounding Ballona Bike Path have substantial concern about user safety, actual crime statistics do not support their perceptions. Lieutenant Dave Tankenson of the Culver City Police Department characterized the Bike Path and Ballona Creek area as having a "very low, almost non-existent crime problem." However, the Culver City Police Department has jurisdiction over only a portion of the Creek. Many respondents expressed concerns about criminal activities associated with the residents of the neighboring Mar Vista "projects," which is within LAPD jurisdiction. Nevertheless, even in that portion of the Creek, their perceptions seem to overstate the actual problem, and LAPD reports only minimal problems with criminal activities within the study area.

- The main public safety concerns of the Culver City Police Department are graffiti and transients setting up encampments along the Creek.
- Reported criminal activity within the study area is actually quite minimal. Within the past year there has only been five arrests for public intoxication and tagging along the Creek.
- Enhancements in aesthetics as well as better signage indicating the distances of nearest exits may provide a sense of security and enhance public perceptions about the safety of the Bike Path.
- Enhanced public awareness efforts concerning the low level of criminal activities along the Bike Path, including the Mar Vista "project" area, may help to alleviate present negative perceptions.
- Crime deterrents such as increased presence of uniformed officers, as well as increased activity and usage along the path may be useful against potential crime and perceptions of crime.

OPPORTUNITIES FOR REDEVELOPMENT: PLANS AND PROPOSALS

Numerous studies have been conducted in an effort to produce a comprehensive proposal for the improvement of the Ballona Creek and Bike Path. The Ballona Creek Master Plan Study, sponsored by The California State Coastal Conservancy, included a comprehensive survey of the opportunities for natural restoration and environment enhancement along the Creek. Culver City initiated the Ballona Creek and Trail Focused Special Study with a grant from the Coastal Conservancy. This study consisted of three community-planning workshops, conducted by RRM Design Group and Culver City. The USC School of Architecture Study completed an extensive survey of the physical environment and looked at the history of Ballona Creek along with comparable projects.

Together, these studies provide a comprehensive assessment of existing conditions and a valuable resource of possible opportunities for future improvements. The current study by Loyola Marymount University and Baldwin Hills Conservancy builds on these previous studies and programs by addressing some of the methodological issues associated with those projects.

Opportunities For Restoration

Figure 2.1. Ballona Creek near the Interstate 10 (close to the intersection of Sentney and Jacob) looking west towards the Baldwin Hills.

The five-mile stretch of the Ballona Creek within the Baldwin Hills Conservancy's boundaries presents a degraded urban landscape with little native flora and fauna. This section investigates the opportunity for environmental enhancement through the use of native southern Californian plant species that would attract native fauna. Observations of existing flora and fauna were used together with data from the Ballona Wetlands and the Baldwin Hills Conservancy to determine which communities could be present in a transitional ecosystem linking these two areas. Relevant communities are coastal sage scrub, grassland, riparian, and wetland. A plant palette was created taking the relevant communities into consideration. The revegetation of the Ballona Creek using plants native to California will create a corridor between the Baldwin Hills Conservancy and

Ballona Wetlands, develop floral and faunal comminutes, and foster educational and recreational opportunities.

PURPOSE AND BACKGROUND

This biological aspects of this study stem from the results of the Ballona Creek Recreational Use Survey administered to Ballona Creek neighbors. The results of the survey included both negative and positive reflections of the proposals for the Creek enhancement. The major negative views included neighbors' concerns over the noise and security issues construction may bring upon them, as well as too much public access near their residences post enhancement. Positive reflections of the enhancement included support for beautification, a natural green environment, and increased use of public space. A high percentage of the respondents advocating to change the Creek and using native Californian plant species for landscaping to enhance the Ballona Creek both environmentally and aesthetically.

California native plants are preferred for the landscaping of the Ballona Creek for the following reasons:

1. Native flora brings native fauna; California native plant species will attract birds & invertebrates.
2. Use of native flora creates a sense of identity and stewardship among users.
3. Educational and recreational opportunities that would not exist if using non-natives will be created.
4. Long-term costs are much lower, especially if self-sustaining communities can be developed as opposed to gardening with California native plants.

The creek biota and environmental conditions and transitioning ecosystem are the biological aspects that were focused on in the study. A biotic survey of the Creek was performed, emphasizing plants. Plants were physically collected or visually assessed, then identified through the process of keying out through the aid of the *Jepson Manual of Higher Plants of California* and relevant gardening books (references). A species list of the observed plants was created.

The possibility of a transitioning ecosystem from the Baldwin Hills Conservancy, along the Ballona Creek, through the Ballona Wetlands has been explored by the comparison of biota, which had been previously observed. A plant palette was created from references of known species of the Baldwin Hills Conservancy, Ballona Wetlands, and surrounding area along the Creek.

Re-vegetation v. Restoration

Improving the Ballona Creek may be accomplished through two disparate approaches – re-vegetation or restoration. Re-vegetation (gardening) consists of covering the ground with vegetation, which frequently comprises non-native species. Any plant species that is not native to an area is considered a weed; many times the weeds are invasive and threatening to the surrounding environment. The vegetation is chosen for pure aesthetic benefit rather than taking the environment into consideration. There is usually a constant replacement of the non-native weeds, which require continual watering and other management. Over time the maintenance cost can accumulate significantly.

On the other hand, restoration through the use of native plant species supports and helps foster environmental communities. Restoration consists of the planting of 100% California native plants with components from the pioneer, sub climax & climax communities. The ecosystem should represent the native appearance and have no invasive components present. In their natural environment, native plants species do not require watering, pruning, or other heavy maintenance. The long-

term costs of native California plants will be significantly lower than the cost of non-native species.

Ecosystems are dynamic structures; life is continually moving into and out of them. Ideally the Ballona Creek will become a corridor from Baldwin Hills to Ballona for increased recreational use and environmental biota residing throughout the Creek. The corridor for the biota of the Ballona Creek should reflect the natural ecology of the area by including coastal sage scrub, riparian, grassland, and wetland communities. This study aims to explore the possibility of planting native California plants along the Ballona Creek in order to restore degraded environmental communities.

EXISTING CONDITIONS

General

The concrete-lined Ballona Creek presents several different profiles along its length from the Interstate 10 to the Interstate 90 (Figure 2.2) with varying amounts of exposed soil available for plant growth. The eastern section is straight sided (Figure 2.3), while the mid and western sections are sloped (Figures 2.4 and Figure 2.5). To the west of Centinela, the creek becomes soft-bottomed and is subjected to tidal influence (Figure 2.6). The trail and bikeway parallels the creek on its north side and is wide enough for a large vehicle (Figure 2.7). With the exception of the soft bottom, all areas considered for restoration occur above the concrete limits of the channel.

Soil

The soil collected at several sites along the length of the creek (Figures 2.8 - 2.10) was analyzed for organic content, pH, and nutrient availability (nitrate nitrogen, phosphorous, potassium, chlorine, calcium, and ferric iron) using a LaMotte Soil Analysis Kit.

The organic content (humus) of the soil (Figure 2.11) was greater where vegetation already exists, such as site # 1 that is a mixture of garden species, e.g., *Bougainvillea*, and weeds, e.g., fennel. Low humic content occurred on the

open sites. The pH (Figure 2.12) did not differ significantly between sites and was in the range of 7 to 8, which is not unusual for soils that support chaparral type vegetation. The high chlorine, calcium, and ferric iron concentrations (Figure 2.13) distinguished the tidally influenced soils of the soft-bottomed channel. Unexpected were the high concentrations of nitrogen from the two sites (#2 and #4) with very little vegetation cover. As samples were from surface layers, it is possible that this is associated with nitrogen input from dogs walked in this area.

Figure 2.2. Ballona Creek study area boundaries from Interstate 10 in the east to the Interstate 90 in the west.

Figure 2.3. Straight-sided section of the eastern part of the Ballona Channel close to Interstate 10.

Figure 2.4. Sloped sides of the Ballona Channel in the mid-section of the study area close to Pearson Pl.

Figure 2.5. Sloped sides of the Ballona Channel in the western reach of the study area close to Interstate 405.

Figure 2.6. The Ballona Channel is soft-bottomed west of Centinela as evidenced by the band of vegetation along the channel-bottom edge.

Figure 2.7. The bike path parallels the Ballona Channel on the north side and is wide enough to accommodate large vehicles, as can be seen from the street sweeper on the path at National.

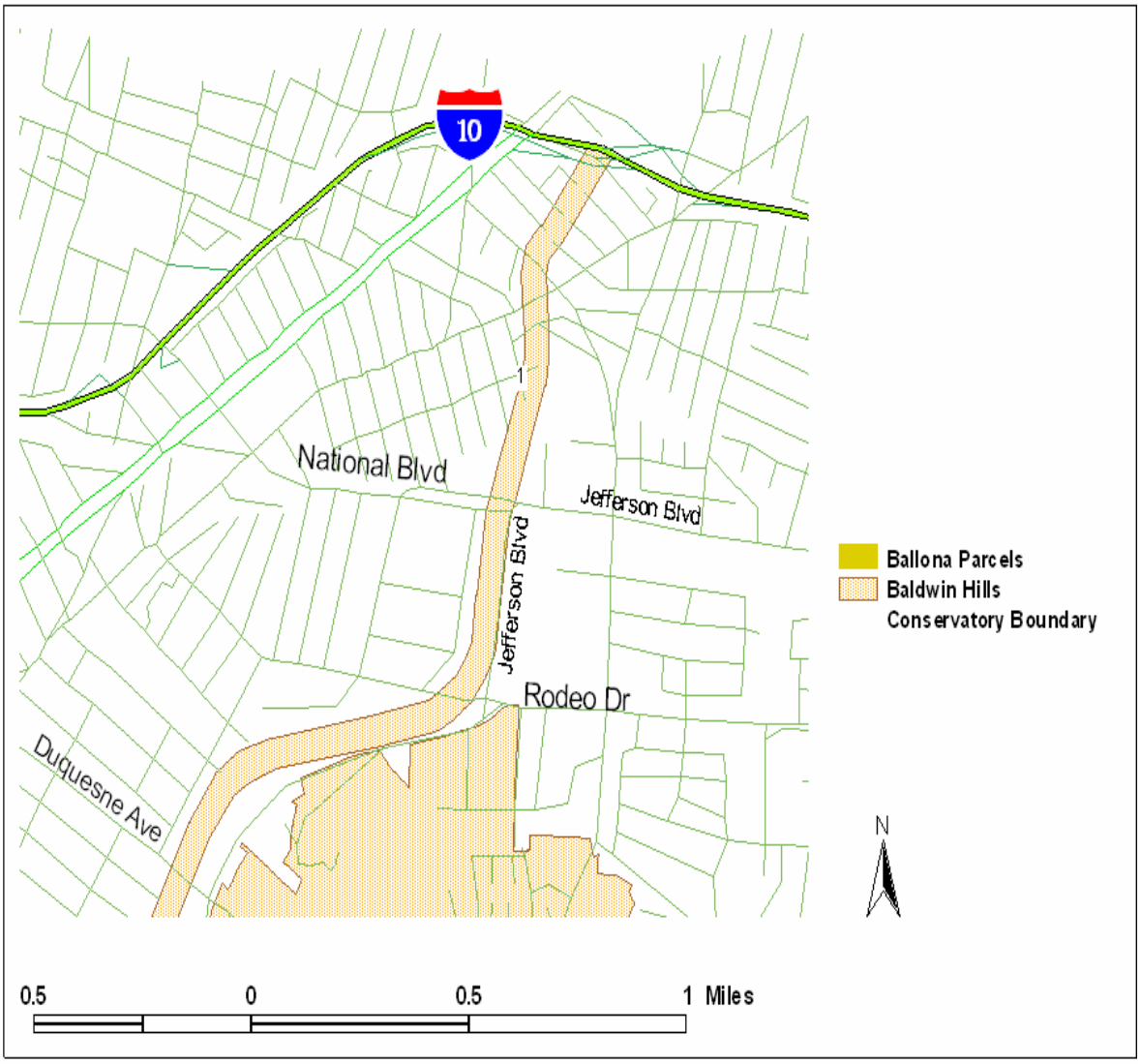

Figure 2.8. Map of the eastern reach of the study area with soil sampling site #1.

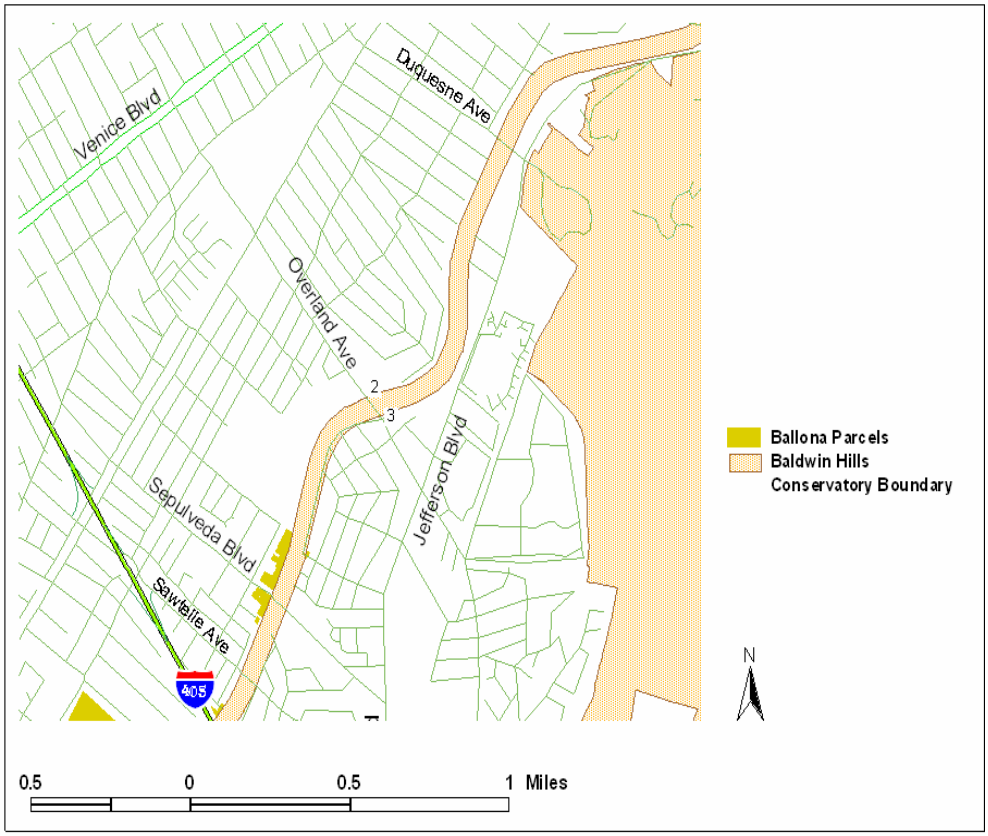

Figure 2.9. Map of the mid reach of the study area with soil sampling sites #2 and #3.

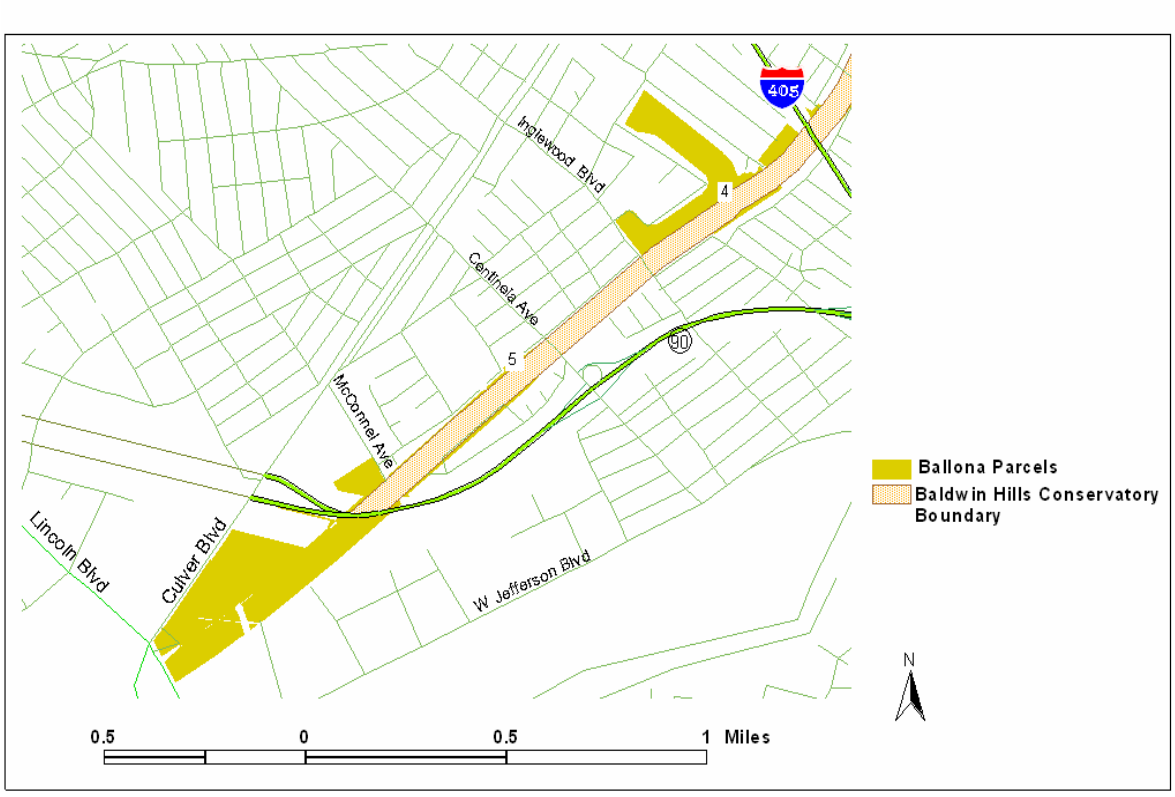

Figure 2.10. Map of the western reach of the study area with soil sampling sites #4 and #5.

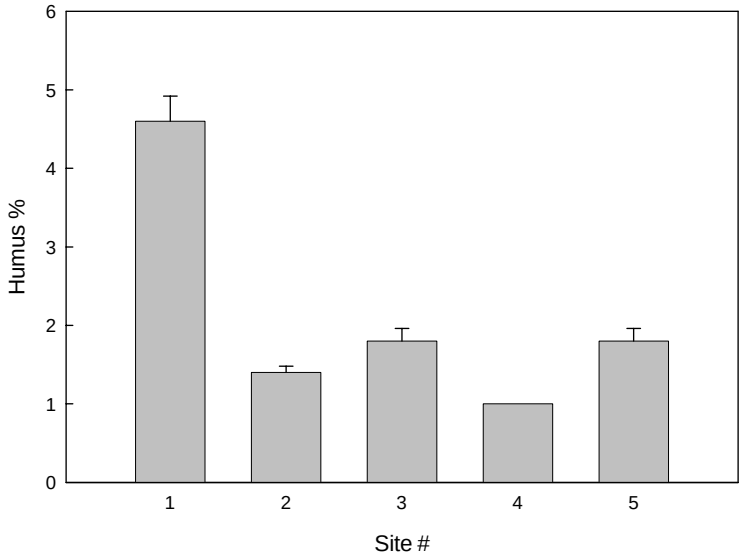

Figure 2.11. Organic content of soils (% humus) from 5 sites along the Ballona Creek. (Results are the average of *n* = 5 samples, ± the standard error.)

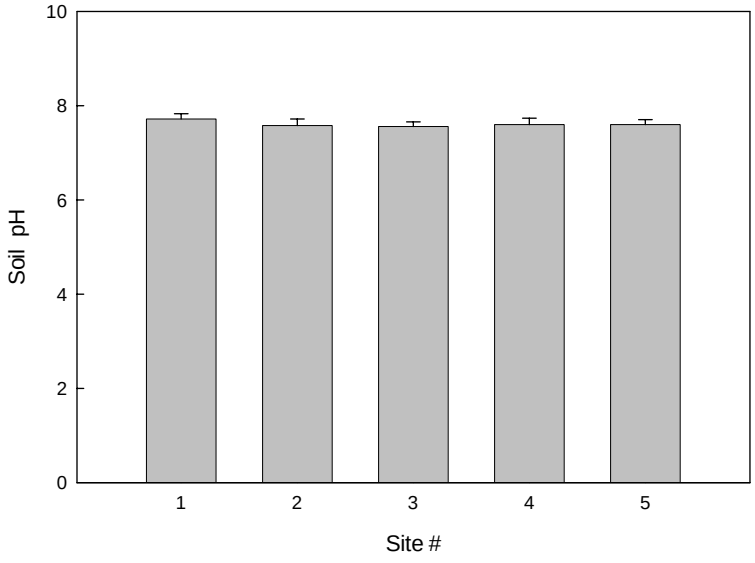

Figure 2.12. The pH of soil from 5 sites along the Ballona Creek. (Results are the average of *n* = 5 samples, ± the standard error.)

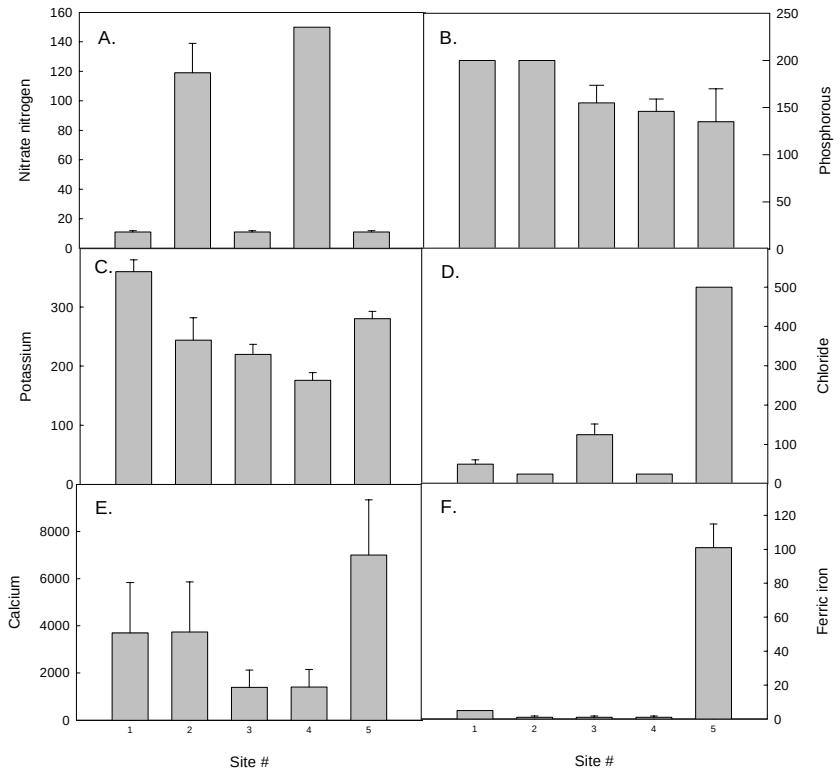

Figure 2.13. The nutrient content of soil from 5 sites along the Ballona Creek: A, nitrate nitrogen in units of ppm; B, phosphorous in units of lb/acre; C, potassium in units of lb/acre; D, chloride in units of ppm; E, calcium in units of ppm; F, ferric iron in units of lb/acre. (Results are the average of n = 5 samples, $\pm$ the standard error.)

Flora

The majority of plant species observed along the Ballona Creek were non-native. Less than one percent of the plant cover could be classified as native. The non-native species fall into two categories; those planted to enhance the environment, and those that are associated with disturbed/degraded landscapes. Of those planted (Figure 2.14), some have the potential to spread, i.e., are invasive, for example *Carpobrotus sp*. (*Carpobrotus edulus,* iceplant, is on the A-1 List – Most invasive wildland pest plants - of The California Exotic Pest Plant Council). Many of the ruderal species (Figure 2.15) are also classified as widespread invasive, e.g., wild fennel (*Foeniculum vulgare*, CalPECC, A-1 List).

Some of the problems with invasives may be attributed to inadequate education of the neighbors about native southern Californian plant species and/or preferences for planting species that may spread. Several creek-adjacent properties have been landscaped, but none using native plant species (Figure 2.16).

Fauna

Few birds, mammals (non-domesticated) and reptiles were observed along the Creek. The low diversity of birds, invertebrates, mammals, reptiles and amphibians observed could be attributed to the lack of suitable habitat along the Creek, including few native plant species. Native plants provide the building block of an ecosystem by providing food, shelter, and oxygen; the Creek lacks this integral component. The only area in which bird life was consistently observed, other than seabirds, was at the eastern end of the study area which had a significant vegetation cover, although largely non native species (Figure 2.1). Seagulls and black-necked stilts frequented the channel at the junction with the Sepulveda Channel (Figure 2.17) and many of the bird species associated with the Ballona Wetlands are found in and around the Ballona Channel near the Interstate 90. Indeed, a flat area just outside of the study area, where the

Centinella Creek joins the Ballona Channel could potentially provide habitat for these birds (Figure 2.18).

Figure 2.14. An aesthetically pleasing planting along the south edge of the Ballona Channel near Overland provides a green contrast to the barren north edge. However the species are non-native and include a ground cover of *Carpobrotus sp*.

Figure 2.15. Fennel in the foreground is one of the invasive species in this disturbed Ballona Channel adjacent vegetation at the eastern edge of the study area.

Figure 2.16. Landscaped property adjacent to a weedy patch in the mid reach of the study area close to Dusquene Avenue. Plant species in both areas are non-native to southern California.

Figure 2.17. Gulls and other shore birds, e.g., black-necked stilt come up the Ballona Creek to the junction with the Sepulveda Channel.

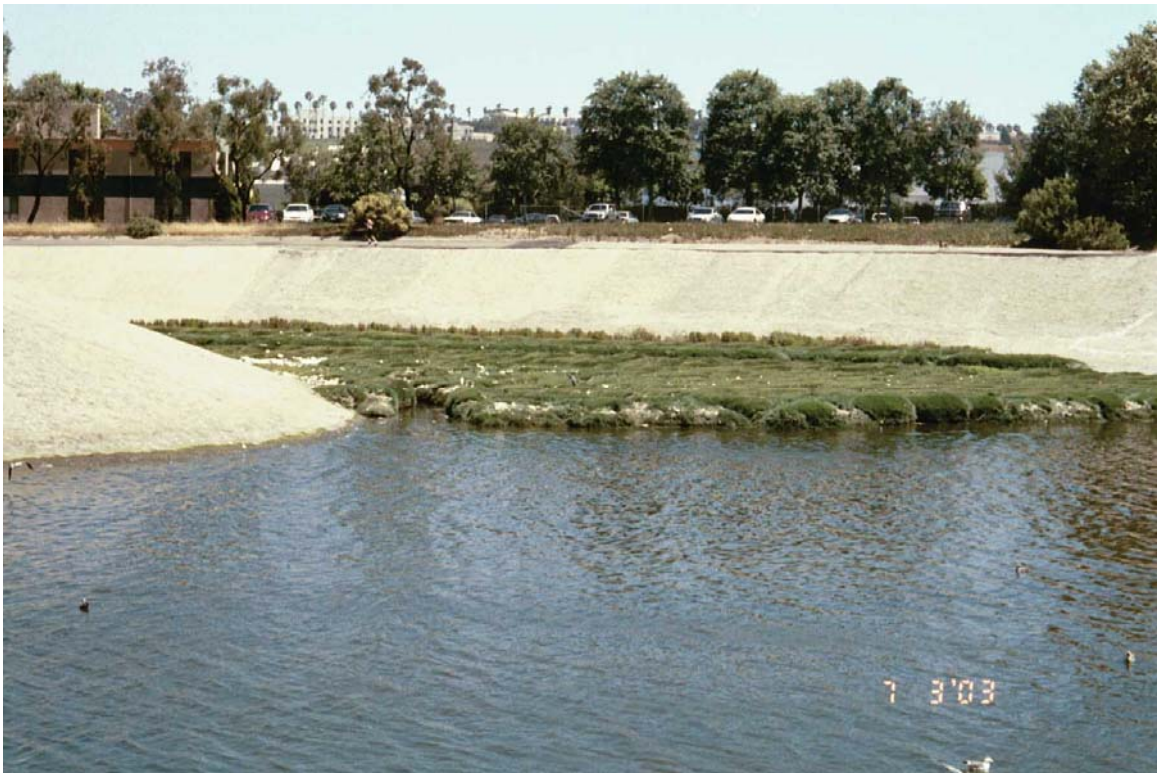

Figure 2.18. Many birds use the area immediately outside the study area at the junction of the Centinella Creek with the Ballona Channel.

CONSTRAINTS

Restoration is not always easy, and the Ballona Creek has several constraints. The area surrounding the creek currently contains little native vegetation and many weeds. The total area being considered for biological restoration is small, linear, discontinuous, and has limited access to ground water due to heavy hardscaping. Additionally, there is a potential conflict between maximizing pedestrian and bikeway area versus planting area. Furthermore, increased lighting desired by some bike commuters would constitute light pollution for these habitats. Some neighbors have also encroached onto parcels beside their residence and have attempted to landscape these areas. These neighbors may resist efforts of a more coordinated restoration plan. Restoration is expected to be patchy due to these constraints with initial heavy maintenance.

OPPORTUNITIES

Tables of overlap showed a percentage of shared species between the Baldwin Hills Conservancy area and Ballona Wetlands invertebrate (Appendices A and B), reptiles (Appendix C), birds (Appendix D), mammals (Appendix E), and vegetation (Table 2.1). The large number of shared species between the Baldwin Hills Conservancy area and Ballona Wetlands support the concept of a transitional ecosystem along the Ballona Creek.

The enhancement provides an opportunity to educate neighbors of the benefits of native California plants as well as the dangers to the environment when using invasive weeds for landscaping.

Through community involvement in the implementation of a transitional ecosystem, the educational opportunity of informing the public of its importance arises. The staging of the restoration can serve to illustrate both the difficulties and benefits of restoration to the public.

Table 2.1. Shared native plants of the Baldwin Hills Conservancy and Ballona Creek.		
Family	Scientific Name	Common Name
Anacardiaceae	*Malosma laurina (Rhus laurina)*	Laurel sumac
Anacardiaceae	Rhus ovata	Sugar bush
Asteraceae	*Ambrosia acanthicarpa*	Ragweed/Annual bursage
Asteraceae	*Ambrosia chamissonis*	Ragweed/Beach bur
Asteraceae	*Artemisia californica*	California sage brush
Asteraceae	*Baccharis pilularis*	Coyote brush
Asteraceae	*Baccharis salicifolia*	Mule fat
Asteraceae	*Encelia californica*	California bush sunflower
Asteraceae	*Filago sp.*	Filago
Asteraceae	*Gnaphalium bicolor*	Cudweed
Asteraceae	*Gnaphalium californicum*	California cudweed
Asteraceae	*Gnaphalium canescens ssp. beneolens*	Everlasting cudweed
Asteraceae	*Gnaphalium ramosissimum*	Pink cudweed
Asteraceae	*Gnaphalium stramineum (G. chilense)*	Chilean cudweed
Asteraceae	*Grindelia robusta*	Gum plant
Asteraceae	*Hemizonia fascicuata (H. ramosissima)*	Common tarweed
Asteraceae	*Lessingia filaginifolia (Corethrogyne filaginifolia)*	Bush aster/Corethrogyne
Asteraceae	*Malacothrix saxatilis*	Cliff aster
Asteraceae	*Stephanomeria virgata*	Tall stephanomeria
Asteraceae	*Xanthium strumarium*	Rough cocklebur
Caprifoliaceae	*Sambucus mexicanus*	Blue elderberry
Convolvulaceae	*Calystegia macrostegia*	western bindweed
Convolvulaceae	*Calystegia macrostegia* var. *cyclostegia*	Wild morning glory
Cucurbitaceae	*Cucurbita foetidissima*	Calibazilla
Euphorbiaceae	*Chamaesyce albomarginata (Euphorbia albomarginata)*	Rattlesnake weed
Fabaceae	*Lotus purshianus*	Spanish clover/Bird's foot trefoil
Fabaceae	*Lotus scoparius*	Deerweed
Fabaceae	*Lupinus bicolor microphyllus*	Lupine
Fabaceae	*Lupinus longifolius*	Longleaf bush lupine
Fabaceae	*Lupinus succulentus*	Arroyo lupine
Juncaceae	*Juncus bufonius*	Toad rush
Onagraceae	*Epilobium ciliatum*	Willow-herb

Papaveraceae	*Eschscholzia californica*	California poppy
Poaceae	*Melica imperfecta*	Melic grass
Polygonaceae	*Eriogonum fasciculatum*	California buckwheat
Rubiaceae	*Galium angustifolium*	Bedstraw
Salicaceae	*Salix lasiolepis*	Arroyo willow
Verbenaceae	*Verbena lasiostachys*	Common Verbena

RECOMMENDATIONS

Much can be done to enhance the Ballona Creek with a minimum of construction. In particular, planting native species along the channel will create a corridor from the Ballona Wetlands to Baldwin Hills. In creating a plant palette for use in enhancing the Ballona Creek (Table 2.2 – 2.4), consideration was given to species that are drought tolerant, attract birds and butterflies, and that reflect the following ecosystems: wetland, riparian, grassland, and coastal sage scrub communities. The plant palette reflects the transitioning ecosystem as well as the environmental constraints of the Ballona Creek. The layers of canopy, lower canopy, shrub understory, grasses, herbaceous, as well as riparian and wetland plants will give the Ballona Creek depth and diversity for its inhabitants.

Manual removal of the weeds is the best method rather than the use of chemicals; minimum tainting of the soil will provide a better environment for the new native plants. (Also, it would reduce runoff into the creek). Monitor to check the spread of highly invasive species. Also try to educate Creek adjacent neighbors not to plant these species (Table 2.5).

Use natural enhancements such as rocks for sitting, which are less inviting to vandalize.

Add signage for major streets and Creek access. Additionally, as enhancements proceed, signage relating to the restored communities may also be added.

Ballona Creek Restoration Plant Palette		
Table 2.2. Coastal Sage Scrub Plant Palette		
Family	Scientific Name	Common Name
Canopy Layer		
Fagaceae	*Quercus agrifolia*	Coast live oak
Fagaceae	*Quercus x virginica (virginiana?)*	Hybrid live oak
Juglandaceae	*Juglans californica**	California walnut
Plantanaceae	*Platanus racemosa*	Western sycamore
Rosaceae	*Prunus ilicifolia ssp. Ilicifolia*	Holly-leafed cherry
Salicaceae	*Populus fremontii*	Fremont cottonwood
Lower Canopy Layer		
Anacardiaceae	*Malosma laurina (Rhus laurina) **	Laurel sumac
Caprifoliaceae	*Sambucus mexicanus**	Blue elderberry
Rosaceae	*Adenostoma fasciculatum*	Chamise
Shrub Understory		
Amaranthacae	*Amaranthus californicus*	Amaranth/Ca. Pigwed
Anacardiaceae	*Rhus integrifolia*	Lemonade berry
Anacardiaceae	*Rhus ovata*	Sugar bush
Asteraceae	*Achyrachaena mollis*	Blow-wives
Asteraceae	*Artemisia californica**	California sage brush
Asteraceae	*Baccharis pilularis**	Coyote brush
Asteraceae	*Baccharis salicifolia**	Mule fat
Asteraceae	*Encelia californica**	California bush sunflower
Cactaceae	*Opuntia littoralis*	Coastal prickly pear
Chenopodiaceae	*Atriplex lentiformis*	Saltbrush
Crassulaceae	*Dudleya lanceolata**	
Fagaceae	*Quercus dumosa*	Scrub oak
Lamiaceae	*Salvia apiana*	White Sage
Lamiaceae	*Salvia leucophylla*	Purple Sage
Lamiaceae	*Salvia mellifera**	Black sage
Lamiaceae	*Salvia spathacea*	Hummingbird Sage
Malvaceae	*Malacothamnus fasciculatus*	Bush mallow/Chaparral mallow
Polygonaceae	*Eriogonum fasciculatum**	California buckwheat
Polygonaceae	*Eriogonum parvifolium*	Dune buckwheat
Rosaceae	*Heteromeles arbutifolia**	Toyon
Rosaceae	*Rosa californica*	California rose
Scrophulariaceae	*Mimulus arundinacea*	Monkeyflower
Solanaceae	*Solanum xanti*	Chaparral nightshade

Grasses		
Poaceae	*Leymus condensatus (Elymus c.)**	Giant rye-grass
Poaceae	*Melica imperfecta**	Melic grass
Poaceae	*Nassella pulchra**	Purple needle grass
Herbaceous Understory Layer		
Asteraceae	*Achillea millefolium*	Yarrow
Asteraceae	*Brickellia californica*	Brickellbush
Iridaceae	*Sisyrinchium bellum*	Blue-eyed grass
Papaveraceae	*Eschscholzia californica*	California poppy
Verbenaceae	*Verbena lasiostachys*	Common Verbena
Ranunculaceae	*Clematis ligusticifolia*	Virgin's bower

Table 2.3: Riparian Plant Palette

Asteraceae	*Baccharis salicifolia*	Mule fat
Asteraceae	*Baccharis glutinosa**	
Asteraceae	*Lessingia filaginifolia (Corethrogyne filaginifolia)*	Bush aster/Corethrogyne
Asteraceae	*Xanthium strumarium**	Rough cocklebur
Caprifoliaceae	*Sambucus mexicanus*	Blue elderberry
Fabaceae	*Lotus purshianus*	Spanish clover/Bird's foot trefoil
Hydrophyllaceae	*Phacelia cicutaria var. hispida*	
Juncaceae	*Juncus bufonius*	Toad rush
Salicaceae	*Salix lasiolepis**	Arroyo willow
Verbenaceae	*Verbena lasiostachys*	Common Verbena

Table 2.4. Bird & Butterfly Attracting Natives

Asteraceae	*Achillea millefolium*	Yarrow
Cactaceae	*Opuntia littoralis*	Coastal prickly pear
Caprifoliaceae	*Sambucus mexicanus*	Blue elderberry
Fagaceae	*Quercus agrifolia*	Coast live oak
Fagaceae	*Quercus dumosa*	Scrub oak
Iridaceae	*Sisyrinchium bellum*	Blue-eyed grass
Lamiaceae	*Salvia apiana*	White Sage
Lamiaceae	*Salvia leucophylla*	Purple Sage
Lamiaceae	*Salvia mellifera**	Black sage
Lamiaceae	*Salvia spathacea*	Hummingbird Sage
Onagraceae	*Epilobium canum*	California fuchia
Polygonaceae	*Eriogonum fasciculatum*	California buckwheat
Polygonaceae	*Eriogonum parvifolium*	Dune buckwheat
Rosaceae	*Heteromeles arbutifolia*	Toyon
Rosaceae	*Prunus ilicifolia ssp. Ilicifolia*	Holly-leafed cherry

Rosaceae	*Rosa californica*	California rose
Scrophulariaceae	*Mimulus arundinacea*	Monkeyflower

*Indicates material emphasized in *The Biota of Baldwin Hills: An Ecological Assessment*

Table 2.5. Highly Invasive Weeds		
	Carpobrutus edulis	Iceplant
	Cortaderia jubata	Pampas Grass
	Cortaderia selloana	
	Arundo donax	Giant Reed Grass
	Senecio mikanioides	German Ivy

Despite constraints, any improvement would be beneficial for environmental, educational, and recreational interests. Enhancement through planting of southern California natives will encourage natural communities to develop. By providing a safe and aesthetically pleasing environment, recreational use should increase along the Creek while allowing for educational opportunities of native plant appreciation.

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CNPS *Manual of California Vegetation On-line*

Shipley Nature Center Restoration Palette

The Jepson Manual: Higher Plants of California

The Biota of Baldwin Hills: An Ecological Assessment

http://www.growingnative.com

http://www.laspilitas.com

http://www.ballonawetlands.org/ballona.html

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Water Quality

INTRODUCTION

Ballona Creek drains the Ballona Watershed that totals about 130 square miles, with land uses consisting of 64% residential, 8% commercial, 4% industrial, and 17% open space (LACDWP, Watershed Management Division: http://ladpw.org/wmd/watershed/bc/). The creek and its tributaries are mostly underground, serving as the watershed's storm drain system. The last 6.5 miles of the creek is open channel, with the estuary portion having a sediment bottom.

Water quality is poor because of the runoff from the urbanized watershed. As such, the open portion of the Creek has been listed on the State's 303(d) list of Impaired Bodies of Water for the following water-borne contaminants (see http://www.swrcb.ca.gov/tmdl/303d_lists.html for complete listing of water, sediment and tissue contaminants):

- Copper (dissolved)
- Enteric viruses
- Coliform bacteria
- Lead (dissolved)
- pH (low)
- Selenium (dissolved)
- Toxicity
- Zinc (dissolved)

These contaminants render the water in the creek system unfit for contact by people, mainly due to the potential presence of harmful bacteria and viruses. Because of human contact issues and elevated levels of metals (see California Dept. Health Services Title 22 regulations for water reuse:

http://www.dhs.ca.gov/ps/ddwem/default.htm), the water also would not meet standards for irrigation and other recycling uses.

Regulations to implement Total Daily Maximum Loads (TMDLs) for constituents on the State's 303(d) list are now being prepared for Ballona Creek. These regulations are being developed by the State, approved by EPA, and will be promulgated via municipal storm water permits issued to Los Angeles County and associated cities in the watershed. (see http://www.swrcb.ca.gov/~rwqcb4/ for details and schedule). Once implemented, the goal of each TMDL is to reduce loading of its target contaminant into Ballona Creek so that its water meets State standards set forth in the Basin Plan for the Los Angeles Region.

The goal of this study is to obtain additional water quality data from Ballona Creek to supplement occasional monitoring performed by the County and City of Los Angeles. This data will be used to further characterize the water quality along the reach from Baldwin Hills to the Ballona Estuary. Specific tasks included:

- Measuring levels of indicator bacteria in the area of Baldwin Hills downstream to the estuary over Summer 2003;
- Assessing recent data collected by the City and County of Los Angeles.

MATERIALS & METHODS

Sampling Sites

Sampling sites were located at bridges spanning the Creek at Rodeo Road, Duquesne Avenue, Overland Avenue, and Sawtelle Avenue (Table 3.1, Figure 3.1). A fifth sampling site was located on north bank of the Creek, due south of

the foot of McConnell Avenue. This later station was within the tidal prism of the Creek.

Table 3.1. Station locations along Ballona Creek for the Baldwin Hills project.

STATION	LOCATION	LATITUDE	LONGITUDE
Rodeo	Center of bridge	34° 1.32' N	118° 22.69' W
Duquesne	Center of bridge	34° 1.04' N	118° 23.35' W
Overland	Center of bridge	34° 0.43' N	118° 23.77' W
Sawtelle	Center of bridge	33° 59.81' N	118° 24.13' W
McConnell	Edge of water	33° 58.91' N	118° 25.36' W

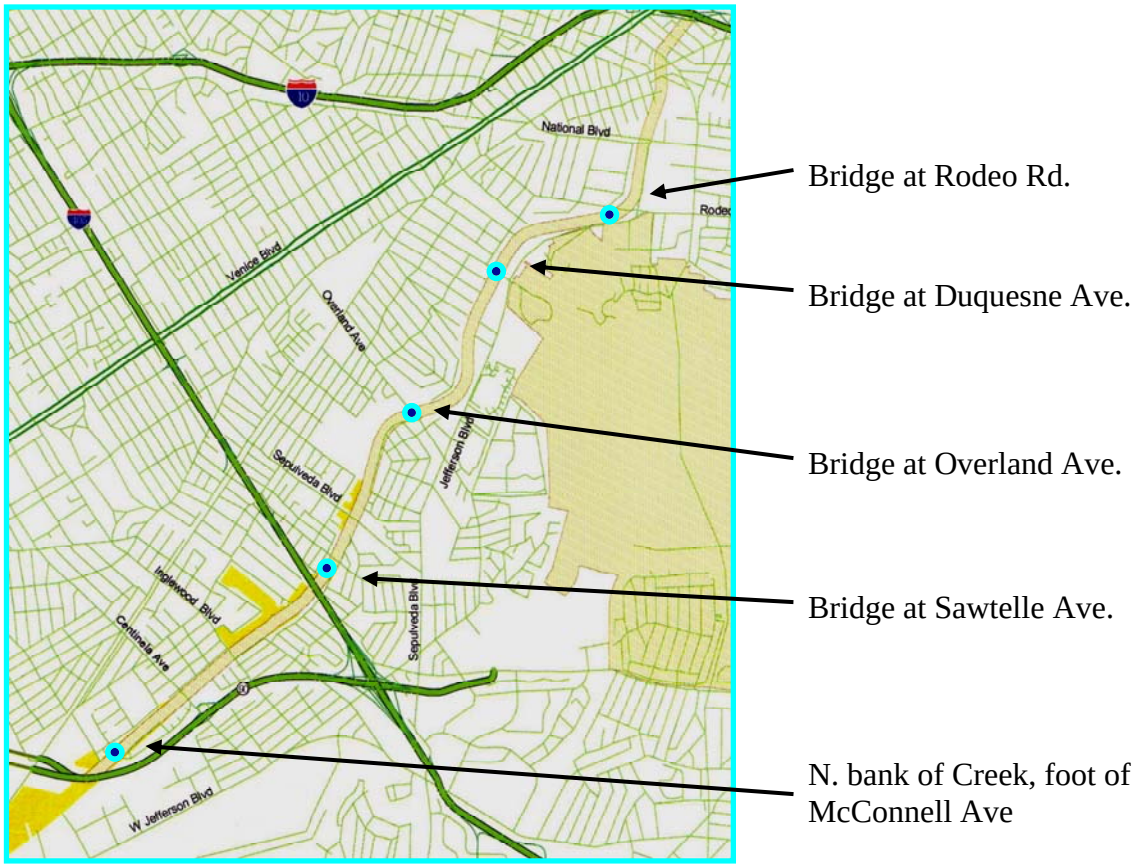


Figure 3.1. Location of stations along Ballona Creek for the Baldwin Hills project.

Stations generally were sampled weekly from July 7 through September 8, 2003. Collections were made between the hours of 0600 and 1000.

Observations

At each station, general observations of the water condition within the creek were noted. These included amounts of trash and any hydrocarbon sheens seen on the surface of the water.

Sample Collection and Measurements

At each bridge station, approximately 1L of water was collected with a bucket PVC bucket sampler. After collecting the water, a 125 ml sterile polypropylene container was filled, placed on ice, then returned to the laboratory for analyses of indicator bacteria. At McConnell, the 125 ml water sample and YSI measurements were collected directly from the Creek.

Water quality parameters then were measured in the bucket-sampler by inserting a YSI 600 water quality sonde equipped with electronic sensors measuring temperature (Cº), salinity (ppt), dissolved oxygen (mg/L) and pH (see http://www.ysi.com for details on sonde sensors).

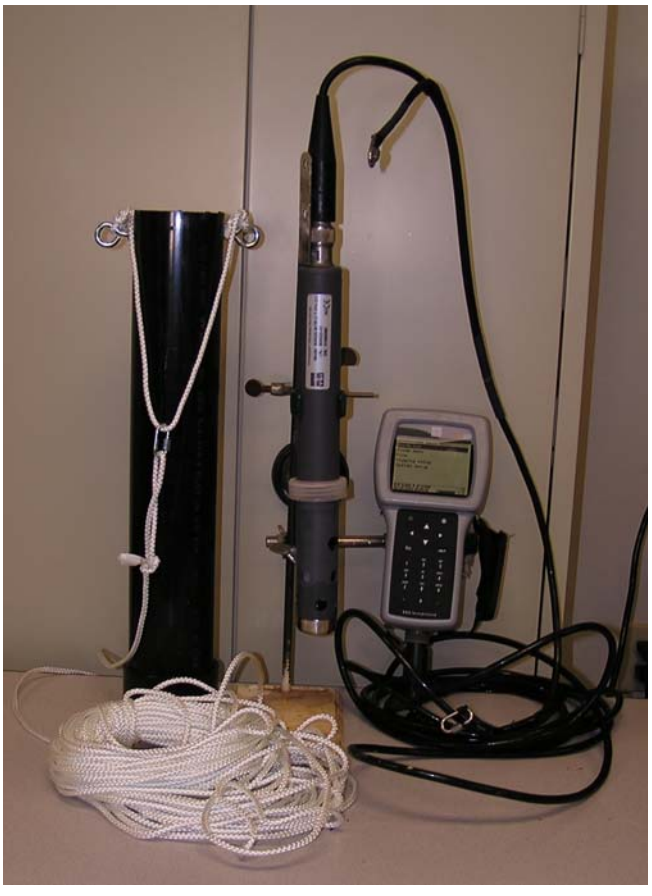


Figure 3.2.
Bucket-sampler and YSI electronic water quality sensors used in study.

Bacterial Testing

Concentrations of indicator bacteria were determined using the substrate enzyme test (APHA, 1998: Standard Methods Section 9223 B). Tests were done using Idexx test kits with Colilert-18 reagent for total coliforms and *E.coli*, and Enterolert reagent for enterococci. Concentrations of bacteria were determined using Quanti-Tray-2000 (96-well) testing trays. Dilutions used were:

- Total coliforms – 1 ml of sample in 99 ml of sterile water.
- *E. coli* – 10 ml of sample in 90 ml of sterile water.
- Enterococci -- 10 ml of sample in 90 ml of sterile water.

Agency Data

Monthly monitoring data was obtained from the City of Los Angeles for the selected metals (dissolved copper, dissolved lead, total selenium and dissolved zinc) at Centinela and Overland Avenues from April 2001 through April 2003 (courtesy of Michael Mullin, Bureau of Sanitation, Watershed Protection Division).

RESULTS

Observations

Observations generally were similar for sites at Rodeo, Overland, Duquesne, and Sawtelle Avenues: clear water, with some filamentous algae (Table 3.2). Hydrocarbon sheens were frequently observed at Duquesne Ave. These were patchy, typically occurring close to the banks of the creek. At McConnell, the channel is about twice as wide with a sediment bottom and within the tidal prism. For these reasons, flows were less than those observed upstream, and the water was more turbid.

On the morning of July 29, there was a wet weather event produced rain shower across the area resulting in increase flows and associated trash and debris. Water at each site was brown, turbid, and laden with trash. On July 17, increased hydrocarbon sheens were noted at Duquesne, Overland, and Sawtelle Avenues.

Table 3.2. Observations made during sampling of the Ballona Creek, July 7-September 8, 2003.

DATE	STATION	WEATHER	OBSERVATIONS
7-Jul	Rodeo	overcast, wind 1-2mph	oil on south side
	Duqesne		clear
	Sawtelle		clear
	McConnell		flow seaward, low tide, mud exposed
9-Jul	Rodeo	overcast	clear, lots of filamentous algae
	Duqesne		sheer hydrocarbon on North side of channel
	Overland		bottom with algae
	Sawtelle		clear, bottom with algae
	McConnell		seaward flow, turbid water
15-Jul	Rodeo	clear, calm	filamentous algae, clear
	Duqesne		clear, patches of sheen hydrocarbon on north bank
	Overland		clear
	Sawtelle		slightly turbid, clumps of algae
	McConnell		turbid, less than 1' visible
17-Jul	Rodeo	clear, warm, SE-S wind	clear
	Duqesne		clear, hydrocarbon sheen across entire channel
	Overland		turbid, hydrocarbon sheen
	Sawtelle		turbid, traces of hydrocarbon sheen
	McConnell		turbid, less than 1' visible
22-Jul	Rodeo	clear, wind W at 7knots	clear
	Duqesne		clear, streaks of hydrocarbon sheen
	Overland		clear
	Sawtelle		clear
	McConnell		slightly turbid
24-Jul	Rodeo	overcast	clear
	Duqesne		heavy sheen of hydrocarbon on north side
	Overland		clear
	Sawtelle		clear
	McConnell		turbid, less than 1' visible, floating organic debris
29-Jul	Rodeo	thndrshwrs last night	debris in flow, plastic bags, bottles, etc; clear, drain flow causing foam in water
	Duqesne		patches of foam, brown water, turbid
	Overland		turbid, brown, patches of foam
	Sawtelle		brown, turbid, flow of debris

	McConnell		slack flow, brown, turbid, lots of floating debris, trash
4-Aug	Rodeo	clear, calm, 75	clear
	Duqesne		heavy sheen of hydrocarbon on both sides of channel
	Overland		sheen across whole channel
	Sawtelle		clear
	McConnell		turbid
12-Aug	Rodeo	clear, 73	clear, slight foam from the drain
	Duqesne		clear, slight hydrocarbon sheen on west side
	Overland		clear
	Sawtelle		clear
	McConnell		turbid, hydrocarbon sheen on west side
19-Aug	Rodeo	overcast, slight breeze, 75	slight green color
	Duqesne		clear
	Overland		clear
	Sawtelle		clear
	McConnell		murky
21-Aug	Rodeo	overcast, very cool, breezy	clear
	Duqesne		clear
	Overland		clear
	Sawtelle		clear
	McConnell		very turbid
25-Aug	Rodeo	overcast, breezy, 70	clear
	Duqesne		clear
	Overland		clear
	Sawtelle		clear
	McConnell		trash, murky
3-Sep	Rodeo	clear, calm, 65	clear
	Duqesne		clear
	Overland		clear
	Sawtelle		clear
	McConnell		murky
8-Sep	Rodeo	partly cloudy, 65	clear
	Duqesne		clear
	Overland		clear
	Sawtelle		clear
	McConnell		hydrocarbon sheen

Temperature

Water temperatures generally ranged from 19 to nearly 26 C° (Figure 3.3). Warmer temperatures were measured during July and August while cooler water

occurred in September. Temperature varied little from Rodeo Road downstream to Sawtelle Avenue, then dropped slightly when in the tidal estuary.

Salinity

As expected, salinity measured less than 1 ppt from Rodeo Road through Sawtelle, indicating freshwater (Figure 3.4). At McConnell Avenue, at the head of the estuary, salinity started increasing due to tidal intrusion of marine water. Still, water at McConnell was relatively fresh since salinities never exceeded 5 ppt.

Oxygen

Concentrations of dissolved oxygen ranged from 3 to nearly 22 mg/L. For each sampling day, dissolved oxygen generally remained about the same from Rodeo Road to Sawtelle Avenue, then dropped slightly when reaching the tidal estuary at McConnell Avenue.

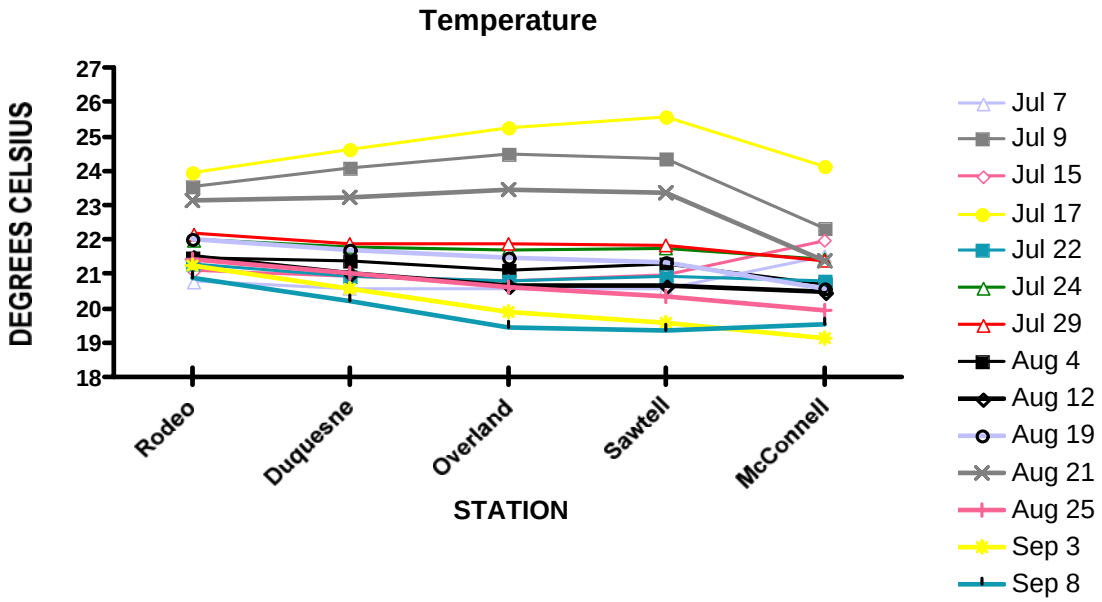


Figure 3.3. Water temperature (C°) measured in Ballona Creek, July 7-Sept 8, 2003.

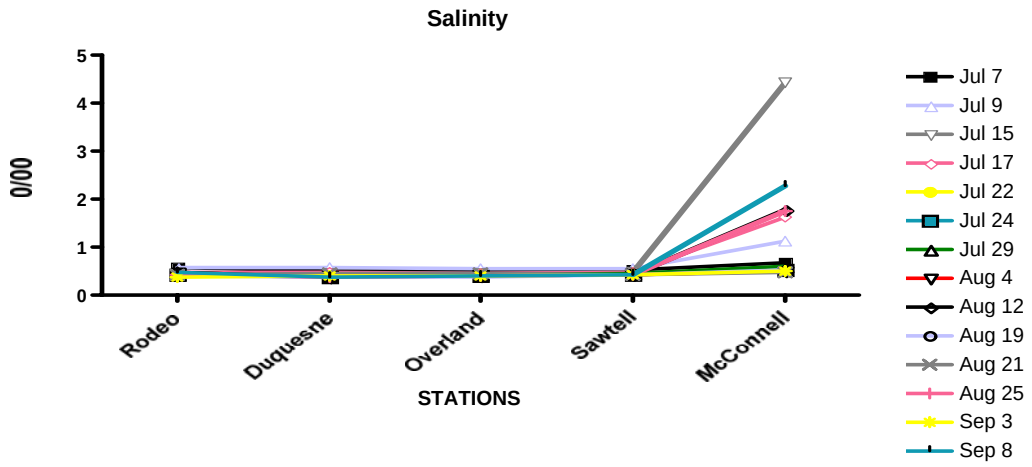


Figure 3.4. Salinity (ppt) measured in Ballona Creek, July 7-Sept 8, 2003.

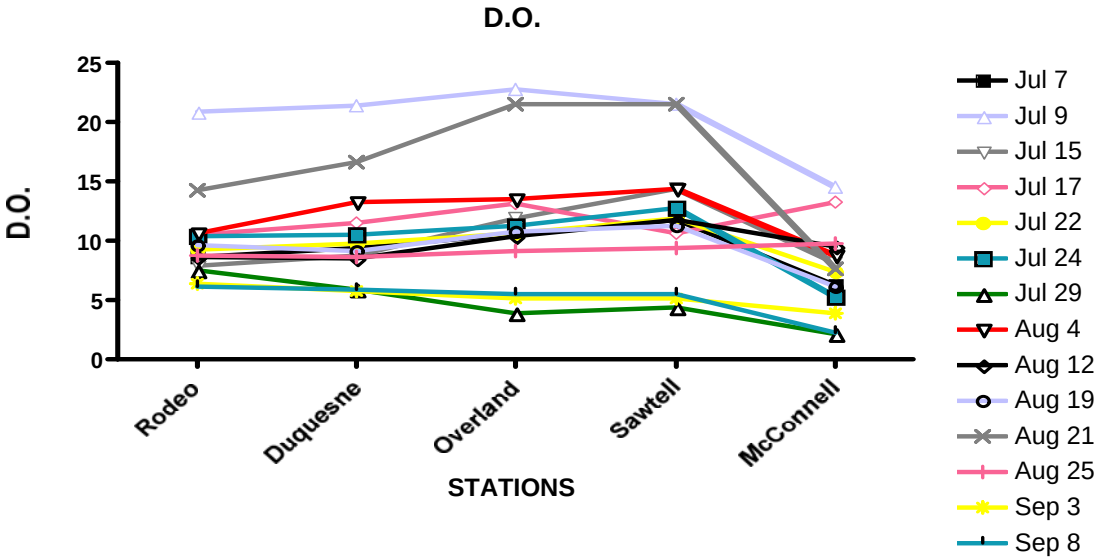


Figure 3.5. Dissolved oxygen (mg/L) measured in Ballona Creek, July 7-Sept 8, 2003.

pH

Levels of pH where similar, ranging from around 7.5 to 8.7 (Figure 3.6). For each sampling day, pH tended to not vary from station to station until reaching the tidal estuary at McConnell. Here, pH generally diminished by less than a unit.

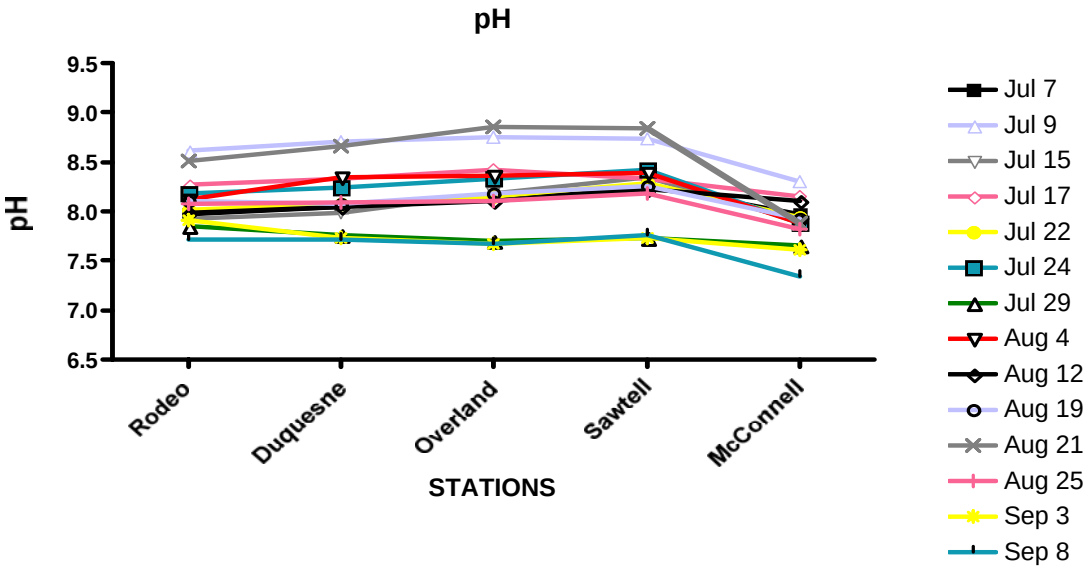


Figure 3.6. pH measured in Ballona Creek, July 7-Sept 8, 2003.

Indicator Bacteria

Densities of total coliforms ranged from 10^3 to over 10^5 cfu/100 ml of water at all stations (Figures 3.7-3.12). Peak concentrations of greater than about 240,000 cfu/100 ml occurred during the runoff event on July 29th. Concentrations of *E. coli* were less, ranging from 10^1 to 10^4 on occasions, such as during the rain event. Similarly, enterococci ranged from 10^1 to 10^3 among the stations. One trend was that counts tended to be elevated in the tidal estuary at McConnell. Here some of the highest counts of the survey were measured.

Usually one or more indicators failed to meet State bathing water standards at all stations on most sampling days. Average densities of indicators failed to meet standards at all sites (Figure 3.12).

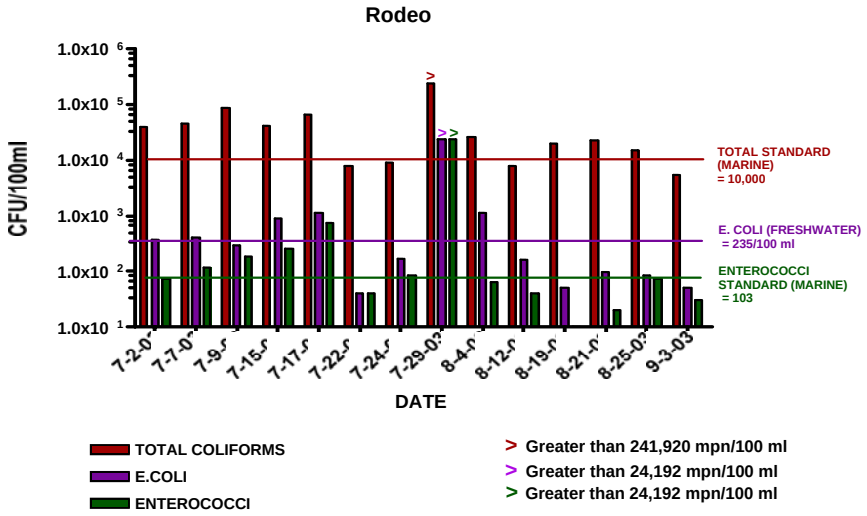


Figure 3.7. Indicator bacteria (cfu/100 ml) measured at Rodeo Road, Ballona Creek, July 7-Sept 8, 2003.

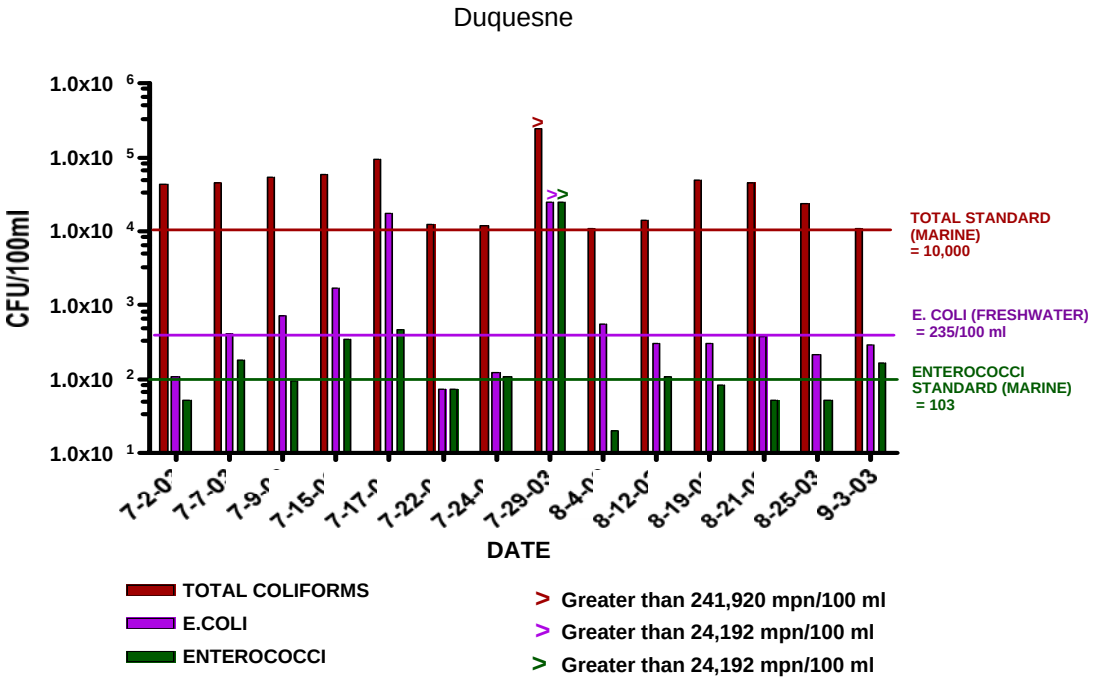


Figure 3.8. Indicator bacteria (cfu/100 ml) measured at Duquesne Ave., Ballona Creek, July 7-Sept 8, 2003.

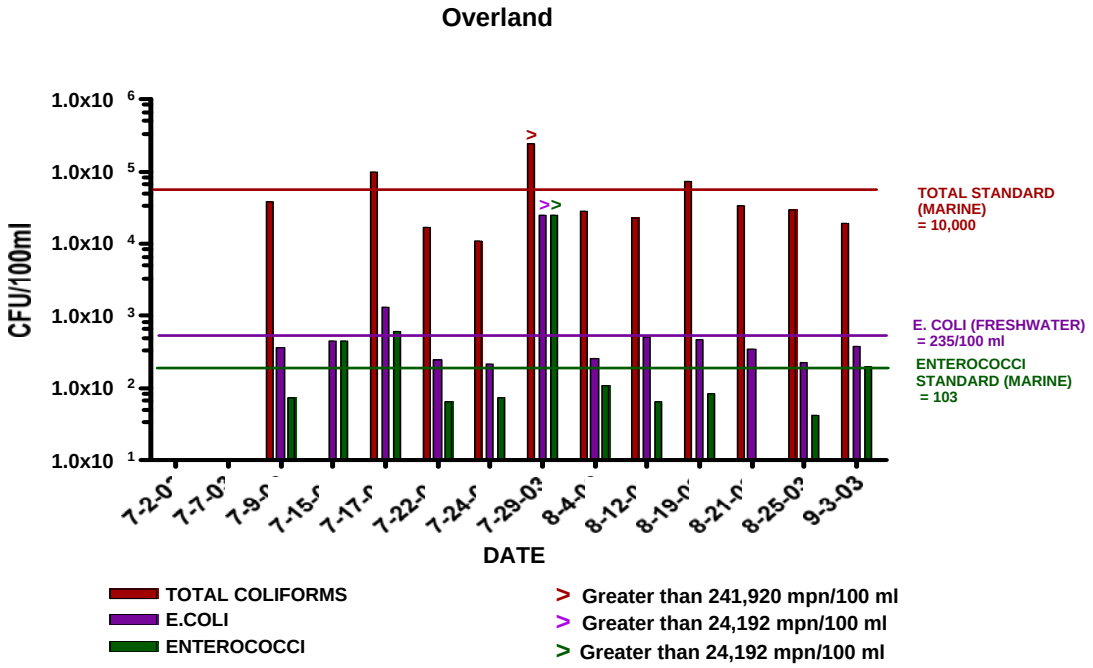


Figure 3.9. Indicator bacteria (cfu/100 ml) measured at Overland Ave., Ballona Creek, July 7-Sept 8, 2003.

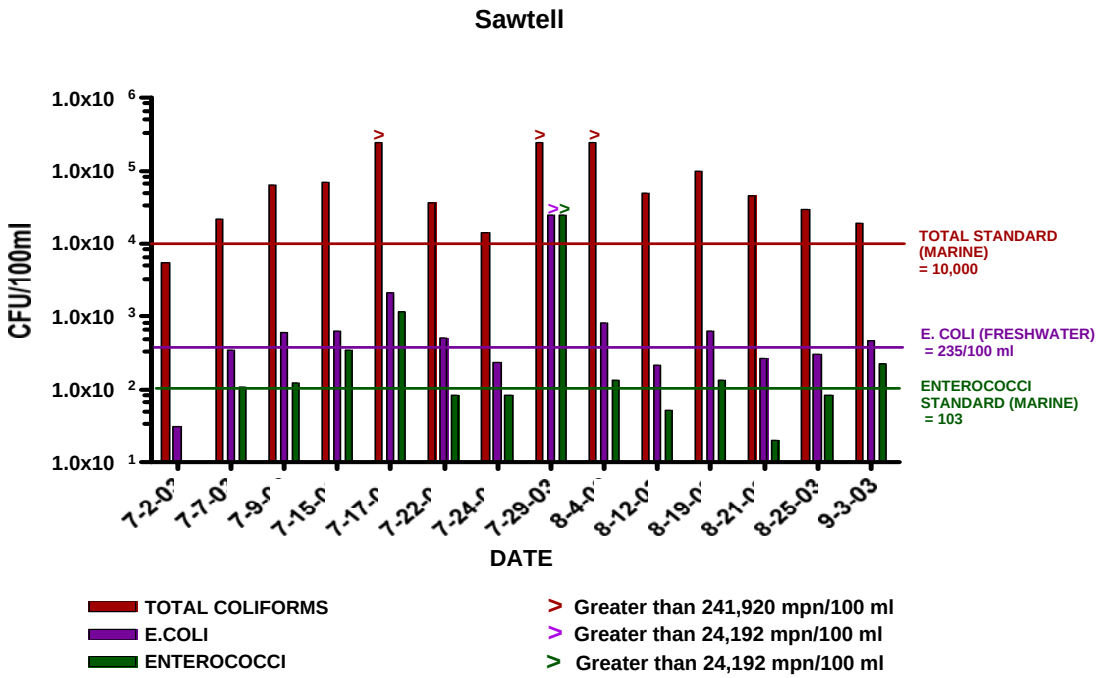


Figure 3.10. Indicator bacteria (cfu/100 ml) measured at Sawtelle Ave., Ballona Creek, July 7-Sept 8, 2003.

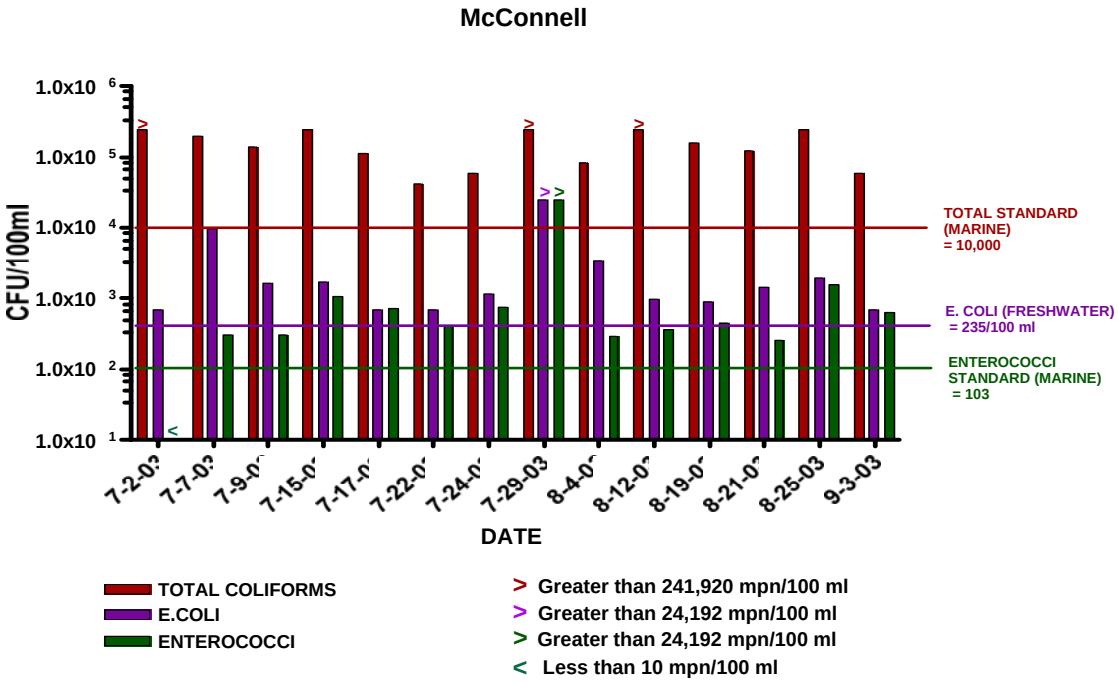


Figure 3.11. Indicator bacteria (cfu/100 ml) measured at McConnell Ave., Ballona Creek, July 7-Sept 8, 2003.

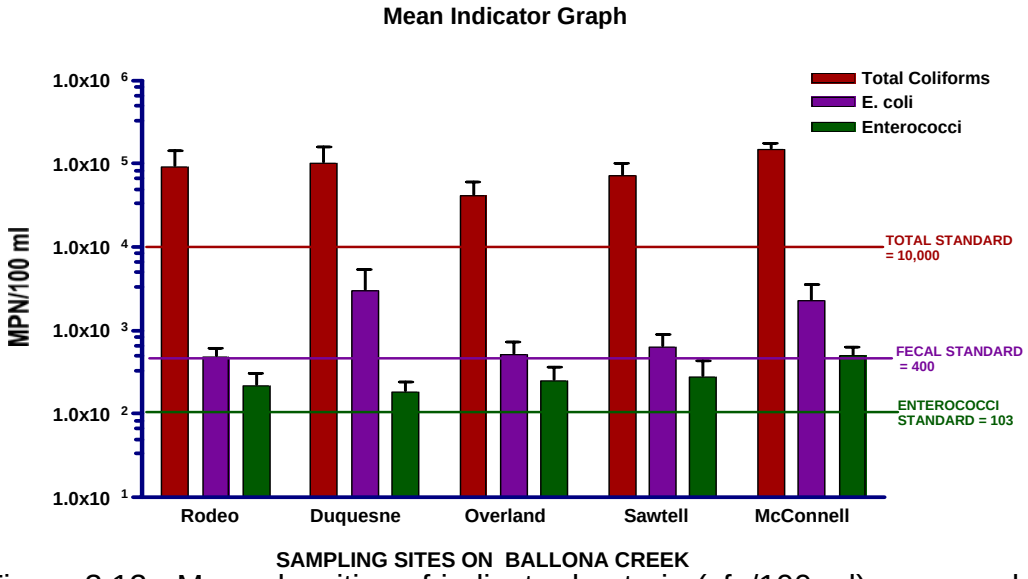


Figure 3.12. Mean densities of indicator bacteria (cfu/100 ml) measured at each station in Ballona Creek, July 7-Sept 8, 2003.

Agency Data

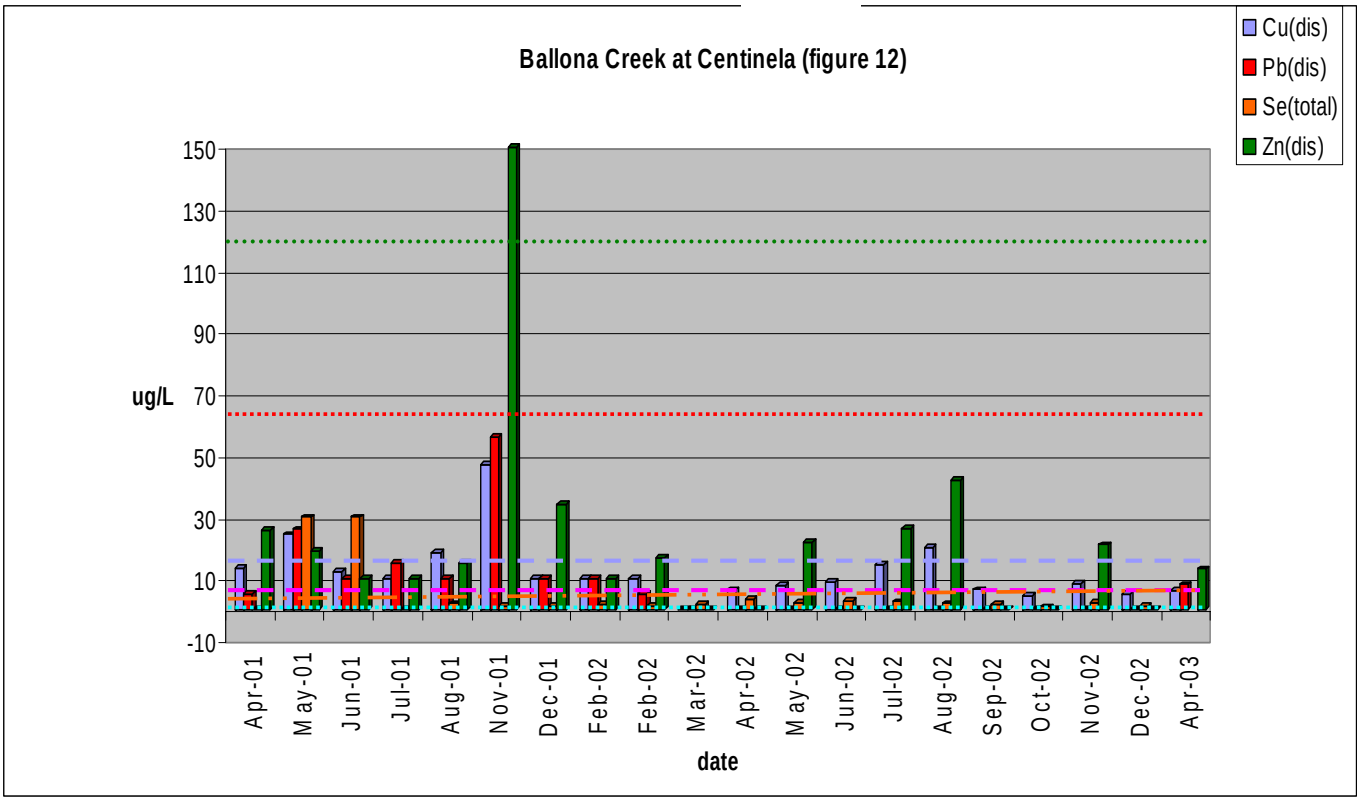
Metals data received from City of Los Angeles' Watershed Protection Division were collected from Centinela and Overland avenues within the study area. In general, concentrations of dissolved copper, zinc and lead, and total selenium were similar among station over time (Figures 3.13–3.14). The one exception occurred with zinc that spiked at both sites during the sampling day in November, 2001. Zinc tended to display other peaks over the sampling period, although much less than the November event.

Metals did not meet State standards on many occasions. The standard for Zinc is for continuous and maximum concentrations, so Zinc only exceeds its standard once throughout the whole sampling period. Many of the metals are not meeting standards for both the maximum criterion standards and the continuous concentration standards. Selenium, especially, has very large spikes over its standards and the same with copper. Copper exceeds the limit or just reaches the limit for every sampling date. Overall, the metals do not seem to be meeting standards, except for Zinc at continuous and maximum concentrations and Lead only at maximum concentrations.

DISCUSSION

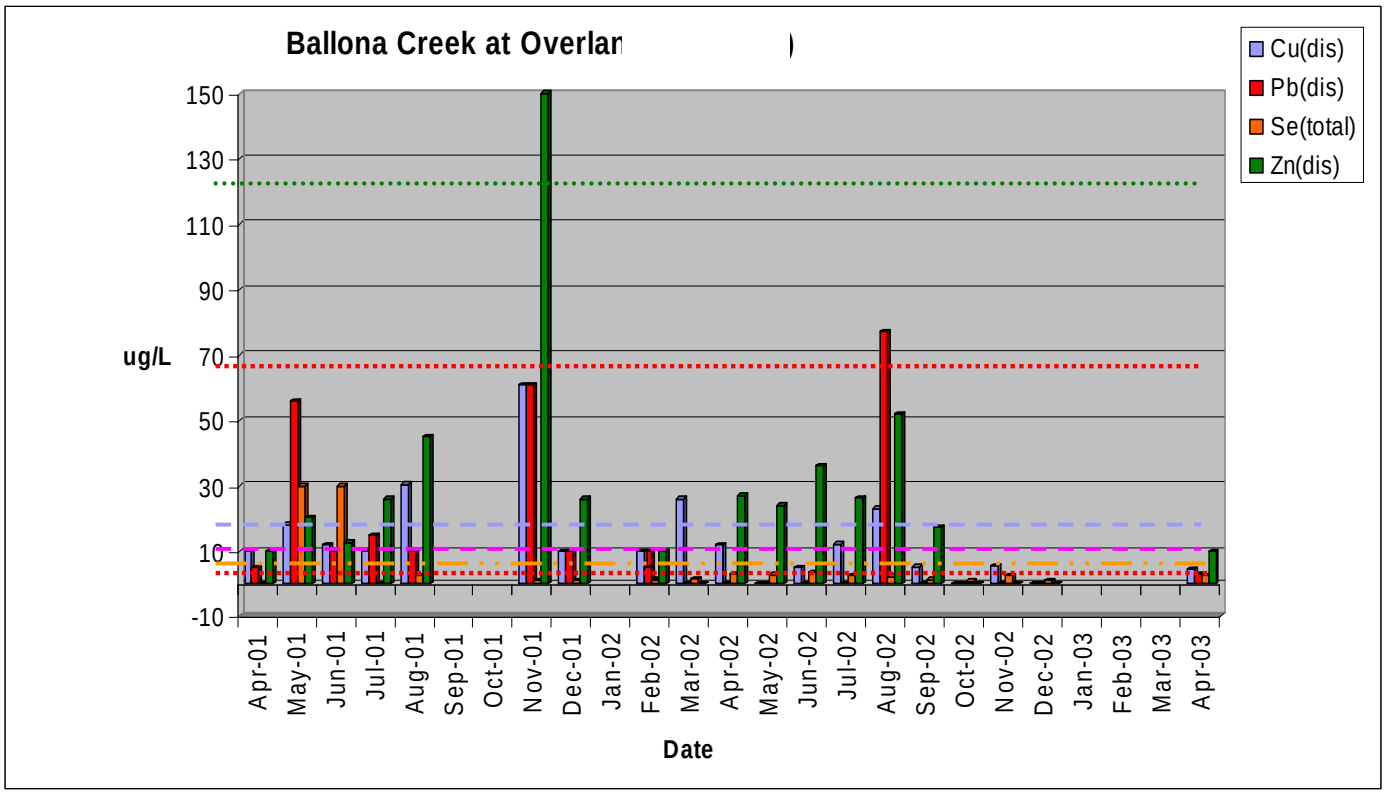
Indicator Bacteria

Densities of indicator bacteria were characteristic of urban runoff with counts ranging from the tens- to hundreds-of-thousands (10^4-10^5) for total coliforms. The average number of total coliforms (Figure 3.12) measured above the bathing water standard of 10,000 cfu/100 ml for single samples. Densities of *E. coli* and enterococci tended to be an order of magnitude less that total coliforms which is typical for this set of indicators. Like totals, averages of the latter two indicators



Zn standard for Continuous: 120ug/L	
Pb Standard for Max. Criterion: 65 ug/L	
Cu Standard for Continuous: 9.0 ug/L	

Figure 3.13. Concentrations of key metals measured by the City of Los Angeles at Centinela Ave, Ballona Creek, from April 2001 through April 2003.



Cu Standard for Max. Criterion: 13 ug/L	
Se Standard for Continuous: 5.0 ug/L	
Pb standard for Continuous: 2.5ug/L	

Figure 3.14. Concentrations of key metals measured by the City of Los Angeles at Overland Ave, Ballona Creek, from April 2001 through April 2003.

were at or above the single sample standard of 400 cfu/100 ml for *E. coli,* and 103 for enterococci.

Bacteria densities spiked on July 29 after rain showers swept the area during the previous night. Wet weather events increase runoff with corresponding increases in bacterial densities. During regional monitoring of coastal areas in southern California, densities of indicator bacteria increased significantly during and after wet weather events (Noble *et al*, 2001*).* (ftp://www.sccwrp.org/pub/download/PDFs/stormevent2000.pdf).

Another trend that was observed was the consistent increase in bacteria counts at McConnell. The sediment bottom at this site may be acting as a bacterial sink, so any resuspension of sediment particles could increase water column loads of bacteria.

Implications of this water not meeting bacterial standards could be an increased probability of human illness from the possible presence of pathogens. Haile *et al.* (1998) found that the probability of illness for swimmers significantly increased with proximity to a flowing storm drain in Santa Monica Bay.

Chemical & Physical Water Quality Parameters

Temperature, salinity and dissolved oxygen seemed to vary as expected. Warmer days resulted in warmer water temperatures. The temperature was never at levels that would harm resident biota. Dissolved oxygen was relatively high, reaching up to 22 mg/L on occasions, probably as a result of algae coating the channel bottom along most of the study area. On a few sampling days, dissolved oxygen fell to below 5 mg/L at McConnell. At these levels, hypoxic conditions could occur whereby resident animals would be harmed. At 2 mg/L, fish kills can occur as conditions become anoxic. Freshwater flowed through the

creek until reaching McConnell where initial mixing with brackish water began. Levels of pH remained fairly constant across stations, ranging from 7-8, typical of freshwater systems.

Metals

Overall, levels of the four metals measured by the City of Los Angeles generally met State standards established through the California Toxics Rule (see http://www.epa.gov/OST/standards/ctr.html). Spikes periodically occurred, the most notable being for zinc during the sampling event in November 2001. During this event, zinc exceeded 150 ug/L at both sampling locations, exceeding the State standard of 120 ug/L. During this time, standards also were exceeded for copper and lead. These spikes most likely were associated with either wet weather or illegal dumping of waste materials in the storm drains.

Metals pollution of water can cause toxicity to resident organisms. For example, Bay (1996) found that elevated levels of zinc in runoff entering Santa Monica Bay from Ballona Creek resulted in chronic toxicity to marine test organisms. The Ministry of Environment in the Province of British Columbia (http://wlapwww.gov.bc.ca/wat/wq/reference/campbellmetal85.pdf) documented that increased levels of dissolved metals inhibited the growth of certain species, ultimately impacting biodiversity through loss of species diversity.

Long Term Outlook for Water Quality

Section 303(d) of the Federal Clean Water Act lists impaired water bodies and associated contaminants causing impairment. Ballona Creek is listed in this section because of the following constituents:

Cadmium(sediment)	ChemA(tissue)
Chlordane (tissue)	dissolved Copper
DDT (tissue)	Dieldrin (tissue)

enteric viruses	high coliform count
dissolved Lead	PCBs (tissue)
pH	sediment toxicity
total Selenium	Silver (sediment)
Toxicity	dissolved Zinc

The Total Maximum Daily Loads (TMDLs) are regulatory limits for each constituent to reach and maintain standards set out by the EPA and the state. Once established for each impairing constituent, TMDLs will be promulgated through various municipal and industrial storm water and discharge permits. Draft TMDLs are now being written, and they give limits and implementation deadlines. All TMDLs must be developed within 13 years as mandated by a court-ordered consent decree between the U.S. Environmental Protection Agency and a number of environmental organizations, and has been in effect since March 22, 1999. As of March 11, 2002, two Trash TMDLs and one Bacterial Indicator TMDL have been developed for Ballona Creek and the Los Angeles River. The two trash TMDLs have been approved by the Los Angeles Regional Water Quality Control Board and the State Water Resources Control Board and have been submitted to the Office of Administrative Law. The Santa Monica Bay Dry-Weather Bacterial TMDL has been approved by the RWQCB, but has not yet been approved by the SWRCB. The Santa Monica Bay Wet-Weather Bacterial TMDL will be issued in April 2004 followed by public hearings. TMDLs then will be drafted by the Regional Board for bacteria in Ballona Creek and other constituents on the 303(d) list. When these TMDLs are adopted, storm water permitees will need to implement the control measures to meet the limits. When these actions occur, water quality in the creek will improve.

SUMMARY

1. Water quality parameters in Ballona Creek were measured weekly over the period July-September 2003 at 5 sites to characterize the reach from Baldwin Hills downstream to the estuary.
2. Parameters measured were densities of total coliform, *E. coli* and enterococci bacteria, temperature, salinity, dissolved oxygen and pH.
3. Additional monitoring data for dissolved zinc, copper, lead and total selenium were received from the City of Los Angeles; data were collected monthly at two sites from April 2001-03.
4. Bacterial densities exceeded State water quality parameters for bathing waters at most sites during nearly every sampling event, especially during wet weather.
5. Metals generally met standards, but spikes occurred over the two year period causing standards to be exceeded.
6. As TMDL regulations are implemented, water quality will improve.

REFERENCES

APHA, 1998. *Standard Methods for the Examination of Water and Wastewater.* 20th Edition. Clesceri, Lenore S., Arnold E. Greenberg, and Andrew D. Eaton (Ed's). American Public Health Association, American Water Works Association, Water Environment Federation.

Bay, S.M., D.J. Greenstein, S.-L. Lau, M.K. Stenstrom and C.G. Kelley, 1996. Toxicity of dry weather flow from the Santa Monica Bay Watershed. *Bulletin of Southern California Academy of Sciences* 95:33-45.

Noble, Rachel T., S.B. Weisberg, M.K. Leecaster, C.D. McGee, J.H. Dorsey, P. Vainik and V. Orozco-Borbon. 2003. Storm effects on regional beach water quality along the southern California shoreline. *Journal of Water and Health* 1:23-31.

Use of The Ballona Creek Corridor as an Outdoor Classroom and Educational Resource

INTRODUCTION

Science has taught us that everything is connected. The restoration of Ballona Creek and its use as an educational resource and outdoor classroom will enable students and members of the community to explore the connection between human actions and the health of the planet, beginning in their own back yard. Students will be given the rare opportunity to learn about the interplay of physical and biological processes firsthand, as they cooperate to restore their watershed and associated habitats. Their work will connect them to their environment, and they will begin to develop a sense of awareness and responsibility as they combine learning about the past with a focus on a sustainable future.

California's population is projected to reach 58 million by the year 2040; if we are to protect our natural resources we must educate ourselves and inspire our children. The creation of a natural corridor from Baldwin Hills to the ocean, where students can explore and experience the wonders of nature and gain an appreciation of the environment, represents a substantial commitment to preparing the next generation for the responsibility of sustainably managing our natural resources.

GOALS

The overall goal of the program is to use education to foster hope and inspire action in all members of the community. We will pay particular attention to developing materials and resources for use in neighborhood schools. As students gain insight into their own relationship to their environment, to others, and to the future health of the planet, they will acquire the knowledge and tools

they need to act responsibly and to make a difference. Those who participate in the educational opportunities provided by this project will:

- develop lasting ties to their community and a sense of ownership and responsibility toward the Creek and the environment in general.
- begin to understand that everything in the Earth system is connected and that their actions have an impact beyond themselves, their friends and families.
- develop an appreciation for the environment and begin to see the beauty associated with purpose in nature.
- develop an understanding of the biological and physical interactions that are essential to a healthy ecosystem

Initially, we aim to enroll a few flagship schools in this project. We will work with interested teachers at these schools to develop curricular packets for use in conjunction with trips to the Creek (Appendix F). In addition, we will recruit pre-service teachers and science students to assist teachers in the field. As we produce more materials and the project grows, we plan to extend our outreach by

- creating interpretive signs for installation along the creek
- creating a Creek website that serves as a clearing house for news, information and curricular materials
- holding training sessions for parents and community members who would like to volunteer to help teachers in the field (using the Seattle Audubon FUN model).
- providing information about the Creek, its restoration and ecology to local libraries
- publishing and distributing a quarterly newsletter containing updates on the seasonal changes and things to look out for along the creek, in addition to articles on relevant conservation issues

As the project evolves, we anticipate increased participation from local schools that do not have the resources to run environmental science education programs independently and from those interested in enhancing what they are already doing.

VISION

The Ballona Creek Education Project will begin when the restoration begins. Our first priority will be to involve a few schools and members of the community in the restoration itself, where appropriate. Students and participants will have the unique opportunity to study ecology and natural history first hand, as they work to restore the Creek habitat. They will learn about the history of the area, how human actions have severely altered the habitat and what steps must be taken to restore the health of the area. They will also begin to understand why this is important and how it is done. They will learn about native plant species and their role in a thriving ecosystem, and the problems associated with invasive exotic species. As the area begins to flourish, students will be able to focus their studies on particular habitats and the plants and animals within them; for example, the riparian habitat, the coastal sage habitat, and the aquatic environment. They might even be fortunate enough to discover specific relationships between species like the El Segundo Blue butterfly and Dune buckwheat.

In addition, those involved in the restoration will be asked to document and catalog their work, enabling them to follow changes in real time. A student, who took part in a restoration project in fourth grade by planting a particular shrub, will be able to watch it grow, reproduce and serve as a food source for other organisms in the community. Not only will this provide valuable personal experience, but the children will also see how their work contributes to a body of knowledge and becomes a resource for future students. Students involved in the

restoration would also be asked to share thoughts, poems, or drawings that will be considered for inclusions on the interpretive signs placed along the creek. They may also want to submit entries to the River of Words environmental poetry and art contest offered in affiliation with The Library of Congress Center for the Book.

The project would involve students at all grade levels, in addition to members of the community. Each activity or field trip will be developed with a particular age group and the California science standards in mind, but all will require some preparation prior to going out into the field and some post trip work to synthesize ideas and consolidate data (Appendix F). The beauty of a project like this is that it evolves over time, and the possibilities for growth and enhancement are limited only by imagination.

Our vision is that investigations that begin locally, at the Creek, will ultimately extend to include field trips to other parts of the watershed. The Ballona Wetlands and the freshwater marsh, which is in the process of restoration, are obvious candidates. Neither is far, and there are already groups coordinating and running field trips in these areas.

Schools and teachers participating in this project will also be encouraged to use their work as the basis for forming a local Roots & Shoots group. Roots & Shoots is the Jane Goodall Institute's international environmental and humanitarian program for young people. The guiding principle behind the project is that every individual can make a difference. Participants plan and implement local projects but also have the opportunity to form partnerships with other groups around the world and make global environmental connections.

RECOMMENDATIONS

- Name members of a working group to oversee the Ballona Creek Education Project and coordinate the production and dissemination of educational materials and programs. Ideally, this team would include committed scientists and educators from the area (some of whom could be drawn from faculty at Loyola Marymount University).

- Identify local schools interested in becoming involved in the initial stages of the project. Preliminary inquiries have identified La Ballona and Turning Point Elementary Schools as possibilities. It is also likely that Culver City Middle School would be interested based on their participation in the Earth day creek side planting.

- Contact teachers at these schools to determine their needs and interests.

- Contact those responsible for the restoration work in order to coordinate student involvement.

- Communicate with organizations that could provide expert advice and guidance at various levels. The Audubon Society, The Californian Native Plant Society and The Metropolitan Water District would be places to start.

- Finally, identify Pre-service and in-service teachers who will develop activity packets in consultation with experts.

This project provides an opportunity for students, teachers, parents and other members of the community to learn, and work together while protecting something of value, which will be a source of pride for everyone involved. It provides an opportunity for pre-service teachers to work with scientists while

developing educational materials that will be relevant beyond their own classroom. And finally, it will offer scientists an opportunity to learn how to share their knowledge and connect with the community of educators in a meaningful way.

APPENDIX A. Butterfly (Lepidoptera) species observed in the Baldwin Hills and Ballona Wetlands.

Scientific Name	**Common Name**
PAPILIONDAE	
Papilio zelicaon Lucas	Anise Swallowtail
PIERIDAE	
Pieris rapae L.	Cabbage White
NYMPHALIDAE	
Danus plexippus L.	Monarch
Vanessa Cardui (L.)	Painted Lady
Vanessa carye annabella	West Coast Lady
Nymphalis antiopa L.	Mouning Cloak
Precis coenia Hubner	Buckeye
LYCAENIDAE	
Strymon melinus pudica	Common Hairstreak
Leptotes marina Reakirt	Marina Blue
HESPERIIDAE	
Hylephila phyleus (Druy)	Fiery Skipper
Erynnis zarucco funeralis	Funeral Duskywing Skipper

Appendix B. Moth Ilepidoptera) species observed in the Baldwin Hills (BH) and Ballona Wetlands (BW).	
NOCTUIDAE	
Heliothis phloxiphaga	False Corn Earworm
Heliothis finitina	none

APPENDIX C. Amphibians and Reptiles shared by Baldwin Hills and Ballona Wetlands.		
Higher Taxon: Family	**Scientific Name**	**Common Name**
Anguidae	*Gerrhonotus multicarinatus*	Southern alligator lizard
Anguidae	*Phrynosoma coronatum*	Coast Horned Lizard
Bufonidae	*Bufo boreas*	Western toad
Colubridae	*Lampropeltis getulus*	Common kingsnake
Colubridae	*Pituophis catenifer*	Gopher snake
Colubridae	*Crotalus viridis*	Western Rattlesnake
Hylidae	*Hyla regilla*	Pacific treefrog
Iguanidae	*Sceloprus occidentalis*	Western fence lizard
Iguanidae	*Uta stansburiana*	Side-blotched lizard
Plethodontidae	*Batrachoseps nigriventris*	Black-bellied Slender Salamander
Plethodontidae	*Batrachoseps pacifcus major*	Garden Slender Salamander
	Masticophis flagellum	Coachwhip or Red Racer

APPENDIX D. Birds shared by Baldwin Hills and Ballona Wetlands.		
Higher Taxon:	**Scientific Name**	**Common Name**
Phasianidae	*Callipepla californica*	California Quail
Podicipedidae	*Podiceps nigricollis*	Eared Grebe
Podicipedidae	*Podilymbus podiceps*	Pied-billed Grebe
Phalacrocoracidae	*Phalacrocorax auritus*	Double-Crested Cormorant
Anatidae	*Anas acuta*	Pintail (Northern)
Anatidae	*Anas americana*	American Wigeon
Anatidae	*Anas clypeata*	Northern Shoveler
Anatidae	*Anas crecca*	Green-Winged Teal
Anatidae	*Anas cyanoptera*	Cinnamon Teal
Anatidae	*Anas domesticus (Anas platyrhynchos)*	Domestic Duck
Anatidae	*Anas platyrhynchos*	Mallard
Anatidae	*Ayhtya collaris*	Ring-necked Duck
Anatidae	*Branta canadensis*	Canada Goose
Anatidae	*Lophodytes cucullatus*	Hooded Merganser
Anatidae	*Oxyura jamaicensis*	Ruddy Duck
Accipitraidae	*Elanus leucurus*	White-tailed Kite
Accipitraidae	*Accipiter cooperii*	Cooper's Hawk
Accipitraidae	*Buteo jamaicenisis*	Red-tailed Hawk
Accipitraidae	*Buteo lagopus*	Rough-legged Hawk
Accipitraidae	*Buteo lineatus*	Red-shouldered Hawk
Falconidae	*Falco peregrinus*	Peregrine Falcon
Falconidae	*Falco sparverius*	American Kestrel
Pandionidae	*Pandion haliaetus*	Osprey
Accipitraidae	*Circus cyaneus*	Marsh Hawk/Northern Harrier
Accipitraidae	*Accipiter striatus*	Sharp-shinned Hawk
Ardeidae	*Ardea alba*	Great Egret
Ardeidae	*Ardea herodias*	Great Blue Heron
Ardeidae	*Botaurus lentiginosus*	American Bittern
Ardeidae	*Butorides virescens*	Green Heron
Ardeidae	*Egretta thula*	Snowy Egret
Ardeidae	*Nycticorax nycticorax*	Black-Crowned Night-Heron
Cathartidae	*Cathartes aura*	Turkey Vulture
Rallidae	*Fulica americana*	American Coot
Laridae	*Larus californicus*	California Gull
Laridae	*Larus delawarensis*	Ring-billed Gull
Laridae	*Larus occidentalis*	Western Gull
Charadridae	*Pluvialis squatarola*	Black Bellied Plover

Scolopacidae	*Actitis macularia*	Spotted Sandpiper
Scolopacidae	*Gallinago gallinago*	Common Snipe
Scolopacidae	*Limnodromus scolopaceus*	Long-billed Dowitcher
Scolopacidae	*Numenius phaeopus*	Whimbrel
Scolopacidae	*Tringa melanoleuca*	Greater Yellowlegs
Chameidae	*Chamaea fasciata*	Wrentit
Columbidae	*Columba livia*	Rock Dove
Columbidae	*Streptopelia chinensis*	Spotted Dove
Columbidae	*Zenaida macroura*	Mourning Dove
Strigidae	*Athene cunicularia*	Burrowing Owl
Caprimulgidae	*Chordeiles acutipennis*	Lesser Nighthawk
Trochilidae	*Calypte anna*	Anna's Hummingbird
Trochilidae	*Calypte costae*	Costa's Hummingbird
Trochilidae	*Selasphorus rufus*	Rufous Hummingbird
Trochilidae	*Selasphorus sasin*	Allen's Hummingbird
Trochilidae	*Archilochus alexandri*	Black-chinned Hummingbird
Apodidae	*Aeronautes saxatalis*	White-throated Swift
Apodidae	*Chaetura vauxi*	Vaux's Swift
Alcedinidae	*Ceryle alcyon*	Belted Kingfisher
Picidae	*Colaptes auratus*	Northern Flicker
Picidae	*Picoides pubescens*	Downy Woodpecker
Icteriae	*Agelaius phoeniceus*	Red-winged Blackbird
Icteridae	*Euphagus cyanocephalus*	Brewer's Blackbird
Icteridae	*Icterus bullockii*	Bullock's Oriole
Icteridae	*Icterus cucullatus*	Hooded Oriole
Icteridae	*Molothrus ater*	Brown-Headed Cowbird
Cardinalidae	*Pheucticus melanocephalus*	Black-Headed Grosbeak
Emberizidae	*Chondestes grammacus*	Lark Sparrow
Emberizidae	*Melospiza lincolnii*	Lincoln's Sparrow
Emberizidae	*Melospiza melodia*	Song Sparrow
Emberizidae	*Passerculus sandwichensis beldingi*	Belding's Savannah Sparrow
Emberizidae	*Passerella iliaca*	Fox Sparrow
Emberizidae	*Pooecetes gramineus*	Vesper Sparrow
Emberizidae	*Spizella breweri*	Brewer's Sparrow
Emberizidae	*Spizella passerina*	Chipping Sparrow
Emberizidae	*Zonotrichia atricapilla*	Golden-Crowned Sparrow
Emberizidae	*Zonotrichia leucophrys*	White-Crowned Sparrow
Fringillidae	*Carduelis lawrencei*	Lawrence's Goldfinch
Fringillidae	*Carduelis tristis*	American Goldfinch
Fringillidae	*Carduleis psaltria*	Lesser Goldfinch

Fringillidae	*Carpodacus mexicanus*	House Finch
Fringillidae	*Passerculus sandwichensis*	Savannah Sparrow
Tyannidae	*Contopus cooperi*	Olive-Sided Flycatcher
Tyannidae	*Contopus sordidulus*	Western Wood-pewee
Tyannidae	*Sayornis saya*	Say's Phoebe
Tyannidae	*Tyrannus verticalis*	Western Kingbird
Tyrannidae	*Empidonax difficilis*	Pacific-slope Flycatcher
Tyrannidae	*Empidonax hammondi*	Hammond's Flycatcher
Tyrannidae	*Empidonax traillii*	Willow Flycatcher
Tyrannidae	*Empidonax wrightii*	Gray Flycatcher
Tyrannidae	*Myiarchis cinerascens*	Ash-throated Flycatcher
Tyrannidae	*Sayornis nigricans*	Black Phoebe
Tyrannidae	*Tyrannus vociferans*	Cassin's Kingbird
Sylviidae	*Polioptila caerulea*	Blue-gray Gnatcatcher
Passeridae	*Passer domesticus*	House Sparrow
Corvidae	*Aphelocoma californica*	Western Scrub-Jay
Corvidae	*Corvax corvax*	Common Raven
Mimidae	*Mimus polyglottos*	Northern Mockingbird
Laniidae	*Lanius ludovicianus*	Loggerhead Shrike
Hirundinidae	*Hirundo rustica*	Barn Swallow
Hirundinidae	*Tachycineta bicolor*	Tree Swallow
Hirundinidae	*Tachycineta thalassina*	Violet-green Swallow
Turdidae	*Catharus guttatus*	Hermit Thrush
Turdidae	*Turdus migratorius*	American Robin
Parulidae	*Dendroica coronata*	Yellow-rumped Warbler
Parulidae	*Dendroica nigrescens*	Black-Throated Gray Warbler
Parulidae	*Dendroica occidentalis*	Hermit Warbler
Parulidae	*Dendroica petechia*	Yellow Warlber
Parulidae	*Dendroica striata*	Blackpoll Warbler
Parulidae	*Dendroica townsendi*	Townsend's Warbler
Parulidae	*Oporornis tolmiei*	MacGillivray's Warbler
Bombycillidae	*Bombycilla cedrorum*	Cedar Waxwing
Cardinalidae	*Guiraca caerulea*	Blue Grosbeak
Cardinalidae	*Passerina amoena*	Lazuli Bunting
Emberizidae	*Junco hyemalis*	Dark-eyed Junco
Emberizidae	*Pipilo crissalis*	California Towhee
Emberizidae	*Pipilo maculatus*	Spotted Towhee
Mimidae	*Toxostoma redivivum*	California Thrasher
Motacillidae	*Anthus rubescens*	American Pipit
Sturnidae	*Sturnus vulgaris*	Starling

Troglodytidae	*Thryomanes bewickii*	Bewick's Wren
Troglodytidae	*Troglodytes aedon*	House Wren
Turdidae	*Catharus ustulatus*	Swainson's Thrush
Vireonidae	*Vireo cassinii*	Cassin's Vireo
Vireonidae	*Vireo gilvus*	Warbling Vireo

APPENDIX E. Mammals shared by Baldwin Hills and Ballona Wetlands.		
Higher Taxon:	**Scientific Name**	**Common Name**
Carnivora	*Canis familiaris*	Domestic dog
Carnivora	*Canis latrans ochropus*	Coyote
Carnivora	*Felis catus*	Domestic cat
Carnivora	*Mephitis mephitis holzneri*	Striped sunk
Carnivora	*Procyon lotor psora*	Raccoon
Carnivora	*Spilogale gracilis phenax*	Western spotted skunk
Carnivora	*Urocyon cinereoargenteus californicus*	Gray fox
Chiroptera	*Antrozous pallidus pacificus*	Pallid bat
Chiroptera	*Eptesicus fuscus bernardinus*	Big brown bat
Chiroptera	*Eumops perotis californicus*	Western mastif bat
Lagonorpha	*Lepus californiacus bennetti*	Black-tailed jack rabbit
Lagonorpha	*Sylvilagus audubonii sactidiegi*	Desert cottontail
Marsupialia	*Didelphis virginiana virginiana*	Virginia possum
Rodentia	*Microtus californicus stephensi*	California vole
Rodentia	*Mus musculus brevirostris*	House mouse
Rodentia	*Peromyscus maniculatus gambelli*	Deer mouse
Rodentia	*Rattus norviegicus norvegicus*	Western harvest mouse
Rodentia	*Rattus rattus*	Black rat
Rodentia	*Spermophilus beecheyi beecheyi*	California ground squirrel
Rodentia	*Thomomys bottae bottae*	Botta's pocket gopher

Appendix F: Sample Elementary School Activity

Ballona Creek Investigators: *Edna Ramirez*
Cherie Tanabe

Science Context: Life Science

Grade: 5th grade

Overview:

In this lesson, students will investigate and carry out observations at Ballona Creek and will become familiar with its existing ecosystems. They will go on a series of three field trips in which they collect data to create a classroom mural that identifies the different components of the habitats at the creek, and to contribute to class discussions.

Goals:

- Students will be able to define and give examples of ecosystems at Ballona Creek.
- They will become familiar with native plants in the area and explain why native plants are important to Ballona.
- By studying the habitats at Ballona Creek, students will be able to identify the relationship that exists between plants and animals at the riparian and the costal sage area.
- Most importantly, the students will become more attentive, aware, and appreciative of the environment.

Background:

The teacher should guide students through the identification of the components of an ecosystem at Ballona Creek and help students reach an understanding of the interdependence between the ecosystem of the riparian and coastal sage area. They should also stress the importance of maintaining the native plant population at the creek.

What is a native plant? California native plants grew here prior to European contact, and are the plants that the first Californians knew and depended on for their livelihood. Native plants are the foundation of our native ecosystems, or natural communities.

Why are native plants important? Our native plants, having evolved here, are best suited to live and perform certain tasks such as manufacturing oxygen and filtering impurities from our water. These plants also do the best job of providing food and shelter for native wild animals. Maximum diversity in animal populations requires maximum diversity of plants. Biological diversity is vital to humans, because ultimately, we all live off the land. Native plants continue to play a crucial role in the development of new foods, medicines and industrial products.

- For more information on Native plants visit:

  California Native Plant Society

  http://www.cnps.org/activities/natives.htm

What is an Ecosystem? Within each ecosystem, there are habitats. A habitat is the place where a population lives. All of the populations interact and form a community. The community of living things interacts with the non-living world around it to form the ecosystem. The habitat must supply the needs of organisms, such as food, water, temperature, oxygen, and minerals. If the population's needs are not met, it will move to a better habitat or stop existing.

The riparian habitat is the transitional zone between the river or creek and upland systems. The riparian areas are different from the coastal sage or upland area because of its proximity to water.

- For more information visit: **Neighbors**

  http://www.geog.ouc.bc.ca/physgeog/contents/9d.html

- **United States Geological Survey**

  http://biology.usgs.gov/s+t/noframe/m6290.htm

Materials:

- Introduction Packet (attached)
- Field Trip Worksheet Packet (attached)
- In Class Worksheet Packet (attached)
- Folders (one per student to keep their paperwork in)
- Clipboards (one per student bought/made from cardboard and clips)
- Binoculars
- Disposable cameras or a digital camera if available

- Magnifying glasses
- Rulers
- California Native Plant and Bird Field Guide (optional)

Introductory Activities:

Students should be familiarized with the concept of a habitat, which will prepare them to identify ecosystems at the Ballona Creek. For example introductory activities, see the Introduction Packet attached.

Preparation:

Students will work in groups of three or four throughout this lesson. They should be taught the proper use of the binoculars and magnifying lenses, as they will be asked to use them during the field trips. Rules should be established before students go to Ballona Creek so that they will have respect for the area that they investigate.

To get students thinking about the ecosystems at Ballona Creek, the teacher will ask students what they know about Ballona Creek and see if the students are familiar with the area. The teacher may ask if the students have come in contact with any kind of animals that are in the area of the creek.

Using the **Native Plants Reference Handout** (**In Class Worksheet Packet**), the teacher will show students some of the different kinds of native plants that live in the area. The teacher will also give a short description or profile of some of the native plants that can be found in the riparian area of the creek to prepare them for the first field trip. This information should help students think about where they might want to look and what they are to look for when they arrive at the creek.

Action:

Field Trip #1: Riparian Area

In the first trip to Ballona Creek the students, in their groups, will investigate the vegetation in the riparian area. When the students arrive at Ballona Creek they will be asked to close their eyes and use their other senses (smell, hearing) to experience the Ballona Creek. The teacher will engage student thinking by asking thought-provoking questions such as: "What do you smell? What does that scent tell you about the area? What can you hear? What do those sounds tell you about Ballona Creek? What have you learned about Ballona Creek by using your other senses?" Students will write or draw their responses in their personal folders. The teacher will ask the students to keep this information in mind as they work in their groups to find two plants that they want to study and remind them of the rules about respecting the organisms that live in the area.

The students will be given the **Native Plant Field Investigator's Guide** and the **Native Plants Field Investigation Worksheet** from the **Field Trip Packet** to guide their investigation of the area. Students equipped with cameras, magnifying lenses, binoculars, and rulers will start their scientific investigation.

They will be asked to take pictures and record their findings as well as begin to think about the relationships between the plants and animals they observe.

Field Trip #1 Wrap-Up:

After returning from the creek each student will be asked to write their impressions of the Ballona Creek in their folders. They may respond by drawing pictures, writing poetry, writing a short story, or simply writing what they saw and thought. They may also write down any new questions that they may have after visiting the creek. All work done in folders should be dated and stored in these folders for later reference.

The teacher will then assist groups in identifying the plants that they found by referring to a field guide and using the pictures that they took at the creek. After identifying their plants, the students can either break up into groups according to the plants that they have observed at the creek or continue working in their groups to conduct research online. The students are to use the **Plant Investigators** worksheet to guide their research. They will use the data that they collect to make information cards that will be used to make a classroom field guide. This classroom reference will contain information that will elaborate on the mural that they will make of the Ballona Creek.

The groups will contribute their data to the construction of the classroom mural. They will attempt to duplicate the existing ecosystems at the Ballona Creek by using the data that they have collected. As a class the students will then share the data they have found in their groups and explain their contributions to the mural. The teacher will help the students synthesize the data they have collected in relation to what they have learned about habitats.

The wrap up activities may be broken down depending on class time and the preferences of the teacher.

Suggested Prompt Questions**:**

1. Describe the plants you observed.
2. Did you see any insects or birds?
3. How do you think they depend on the plants and other animals around them?
4. What do you think would happen to these animals if their food source no longer existed?

Field Trip #2: Coastal Sage Area

In the second trip to the Ballona Creek the students will investigate the vegetation in the coastal sage area. The students will be observing plant characteristics, like the size of the leaves, smell, texture of the leaves, types of flowers, and so on. Students are asked to identify and photograph plants in the costal sage area. They will record their data on the **Native Plants Field**

Investigation Worksheet provided in the **Field Trip Packet** on two native plants they find in the area.

Suggested Prompt Questions**:**

1. What do you smell?
2. What does that scent tell you about the area?
3. What can you hear?
4. What do those sounds tell you about Ballona Creek?
5. What have you learned about Ballona Creek by using your other senses?
6. What do you think will be different about the plants you saw at the riparian area from the plants you will see today?
7. What do you think will be similar about the plants you saw at the riparian area from the plants you will see today?

Field Trip #2 Wrap-Up

The wrap up for the second field trip will follow the same format as the first but the teacher will connect the habitats observed at the riparian area with the habitats observed at the coastal sage area, emphasizing the dependence between the two.

Suggested Prompt Questions**:**

5. Were there any differences/similarities between the plants in coastal sage area and the plants in the riparian area?
6. Why do you think that is?

Field Trip #3: Native Birds

On the third trip to Ballona Creek students will focus on the birds at Ballona Creek. The **Native Bird Field Investigator's Guide** will guide the students' investigation by asking specific questions about the birds' physical traits and their interaction with other components of the ecosystem. Students will be asked to identify and take pictures of the birds they observe. Students will record their findings on the **Field Investigation Worksheet** from the **Field Trip Packet**.

Field Trip #3 Wrap-Up

To wrap up this field trip students will be asked to write in their folders about their experience.

Working in their groups they will use the **Bird Investigators** worksheet to guide their research on the birds they collected data on at the creek. The National Geographic Website offers a plethora of information on California native birds (see "Resources") that students can use. They will use this information to

make information cards of the native birds found at Ballona Creek for the classroom field guide.

As a class each group will present what they researched and contributed to the mural.

Suggested Prompt Questions:

1. What birds were you able to identify on the trip?
2. Where were the birds you identified during your observation?
3. Did you see more birds in the riparian area or in the costal sage area?
4. Why do you think that is?
5. Were the birds you saw in the riparian area different from the birds you saw in the costal sage area?
6. If so why do you think that is so?
7. How do you think the birds you observed contribute to Ballona Creek? What do you think some of their “chores” are?

Coming Together:

The following day the teacher will inform the students on the ”conference” they will partake in. All the experts will share their knowledge on Ballona Creek’s plants and birds. The students will have various options in selecting the way in which they will share their data with the class. The class will be given a day to prepare. At the end of the conference the teacher will lead a discussion that will connect the entire ecosystem investigated at Ballona Creek. The teacher will then collect all the information cards that the students have made to create an in-class field guide of the Ballona Creek.

Ideas for Student Presentations:

1. Students can create a poster of their findings.
2. Students can share their data in the form of a newscast.
3. Students can create a collage using their photographs, Internet research, and field trip data.

Branching Out:

- As a continuation to this assignment, students can visit the creek again in a different season as the plants will be in different stages at different times of the year. There will also be different birds that students may not have seen in the last trip. This will also let the students to see how the area has changed in just a few months time.
- As a geography assignment, students could study how marshes, creeks and wetlands are formed.

- As a history assignment students can research to find out how the Ballona Creek/Wetlands used to exist in the past. They can study how the Gabrielinos used Ballona Creek as a natural resource.
- As a literature assignment students can write a poem about the plant they researched or their experience at Ballona Creek.
- Students can also research Ballona Creek before the restoration and compare it to its present state as an art assignment, by drawing before and after pictures.

Resources:

The following websites may be helpful guides for teachers to gain background knowledge for this lesson:

The California Native Plants Society Website:

This website provides helpful information about California native plants as far as what they are and why they are important. They also offer some lesson plans that teachers could use in their classroom to familiarize students with plants and their function.

http://www.cnps.org

The Teachnet.com Website

The teachnet.com website is a great reference source for teachers to get new ideas that can be used in their classrooms. There are many different lesson plans offered here that also have a strong background in plants and getting students familiar with them. This website also has links to teacher resources that can help them find out more information about native plants and birds.

http://www.teachnet.com

The Lesson Plan's Page

This is another resource that teachers may use to find other lesson plans that may help students as an introductory activity for this lesson.

http://www.lessonplanspage.com

The National Geographic Website

This website may be helpful in the identification of the birds that students may choose to research in this lesson. It offers free subscription and access to information after registration and provides a nice field guide to different kinds of animals that live in areas according to zip code. This may be a good website for students to go to in researching birds.

http://www.nationalgeographic.com

The National Audubon Society Website

For more information about birds, this website may be useful for both teachers and students. There is a special feature that offers bird call clips that students and teachers can listen to prior to or after field trips.

http://www.audubon.org

Las Pilitas Nursery Website

This website may be the most useful for students when conducting their research. It provides much information about California native plants and the birds that are attracted to them. This website may serve as an online field guide reference for students as there are pictures on the website that students can compare to the pictures that they have taken at the Ballona Creek.

http://www.laspilitas.com

Ballona Creek Native Plant Field Investigator's Guide

Riparian Habitat/Coastal Sage Habitat

1. Describe or draw what you see around you.

2. Do you see any plants that were mentioned in class?

3. Draw or take a picture of at least two plants and fill in the missing data from your **Ballona Creek Native Plants Investigation Worksheet**.

4. Is there any evidence of animals? If so, what it is?

5. What kinds of animals are around? What color, size, textures are they?

6. What do you think the animals are doing?

7. What do you think they need to survive?

8. Where do you think the animals live?

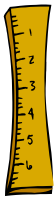
9. What do you think the animals eat?

10. How do you think the animals, plants and environment depend upon each other?

Ballona Creek Native Bird Field Investigator's Guide

1. Describe or draw what you see around you.

2. How many different kinds of birds do you see? Do you see any of the birds that were mentioned in class?



3. Draw or take a picture of any birds that you see and fill in the missing data from your **Ballona Creek Native Birds Investigation Worksheet**.

4. What kind of sounds do the birds make? Can you identify any specific calls coming from a certain bird? What does it sound like?

5. Is there any evidence of animals/insects other than birds? If so, what evidence is there?

6. Other than birds, what kinds of animals/insects are around? What color, size, textures are they?

7. What do you think the animals/insects are doing?

8. What do you think they need to survive?

9. Where do you think the animals/insects live?

10. What do you think the animals/insects eat?

11. How do you think the birds and other animals, plants and environment depend upon each other?

Ballona Creek Native Birds Field Investigation Worksheet

Group Member Names: _____

Date: _____

Location: _____

Bird Two:	
Picture or Drawing:	**Physical Description:** Color(s) of Bird: Description of bird:
	Bird Data: Where did you see your bird?: What is the bird doing? Was it flying?

Ballona Creek Native Plants Field Investigation Worksheet

Group Member Names: _____

Date: _____

Location: _____

<table>
<tr><td colspan="2">Plant Two:</td></tr>
<tr><td rowspan="6">Picture or Drawing:</td><td>Physical Description:</td></tr>
<tr><td>Shape of Leaves:</td></tr>
<tr><td>Plant Colors:</td></tr>
<tr><td>Description of Flowers/Seeds/Fruits:</td></tr>
<tr><td>Plant Data:</td></tr>
<tr><td>Height (cm):

Size of Leaves (cm):</td></tr>
</table>

Bird Investigators

In-Class Research Guide

1. What two native birds has your group chosen to become experts in?

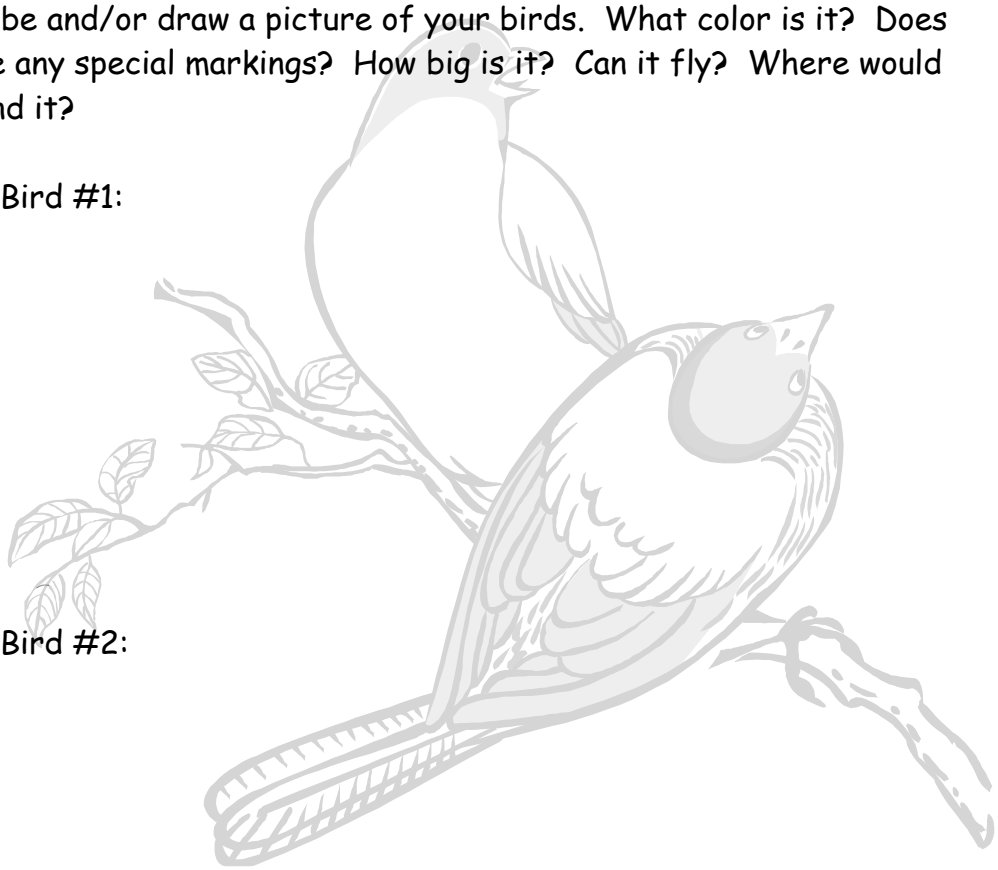
   Bird #1:

   Bird #2:

2. Describe and/or draw a picture of your birds. What color is it? Does it have any special markings? How big is it? Can it fly? Where would you find it?

   Bird #1:

   Bird #2:



3. What do your birds like to eat?

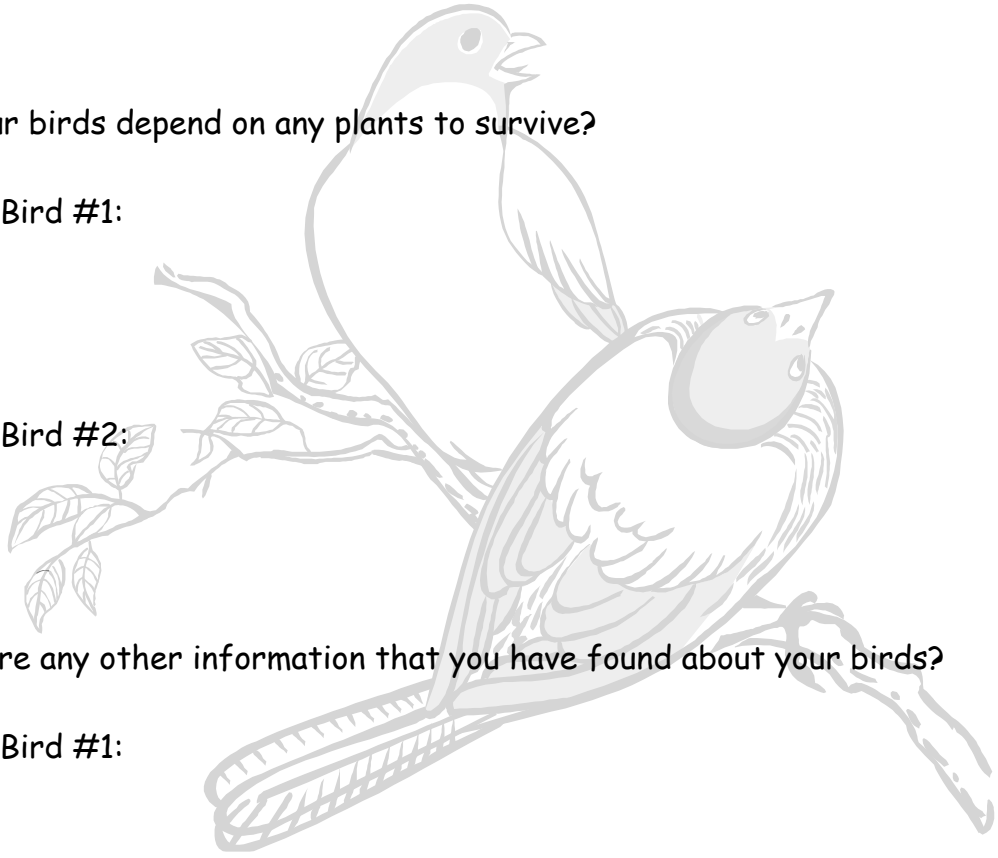
   Bird #1:

Bird #2:

4. How and where do they find their food?

   Bird #1:

   Bird #2:



5. Do your birds depend on any plants to survive?

   Bird #1:

   Bird #2:

6. Is there any other information that you have found about your birds?

   Bird #1:

   Bird #2:

Plant Investigators

In-Class Research Guide

1. What two native plants has your group chosen to become experts in?

   Plant #1:

   Plant #2:

2. What does your plant look like? (What color is it? What shape are its leaves? Does it have flowers? How big does it grow? Does your plant have seeds? What do your plant's seeds look like?) Find or draw a picture of each plant.

   Plant #1:

   Plant #2:

3. What kind of organisms do your plants attract?

   Plant #1:

   Plant #2:

4. Do your plants depend on any organisms or weather conditions in order to survive?

   Plant #1:

   Plant #2:

5. Is there any other information that you have found?

   Plant #1:

   Plant #2:

Native Plants Reference Handout
Ballona Creek

Riparian Area

Common Name	**Scientific Name**
Water wally/Mule fat	*Baccharis glutinosa*
Mule fat	*Baccharis salicifolia (Baccharis viminea)*
Bush aster/Corethrogyne	*Lessingia filaginifolia (Corethrogyne filaginifolia)*
Cocklebur	*Xanthium*
Spanish clover/Bird's foot trefoil	*Lotus purshianus*
Toad rush	*Juncus bufonius*
Arroyo willow	*Salix lasiolepis*
Common Verbena	*Verbena lasiostachys*

Native Plants Reference Handout
Ballona Creek

Coastal Sage Area

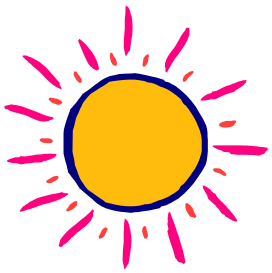
Common Name	Scientific Name
Blue elderberry	*Sambucus mexicanus*
Lemonade berry	*Rhus integrifolia*
California sage bush	*Artemisia californica*
Coyote brush	*Baccharis pilularis*
Mule fat	*Baccharis salicifolia*
California bush sunflower	*Encelia californica*
Live forever	*Dudleya lanceolata*
White sage	*Salvia apiana*
Purple sage	*Salvia leucophylla*
Black sage	*Salvia mellifera*
Hummingbird sage	*Salvia spathacea*
California buckwheat	*Eriogonum fasciculatum*
Toyon (Hollywood Plant)	*Heteromeles arbutifolia*
Monkeyflower	*Mimulus arundinacea*
Yarrow	*Achillea millefolium*
Blue-eyed grass	*Sisyrinchium bellum*
California poppy	*Eschscholzia californica*

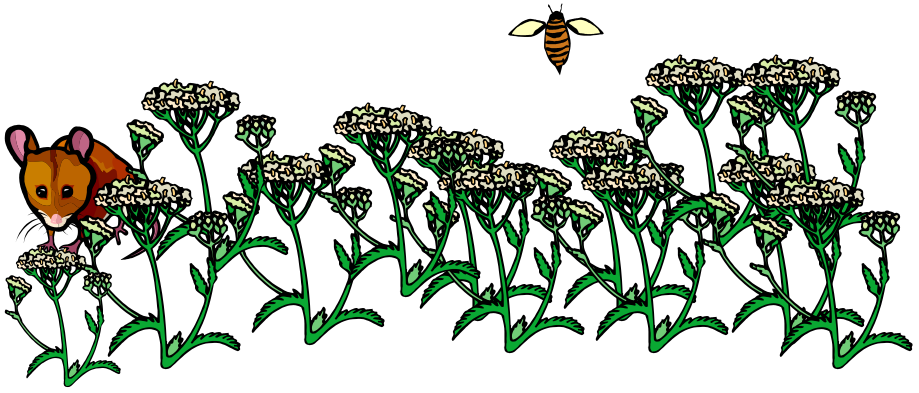
Native Birds Reference Handout
Ballona Creek

Common Name	Scientific Name
Rock Dove	*Columba livia*
Mourning Dove	*Zenaida macroura*
Anna's Hummingbird	*Calypte anna*
Black Phoebe	*Sayornis nigricans*
Say's Phoebe	*Sayornis saya*
Loggerhead Shrike	*Lanius ludovicianus*
Scrub Jay	*Aphelocoma californica*
Common Raven	*Corvus corax*
American Crow	*Corvus Caurinus*
Sage Sparrow	*Amphispiza belli*
Red-Winged Blackbird	*Agelaius phoeniceus*
House Finch	*Carpodacus mexicanus*
Song Sparrow	*Melospiza melodia*

Introduction

Packet





LINKS IN A FOOD CHAIN

~Author Unknown


There once was a flower that grew on the plain.
Where the sun helped it grow, and so did the rain--
Links in a food chain.

There once was a bug who nibbled on flowers,

Nibbled on flowers for hours and hours!


The bug ate the flower that grew on the plain,
Where the sun helped it grow, and so did the rain--
Links in a food chain.


There once was a bird who gobbled up bugs,
And creepies and crawlies, and slimies and slugs.

The bird ate the bug, who nibbled on flowers,

Nibbled on flowers for hours and hours!


The bug ate the flower that grew on the plain,
Where the sun helped it grow, and so did the rain--
Links in a food chain.


There once was a snake who often grabbed birds,
And swallowed them whole, or so I have heard.

The snake ate the bird, who gobbled up bugs,

And creepies and crawlies, and slimies and slugs.


The bird ate the bug, who nibbled on flowers,
Nibbled on flowers for hours and hours!

The bug ate the flower that grew on the plain,
Where the sun helped it grow, and so did the rain--
Links in a food chain.

There once was a fox, and I'll make a bet:
He'd eat anything he could possibly get.

The fox ate the snake, who often grabbed birds,
and swallowed the whole, or so I have heard.

The snake ate the bird, who gobbled up bugs,
And creepies and crawlies, and slimies and slugs.

The bird ate the bug, who nibbled on flowers,
Nibbled on flowers for hours and hours!

The bug ate the flower that grew on the plain,
Where the sun helped it grow, and so did the rain--
Links in a food chain.

The fox, he grew older and died one spring day,
But he made the soil rich, when he rotted away.

A new flower grew where he died on the plain.
And the sun helped it grow, and so did the rain--
LINKS IN A FOOD CHAIN.

Activity: The Web of Life

Objective:
Students will able to:

- see how animals are connected to other organisms to construct a food web.
- see that most plants and animals are members of many different food webs.
- see that the animals eat a variety of different foods, but they are being preyed on by a number of predators.
- see the interdependence among members of a community and understand that the elimination of one member affects the whole community.
- recognize the importance of plants within a food web.

Materials:

- Ample classroom space
- Flashcards or Life-cards (the teacher will create flashcards with pictures and labeled for herbivores, carnivores, omnivores, and another for a plant)
- Balls of yarn in different colors.

Activity:

1.The flash cards for the herbivores, carnivores and omnivores are broken down into specific species from different habitats to represent the creatures from smallest to largest on the particular food chain:

i.e.: shark > seal > large fish > small fish > crustacean > coral.

robin ---> mosquitoes ---> worm ---> clover

raccoon---> worm ----> clover

groundhog ---> mosquitoes--->clover

white-tailed deer ----> mosquitoes---> alder

2.Pass out the life cards to the students to hang around a player's neck. Each player wears a card and the largest (like a shark) of each type has the ball of wool.

3.This player then has to 'catch' his most likely food source from the remaining players based on size (i.e.: so the shark might catch the seal. The shark holds one end of the wool, leaving a couple of meters dangling.

4.That first student will then passes the ball to the seal who then has to catch 'large fish' while still being linked via the yarn to the shark.

5.Don't break this yarn link.

6.Then, the large fish has the ball of wool and catches small fish and so on down the food chain until the strand of wool links all the creatures. Creatures that get eaten by omnivores may hold more than one color length of wool so the interdependence is demonstrated.

7.Plant gathers up the strands of all those that eat something derived from plants.

8.What you should find is that the plant stands at one end with a number of strands of wool, in the middle are all the creatures with strands of wool going every which way like a web. The plant, using scissors, will cut the strings from the hands of the animals that eat something derived from plants.

9. The teacher will reinforce the importance of plants sharing with students that plants are the only organisms that can convert the sun’s energy into food.

10. The teacher will emphasize that the food web demonstrated in this activity is only one example of the many that exist on earth. The teacher will make sure the students understand that the ecosystem at Ballona Creek will be different from the one in the activity. The teacher can give an example of one food wed that Ballona Creek is home to.

Conclusion:

- Students will be able to see and understand the interdependence of animals in a community and the important role plants play in a community.

Modified from:
An activity produced by Barbara Braxton, Teacher Librarian, Palmerston Australia

Activity: Disrupting an Ecosystem

Objective:

Students will understand the concept that living things depend on water for their survival. Students will be able to identify Water as a key component of any ecosystem.

Overview:

Students will gain a basic understanding of the importance of water in any ecosystem. The lesson will teach students that all members of an ecosystem depend on water to survive. Students will perform a simple simulation that demonstrates how the lack of water can lead to the end of species and organisms.

Opening:

Ask students to think of some animals and plants that they are familiar with, such as their pets or animals that live outdoors near their homes. Ask them to state the things these animals need to survive, such as water, food, a place to make their home.

Ask students to think more carefully about the animals they have described. Discuss the following questions with the class:

- What do the animals eat?
- Where do they live?
- How do they depend on the plants and other animals around them?
- What is one thing that both plants and animals need to live (water)?
- What would happen to these animals if their source of water no longer existed?

Activity:

The Jenga (from Milton Bradley) is going to represent an ecosystem. Each of the 54 hardwood blocks is going to be assigned (by the color of the block) an identity of a plant, animal, or water. Each table will have their own Jenga set. The teacher will direct students to take turns removing the appropriate block representing the water. The Jenga blocks being removed would represent the destruction of the water sources in ecosystems. Continue until the Jenga structure is not standing.

Discuss the implications of the simulation with the class. What happens to the plants and animals in an area when the source of water is eliminated? Make sure students understand that all plants and animals in an area (an ecosystem) need water in order sustain life. Can they think of other examples of dependence, such as in their families, with their friends, or at school?

Closing:

- Have students draw a picture of the way they are dependent on water (how they use water) and have them explain what would happen to them if water were to run out.

- Ask students to brainstorm the reasons why they think some species might be in trouble, in addition to the ecosystem-related reasons they have discussed. Can they think of any ways in **which human activities** might affect the lives of animals? Show them pictures of **construction**, **recreation,** and other human activities, and have them explain or even draw pictures of how the activities in each picture might affect animals.

Appendix G: City of Culver City Ballona Creek and Trail Focused Special Study

Pursuant to the Land Use, Circulation and Open Space Elements of the city's General Plan, the City of Culver City prepared the Ballona Creek and Trail Focused Special Study (Focused Special Study) in 2003. In coordination with the City's Planning Division, the City commissioned RRM Design Group to conduct the public outreach and workshops, develop planning and design principles and preliminary improvement proposals, and submit a final report for City Council review.

On December 8, 2003, the Culver City Council heard public testimony regarding the Focused Special Study. Despite considerable testimony in favor of the City adopting a progressive vision for Ballona Creek and undertaking recreational and environmental improvements, a number of residents raised concerns about the Study's process and its recommendations. Specifically, residents addressed their concerns about how potential improvements may impact noise, buffer areas, crime and safety, and lighting.

Upon hearing all of the oral and written testimony, the City Council Received and Filed the Focused Special Study, and directed staff to complete a General Plan Amendment that would establish formal guidelines for all development on Ballona Creek. In particular, the Council requested staff review Table 5A of the Study, focusing on the quality of life, and safety/security sections. As well, the Council asked staff to consider Chapter 10 priority 1B improvements, including ALTA level and hydrologic surveys.