APPENDIX A

MITIGATION MONITORING
and
REPORTING PROGRAM

MITIGATION MONITORING AND REPORTING PROGRAM

City of Santa Cruz General Plan 2030

This Mitigation Monitoring and Reporting Program (MMRP) for the City of Santa Cruz *General Plan 2030* has been prepared pursuant to the California Environmental Quality Act (CEQA – Public Resources Code, Section 21000 *et seq*.) and the CEQA Guidelines (Cal. Code Regs., Title 14, Chapter 3, Sections 15074 and 15097). A master copy of this MMRP shall be kept in the office of the Zoning Administrator and shall be available for viewing upon request.

Project Description. The proposed City of Santa Cruz Draft *General Plan 2030* (dated February 27, 2009) is an update of the City's existing *General Plan and Local Coastal Plan 1990- 2005*. Pursuant to State law, the proposed General Plan includes the following elements required by state low: Land Use, Circulation, Conservation, Open Space, Safety, and Noise, and also includes optional subjects set forth in the State General Plan Guidelines related to community design and economic development. Goals, policies and actions are provided for each element. The General Plan also includes a Land Use Map as required by State law, which identifies land use designations and graphically depicts the arrangement and location of land uses throughout the City. To aid the environmental analysis, a "buildout" projection was developed, which considers the development potential of land permitted under the proposed General Plan that is estimated to occur in Santa Cruz by the year 2030.

MMRP. This MMRP includes mitigation measures in the Mitigation Monitoring and Reporting Matrix on the following pages that correspond to the final environmental impact report (EIR) for the project. The matrix lists each mitigation measure or series of mitigation measures by environmental topic. For each mitigation measure, the frequency of monitoring and the responsible monitoring entity is identified.

Mitigation Measure	Implementation Actions	Monitoring / Reporting Responsibility	Timing Requirements	Reporting Requirements	Verification of Compliance
Transportation and Traffic					
Recommended Revisions to the *Draft General Plan 2030* Revise or add policies/actions as indicated below. Deleted text is shown in ~~strikeout~~ typeface, and new text is shown in <u>underlined</u> typeface. M3.1.4 Accept a lower level of service and higher congestion at major regional intersections if necessary improvements would be ~~too~~ <u>prohibitively</u> costly or result in significant, <u>unacceptable</u> environmental impacts.	City Council is responsible for including measure in the final adopted General Plan.	The Planning & Community Development Department is responsible for including measure in final adopted version of the General Plan upon adoption by the City Council.	• At time of adoption by City Council to include measure in the General Plan. • Upon adoption, the Planning Dept. shall publish a final adopted version of the General Plan 2030 with the measure included.	None.	
Cultural Resources					
MITIGATION 4.9-1. Add Action HA1.2.2 that establishes a procedure for preparing archaeological investigations as follows: *HA1.2.2* <u>Require preparation of archaeological investigations on sites proposed for development within areas identified as "Highly Sensitive" or "Sensitive" on the "Areas of Archaeological Sensitivity" and "Historical Archaeology Sensitivity" maps, except for exempt uses within "Sensitive" areas as described below, prior to approval of development permits. The investigation shall include archival research, site surveys and necessary supplemental testing as may be required, conducted by a qualified archaeologist. The</u>	City Council is responsible for including measure in the final adopted General Plan.	The Planning & Community Development Department is responsible for including measure in final adopted version of the General Plan upon adoption by the City Council.	• At time of adoption by City Council to include measure in the General Plan. • Upon adoption, the Planning Dept. shall publish a final adopted version of the General Plan 2030 with the measure	None.	

Mitigation Measure	Implementation Actions	Monitoring / Reporting Responsibility	Timing Requirements	Reporting Requirements	Verification of Compliance
significance of identified resources shall be ascertained in accordance with CEQA definitions, and impacts and mitigation measures outlined if significant impacts are identified, including, but not limited to recovery options and onsite monitoring by an archaeologist during excavation activities. A written report describing the archeological findings of the research or survey shall be provided to the City. Allow minor projects with little excavation to be exempt from this requirement for preparation of an archaeological assessment within designated "Sensitive" areas, but not within the "High Sensitivity" areas. Minor projects generally involve spot excavation to a depth of 12 inches or less below existing grade, or uses that have virtually no potential of resulting in significant impacts to archaeological deposits. Exempt projects may include: building additions, outdoor decks, or excavation in soil that can be documented as previously disturbed.			included.		
MITIGATION 4.9-2. Add Action HA1.2.3 that establishes a procedure for preparing archaeological investigations as follows: *HA1.2.3* The City shall notify applicants within paleontologically sensitive areas of the potential for encountering such resources during construction and condition approvals that work will be halted and resources examined in the event of encountering paleontological resources during construction. If the find is significant, the City should require the treatment of the find in	City Council is responsible for including measure in the final adopted General Plan.	The Planning & Community Development Department is responsible for including measure in final adopted version of the General Plan upon adoption by the City Council.	• At time of adoption by City Council to include measure in the General Plan. • Upon adoption, the Planning Dept. shall publish a final adopted version	None.	

Mitigation Measure	Implementation Actions	Monitoring / Reporting Responsibility	Timing Requirements	Reporting Requirements	Verification of Compliance
accordance with the recommendations of the evaluating paleontologist. Treatment may include, but is not limited to, specimen recovery and curation or thorough documentation.			of the General Plan 2030 with the measure included.		
Air Quality					
MITIGATION 4.11-1. The City shall work with the MBUAPCD and AMBAG and request that AMBAG's next population and housing forecast for the city of Santa Cruz and MBUAPCD's next *Air Quality Management Plan* be updated to reflect potential growth that could be accommodated by the General Plan 2030.	Action is specified in the measure.	The Planning & Community Development Department staff is responsible for coordinating review of population projections with AMBAG staff.	At the time AMBAB initiates population and housing projection updates.	City Planning staff shall report outcome to Planning Director.	

APPENDIX B

UPDATED AIR QUALITY STANDARDS

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		Federal Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.075 ppm (147 µg/m^3)		
Respirable Particulate Matter (PM10)	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)	24 Hour	No Separate State Standard		35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	15.0 µg/m^3		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-Dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	—
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 µg/m3)	Gas Phase Chemiluminescence	53 ppb (100 µg/m^3) (see footnote 8)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.18 ppm (339 µg/m^3)		100 ppb (188 µg/m^3) (see footnote 8)	None	
Sulfur Dioxide (SO_2)	24 Hour	0.04 ppm (105 µg/m^3)	Ultraviolet Fluorescence	—	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)[9]
	3 Hour	—		—	0.5 ppm (1300 µg/m^3) (see footnote 9)	
	1 Hour	0.25 ppm (655 µg/m^3)		75 ppb (196 µg/m^3) (see footnote 9)	—	
Lead[10]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	—
	Calendar Quarter	—		1.5 µg/m^3	Same as Primary Standard	High Volume Sampler and Atomic Absorption
	Rolling 3-Month Average[11]	—		0.15 µg/m^3		
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		**No Federal Standards**		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[10]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

See footnotes on next page …

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM10, PM2.5, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the EPA.

8. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010). Note that the EPA standards are in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national standards to the California standards the units can be converted from ppb to ppm. In this case, the national standards of 53 ppb and 100 ppb are identical to 0.053 ppm and 0.100 ppm, respectively.

9. On June 2, 2010, the U.S. EPA established a new 1-hour SO_2 standard, effective August 23, 2010, which is based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. EPA also proposed a new automated Federal Reference Method (FRM) using ultraviolet technology, but will retain the older pararosaniline methods until the new FRM have adequately permeated State monitoring networks. The EPA also revoked both the existing 24-hour SO_2 standard of 0.14 ppm and the annual primary SO_2 standard of 0.030 ppm, effective August 23, 2010. The secondary SO_2 standard was not revised at that time; however, the secondary standard is undergoing a separate review by EPA. Note that the new standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the new primary national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

10. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

11. National lead standard, rolling 3-month average: final rule signed October 15, 2008.

APPENDIX C

REVISED DEIR APPENDIX E

GREENHOUSE GAS & AIR QUALITY EMISSIONS CALCULATIONS

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MEMORANDUM

To: Stephanie Strelow

From: Don Ballanti

Date: February 24, 2012

Subject: Santa Cruz GP GHG Emissions

This memorandum updates my previous memorandum dated April 6, 2011.

I applied the URBEMIS program and the Bay Greenhouse Model (BGM) to the incremental growth expected by 2030. The trip rates used were adjusted trip rates accounting for interactivity between land uses and smart growth factors (enhanced mixed uses, local serving retail, transit/bike/pedestrian accessibility).[1]

Greenhouse gas emissions were estimated using the BGM Model developed by the Bay Area Air Quality Management District.[2] The Bay Area Air Quality Management District's (BAAQMD's) Greenhouse Gas Model (BGM) is an Excel spreadsheet program that allows users to estimate operational greenhouse gas (GHG) emissions from land development projects. BGM reads URBEMIS-2007 project files to generate a portion of a project's GHG emission estimates.

URBEMIS-2007 is a land-use based program. Inputs are land use type, amount of each land use, a trip generation rate. The general plan growth increments by land use were input along with adjusted daily trip rates. URBEMIS-2007 has no Single Room Occupancy land use category, so the land use "low rise apartment" was substituted.

[1] Memorandum to Chris Schneiter from Ron Marquez, General Plan Traffic Analysis Methodology, August 29, 1011.
[2] Bay Area Air Quality Management District, *Draft Bay Area Air Quality Management District Greenhouse Gas Model User's Manua*l, April 29, 2010.

My emissions estimates for General Plan Growth should be directly comparable to the inventory of GHG for the City of Santa Cruz CAP. Because the inventory only includes vehicle emissions within the Santa Cruz city limits, a 2.2 mile average trip length for all trip types was used. This average trip distance was based on studies of peak hour VMT and trip generation prepared in 2003.

The project build-out year is 2030. URBEMIS-2007 and BGM were run for this year. A second URBEMIS-2007 and BGM run was made for the same land use/trip inputs but for the year 2008. Comparison of the two sets of results revealed the BGM includes the effects of vehicle fleet changes and California fuel rules, as transportation emissions from the same land use inputs drop 30% between 2008 and 2030. It also revealed that BGM makes no adjustments for future energy efficiency as area sources, electricity use and natural gas emissions were identical for the 2008 and 2030 model runs. BGM assumes that homes and businesses in 2030 would be no more energy efficient in 2030 than homes and businesses in 2008. Therefore, the URBEMIS-2007/BGM results needed adjustment to reflect the State regulations and AB 32 programs, as described below.

Future buildings will be more energy efficient than existing buildings, so the BGM results had to be modified to reflect that fact. The Bay Area Air Quality Management District recently performed an analysis of GHG emission reductions that are anticipated to occur from implementation of the State regulations and AB 32 programs. Measures such as the Renewable Portfolio Standard, improvements in energy efficiency through periodic updates to Title 24, Solar Roofs program and other measures were determined to account for an estimated 9.5% reduction in natural gas GHG emissions and a 38.2% percent reduction in GHG emissions from electricity by 2020.[3] These reductions have been applied to the BGM emission calculations.

The results are shown in Table 1. Future improvements in water efficiency and solid waste generation reductions would also reduce water/wastewater and solid waste emissions, but BGM cannot take this into account. Therefore, the emissions projections shown in Table 1 should be considered as conservative estimates.

The URBEMIS-2007 and BGM outputs are attached.

[3] Bay Area Air Quality Management District, BAAQMD CEQA Guidelines, Appendix D, June 2010.

Table 1: General Plan Growth GHG Emissions, in CO_2 Equivalent Metric Tons/Year

Source	2008	2030
Transportation	34,455.86	24,417.30
Area Sources	910.69	910.69
Electricity	14,722.23	9,098.34
Natural Gas	6,656.74	6,024.35
Water and Wastewater Treatment	640.58	600.02
Solid Waste	6,285.00	6,281.74
Total	63,671.10	47,332.44

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MEMORANDUM

To: Stephanie Strelow

From: Don Ballanti

Date: February 24, 2012

Subject: Santa Cruz GP Criteria Pollutant Emissions Trends

The following analysis provides an analysis of emission trends for the City of Santa Cruz with growth accommodated by the Santa Cruz General Plan 2030. I have prepared an inventory of vehicular and area source emissions for the year 2008 and 2030.

For vehicular emissions, the methodology involved developing estimates of Vehicle Miles Travelled (VMT) within city limits and multiplying by an annual average emission factor derived from the EMFAC-2007 program.

For area sources the baseline emissions were developed from ARB county-wide emission inventories. The additional area source emissions by 2030 were estimated using the URBEMS-2007 program.

2008 Inventory

Vehicle travel on local roads within city limits were provided by Caltrans' Highway Performance Modeling System (HPMS) Data Library[1], which showed that total daily VMT within the Santa Cruz City limits was 566,070 in 2008. The EMFAC 2007 program was used to generate emissions factors for the Santa Cruz County vehicle fleet in the years 2008 under the following assumptions:

[1] http://www.dot.ca.gov/hq/tsip/hpms/datalibrary.php

Average Vehicle Speed: 30 mph
Temperature: 60 degrees F
Relative Humidity: 50%

The California Air Resources Board provides estimates of emission inventories for past and future years on a county, air basin and state basis. City-wide area source emissions in 2008 were estimate by adding the following source categories in the 2008 Santa Cruz Emissions Inventory:

Consumer Products
Residential Fuel Combustion
Architectural Coatings

These emissions were apportioned to the City of Santa Cruz based on population. Since 22% of the county population resides in the City of Santa Cruz, 22% of the emission inventory was apportioned to the City.

2030 Inventory

The URBEMIS-2007 analysis of projected growth through 2030 estimated that anticipate growth would increase daily VMT within city limits by 200,371 to a total of 766,441. Year 2030 EMFAC 2007 emission factors were multiplied by the year 2030 VMT to generate forecasted 2030 emission estimates. The EMFAC 2007 program was used to generate emissions factors for the Santa Cruz County vehicle fleet in the years 2030 under the operation assumptions as for 2008.

Year 2030 area sources were calculated as year 2008 emissions plus forecast new area source emissions generated by URBEMIS-2007.

Results

The results are shown in Table 1. Ozone precursor emissions (ROG and NO_x)would be reduced, with ROG emissions almost unchanged and NO_x showing a substantial reduction. CO also shows a substantial reduction by 2030.

PM_{10} emissions are expected to increase slightly by 2030. Vehicular emissions for this pollutant are not expected to decrease in the future as fast other criteria pollutants. This is because it has two components: exhaust and tire wear. While exhaust emissions will decrease over time, tire wear does not. Even so, the anticipated increase is less about 38 pounds per day, an amount that would not measurably change air quality and would represent a less-than-significant air quality impact.

Table 1: City-Wide Existing and Future Criteria Pollutant Emissions, in Pounds Per Day

Year	Daily Average Emissions in Pounds/Day			
	ROG	**CO**	**NO_x**	**PM_{10}**
2008				
Vehicles	328.6	6,854.1	1,194.6	40.0
Area Sources	1540.0	6810.0	330.0	990.0
Total	1868.6	13,664.1	1527.6	1030.0
2030				
Vehicles	67.6	1,194.6	319.7	44.0
Area Source	1804.7	7,074.1	380.1	1024.4
Total	1,872.3	8,268.7	699.8	1068.4
Change	3.7	-5,395.4	-827.8	+38.4

APPENDIX D

REVISED DEIR APPENDIX F-1
BIOLOGICAL RESOURCES STUDY

AVAILABLE ON CD & CITY WEBSITE

http://www.cityofsantacruz.org

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BIOLOGICAL RESOURCES FOR THE CITY OF SANTA CRUZ GENERAL PLAN UPDATE

Prepared for

The City of Santa Cruz
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Prepared by

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January 2009
(Revised February 2012)

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INTRODUCTION

EcoSystems West Consulting Group (EcoSystems West) was contracted by the City of Santa Cruz (City) Department of Planning and Community Development to update existing biological resource background data for the development of the City of Santa Cruz General Plan. The focus of this effort was to update information on special-status plant and wildlife species (as defined by CEQA) and sensitive habitats within the City's planning jurisdiction, excluding the University of Santa Cruz and City lands outside of the City proper. To this end, EcoSystems West reviewed all available documents on these resources, consulted with local experts, and groundtruthed existing data where possible. In addition, as requested by the City of Santa Cruz, EcoSystems West conducted surveys of monarch butterfly habitat, seabird roosts and rookeries, and 172 vacant parcels that were at least 6,000 square feet (0.14 acres), to update information on these resources. This report is a summary of findings, including tables and narratives of special-status species, sensitive habitats, and a summary of the results of focused surveys. An accompanying geographic information system (GIS) database (geodatabase) provides spatial data created or updated as part of our work.

METHODS

Document Review and Consultation with Local Experts

EcoSystems West met with City staff, reviewed all available data, technical studies, documents, EIRs, and the draft Citywide Habitat Conservation Plan (HCP) (unpublished) (Entrix 2004a,b; H.T. Harvey and Associates 2004). We reviewed the vegetation communities, sensitive species and habitat characterization of the City's existing GIS database, as well as more detailed information presented in the City's open space management plans and master plans.

Up-to-date status information for species listed as 'Threatened' or 'Endangered' under the federal Endangered Species Act (ESA), and federal 'Proposed' and 'Candidate' species was obtained from U.S. Fish and Wildlife Service (USFWS). Up-to-date status information for State of California listed species was obtained from the California Department of Fish and Game (CDFG). For special-status plants we also reviewed the current California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* electronic database (CNPS 2012). Distribution and habitat information in standard regional floras (Munz and Keck 1973; Thomas 1960; and Hickman 1993) was reviewed. Status information was also obtained from Tibor (2001) for CNPS-listed species, including species on CNPS Lists 1 and 2 that are legally protected under the California Environmental Quality Act (CEQA).

EcoSystems West reviewed current California Natural Diversity Database (CNDDB) records for occurrences of special-status species recorded in that database. In addition, we consulted with the following experts and organizations on local biological resources to identify additional occurrences of sensitive species: the local chapter of the California Native Plant Society, Dr. Richard Arnold and his Buggy Database regarding invertebrates, John Dayton and Tim Hyland on monarch butterflies, David Suddjian and Steve Gerow of the Santa Cruz Bird Club, as well as Brian Walton of the Santa Cruz Predatory Bird Research Group, in an effort to acquire updates on nesting birds, as well as preferred foraging and nesting locations of special-status birds.

Based on this review, we identified all known sensitive habitats, special-status plants and animals documented within the Santa Cruz City. We prepared a special-status resource summary table and field maps showing distribution of special-status species and habitats identified based on the synthesis of existing information.

Field Surveys

Habitat Types

Field reconnaissance surveys were used to verify and update the field maps prepared from existing data. These maps, including high resolution (6 inch pixel), recent (2005) aerial imagery of the City, and the existing habitat layer, were examined in the field and in the GIS to identify differences between existing data and current conditions and to more precisely delimit the boundaries of habitat types. The habitat type classification used was the same as that used in the existing habitat mapping, which featured main habitat types and subtypes. Changes to the existing habitat layer were made through heads up digitizing using ArcGIS 9.1.

General data was recorded on physiognomy of the vegetation and on dominant and characteristic species for the habitat types recognized. The generalized vegetation classification schemes for

California of Holland (1986) Sawyer and Keeler-Wolf (1995), and CDFG (2003a) were consulted in classifying the vegetation types within the City Limits. The final classification and characterization of the vegetation of the study area was based on field observations and was developed in consultation with City Planners and the Parks and Recreation biologist.

Sensitive Habitats

During efforts to update the habitat classification for the City, we also identified and refined the boundaries of occurrences of sensitive habitat types within the City. Sensitive habitats include coastal prairie portions of grassland habitat, riparian aquatic habitats, habitats for legally protected species and CDFG 'Species of Special Concern', areas of high biological diversity, areas providing important wildlife habitat and corridor routes, and CNDDB "high priority" habitats. Most of the modifications made to the existing habitat layer for the City included delimiting relatively small (<10 acres) occurrences of patchy sensitive habitats that were not delimited in the original layer, such as patches of freshwater marsh mapped originally as aquatic habitat or patches of riparian habitat within developed areas.

Seabird Roosts and Rookeries Survey

Seabird rookeries are considered sensitive, based on the high biological diversity and importance of the habitat. EcoSystems West ornithologist, Bill Henry, conducted a coastal bird survey as part of the effort to update information on sensitive habitats, to refine the accuracy of the previous mapping for coastal breeding bird habitat, and to supplement existing data. Prior to conducting field surveys, bird experts were consulted for any local nest survey data. Focused nest surveys were conducted in order to observe birds in the nest and fledglings. Nest colony sites were documented on maps and heads up-digitized into the GIS database, which identifies the species observed and the season of use of the site for roosting and/or breeding birds. Due to the small size nests and roost site occurrences, error associated with mapping could be 10 m.

Dispersal Corridors

Disperal corridors may be considered sensitive habitats. In the urban/rural interface dispersal corridors provide important habitat and are often areas of high biological diversity relative to the surrounding developed environment. Movement of wildlife through dispersal corridors is protected under the California Environmental Quality Act (CEQA). Using the high resolution aerial imagery of the City and reconnaissance surveys, potential dispersal corridors within the City of Santa Cruz were identified and mapped in the project geodatabase.

Monarch Surveys

During the fall and early winter, EcoSystems West biologists conducted reconnaissance surveys of historical, current, and potential over-wintering monarch butterfly roosts within the City limits. Potential roosts included stands of eucalyptus identified during habitat mapping. All sites found to be hosting roosting monarchs (temporary or over-wintering) were delineated. In an effort to determine whether the roost sites provide "temporary habitat" (i.e., roosting for periods of a few days to a month) or "over-wintering habitat" (i.e., provide roosting for periods of one to six months), all occupied roost sites were revisited into December.

Surveys assessed the size, extent, and specific location of the population (if present) within each of the roost areas. In all roost areas, biologists evaluated the quality of the habitat in terms of essential resource features, including density of the foliage, exposure to sunlight, protection from wind and other disturbances by insulating trees and vegetation, and key nectar sources. Ecosystems West biologists documented their survey observations with the *Over-wintering Monarch Butterfly Project Site Specific Data Sheet* (Xerces Society 2004). Abiotic data, such as cloud/fog cover (%), wind speed and direction, and air temperature (˚F/˚C) were collected for each survey. The biotic data collected by biologists included the number of butterflies and butterfly clusters, species' of tree being utilized, the tree height at the location of the cluster, the clusters' aspect to the sun, and general behavior (i.e., sunning). Nearby sources of water and food (nectar) were also documented.

Monarch roost sites were heads up digitized from field maps into a separate feature class within the project geodatabase, which includes an attribute table describing the habitat features and occurrence information for each site.

Vacant Parcel Survey

EcoSystems West biologists conducted reconnaissance surveys to determine the potential for vacant parcels within the City to provide habitat for special-status species or sensitive habitats. During the survey, we used existing public access in attempt to examine 172 parcels identified in the existing assessor parcel database as vacant that were at least 6,000 square feet (0.14 acres). Existing conditions, including habitat types, the potential for special-status resources, and current land-use activities were noted. Where appropriate, biotic assessments are recommended in the event of future development of those parcels. Where vacant parcels were not accessible, we attempted to identify potential biological resources from adjacent properties and through analysis of high resolution aerial imagery, and noted where a pre-site assessment is recommended in the event of future development. Available information about observed or potential biotic resources within each parcel and recommendations for further evaluation were included in a database file joined to the vacant parcel layer within the project geodatabase.

REGULATORY SETTING

Local, state, and federal regulations have been enacted to provide for the protection and management of sensitive biological and wetland resources. At the federal level, the United States Fish and Wildlife Service (USFWS) are responsible for the protection of terrestrial and freshwater organisms through the federal Endangered Species Act and the Migratory Bird Treaty Act, while the National Marine Fisheries Service (NOAA Fisheries) is responsible for protection of anadromous fish (fish that live most of their adult life in saltwater but spawn in freshwater) and marine wildlife. Marine mammals are protected under the Marine Mammal Protection Act (MMPA). The U.S. Army Corps of Engineers (Corps) has primary responsibility for protecting wetlands and jurisdictional "other waters of the U.S." under Section 404 of the Clean Water Act. At the state level, the California Department of Fish and Game (CDFG) administers the California Endangered Species Act (CESA), and protects streams and water bodies through the Streambed Alteration Agreement under Section 1600 of the California Fish and Game Code (CFGC 2005). Certification by the State Water Resources Control Board (SWRCB) is also required when a proposed activity may result in discharge into navigable waters, pursuant to Section 401 of the Clean Water Act and the U.S. Environmental Protection Agency (EPA) Section 404(b) (1) Guidelines.

Federal Special-Status Species

Federal Endangered Species Act. The federal Endangered Species Act (ESA) of 1973 (Title 16 United States Code, Section 1531 *et seq*., as amended) prohibits federal agencies from authorizing, permitting or funding any action that would result in biological jeopardy to a species listed as Threatened or Endangered under the ESA. Listed species are taxa for which proposed and final rules have been published in the Federal Register (USFWS 2007a, b, c, d, e).

The U.S. Fish and Wildlife Service's responsibilities include administering the ESA including sections 7, 9, and 10. Section 9 of the ESA, prohibits the take of animal species that are federally listed as endangered or threatened. Section 3(18) of the ESA defines "take" to mean to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Service regulations (50 CFR 17.3) define "harm" to include significant habitat modification or degradation which actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. "Harassment" is defined by the Service as an intentional or negligent action that creates the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering.

Exemptions to the prohibitions against take may be obtained through coordination with the Service in two ways: 1) through interagency consultation for projects with federal involvement (i.e., funded, authorized, or carried out by a Federal agency) pursuant to section 7; or 2) through the issuance of an incidental take permit under section 10(a)(1)(B) of the ESA. The ESA or its implementing regulations do not prohibit take of listed plant species. However, federal agencies cannot undertake activities that would jeopardize the continued existence of a threatened or endangered plant or animal species. In addition, the removal of threatened or endangered plants

may be a violation of the Act under certain circumstances, if the action is not in compliance with state law.

If "Critical Habitat" is determined and published in the Federal Register as a formal rule, that designated critical habitat (plant or animal) receives protection under section 7 of the ESA, through the prohibition of destruction or adverse modification of critical habitat by actions carried out, funded, or authorized by a Federal Agency (i.e., FHWA funding of the multi-use trail). Consultation under section 7 does not apply to activities on private or other non-federal lands that do not involve a Federal nexus. Therefore, the critical habitat designation would not afford any additional regulatory protections under the ESA with regard to those activities.

Migratory Bird Treaty Act. All migratory birds and their nests are federally protected under the Migratory Bird Treaty Act of 1918 (MBTA) (Title 16 United States Code, Section 703-712 as amended; 50 Code of Federal Regulations Section 21; and 50 Code of Federal Regulations Section 13) and by CDFG codes that support the act. The MBTA makes it unlawful to "take" any migratory bird or raptor listed in the 50 Code of Federal Regulations Section 10, including their nests, eggs or products (USFWS 1918).

Marine Mammal Protection Act. All marine mammals are protected under the Marine Mammal Protection Act (MMPA) (Title 16 United States Code, §§ 1361-1421h, October 21, 1972, as amended 1973, 1976-1978, 1980-1982, 1984, 1986, 1988, 1990, 1992-1994 and 1996)(NOAA NMFS 2004). The MMPA prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S.

State of California Special-Status Species

California Endangered Species Act. The 1984 CESA [CFGC 2005 (Section 2050-2098)] prohibits the "take" of State-listed threatened and endangered species. The Habitat Conservation Planning Branch of the CDFG administers the State's rare species program. The CDFG maintains lists of designated Endangered, Threatened and Rare plant and animal species (CDFG 2007a, b), as designated by the California Fish and Game Commission or under the California Native Plant Protection Act (NPPA). In addition to recognizing three levels of endangerment, the CDFG can afford interim protection to candidate species while the Fish and Game Commission is reviewing them. Habitat degradation or modification is not expressly included in the definition of "take" under the California Fish and Game Code; however, the CDFG has interpreted "take" to include the "killing of a member of a species which is the proximate result of habitat modification…" (CFGC 2005).

California Native Plant Protection. Act Project permitting and approval requires compliance with the 1977 NPPA [CFGC 2005 (Section 2050-2098)]. Along with the CESA, the act authorizes the California Fish and Game Commission to designate Endangered, Threatened, and Rare plant species and to regulate the taking of these species. In addition to the Endangered and Threatened categories established by CESA, the NPPA establishes a "Rare" category for plant species only.

CDFG Species of Special Concern, Watch List Bird Species, and Fully Protected Species. In addition to lists of designated Endangered, Threatened, and Rare plant and animal species, the CDFG maintains a list of animal "Species of Special Concern," (CDFG 2011) most of which are species whose breeding populations in California may face extirpation, or are rare or restricted within their ranges.[1] Although these species have no legal status under the CESA, the CDFG recommends considering these species during analysis of proposed project impacts to protect declining populations, and to avoid the need to list them as threatened or endangered in the future. These species may "be considered rare or endangered [under CEQA] if the species can be shown to meet the criteria". Additionally, the California Fish and Game Code contains lists of vertebrate species designated as "Fully Protected" [CFGC 2005 (Section 3511)] [birds], 4700[mammals], 5050 [reptiles and amphibians], and 5515 [fish]. Such species may not be taken or possessed without a permit and are also considered under CEQA.

CEQA Guidelines Section 15380. Under provisions of Section 15380 of the *CEQA Guidelines*, plants and animals with the following protected status must be addressed for proposed development projects: federally-listed Endangered or Threatened species under the ESA, species listed by the State as Endangered, Threatened, or Rare under CESA or NPPA, and other non-listed species that meet the CEQA Guidelines definition of endangered or rare.

Under Section 15380(d) of the *CEQA Guidelines*, a species not included on any list recognized by the State "shall nevertheless be considered rare or endangered if the species can be shown to meet the criteria" for listing. The CDFG, USFWS and U.S. Forest Service all maintain independent lists of species with designated conservation status that meet the *CEQA Guidelines* criterion for consideration. Under provisions of Section 15380(d) of the *CEQA Guidelines*, the project lead agency and CDFG, in making a determination of significance, must treat non-listed plant and animal species as equivalent to listed species if such species satisfy the minimum biological criteria for listing.

The CEQA Guidelines Environmental Checklist identifies potential impacts to a sensitive natural community as one of six biological topics to be reviewed. Where determined to be significant under CEQA, the potential impact would require mitigation through avoidance, minimization of disturbance or loss, or some type of compensatory mitigation when unavoidable.

CNDDB maintains a working list of "high priority" habitats for inventory (i.e., those habitats that are rare or endangered within the borders of California) (Holland 1986; CDFG 2003a). CNDDB "high priority" habitats are generally considered sensitive habitats under CEQA. CNDDB also ranks special status wildlife based on their global and state status, and on the status of any subspecies its range. Species ranked by the CNDDB may be protected under CEQA if they are shown to meet the criteria for listing.

California Native Plant Society Inventory of Rare and Endangered Vascular Plants of California. In general, the CDFG qualifies plant species on List 1B (Plants Rare, Threatened, or Endangered in California and Elsewhere) or List 2 (Plants Rare, Threatened, or Endangered in

[1] "Extirpate" = to destroy completely; to pull up by the root; exterminate (Merriam-Webster).

California, But More Common Elsewhere) of the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (Tibor 2001; CNPS 2012) for legal protection under CEQA. Species on CNPS List 3 (Plants About Which We Need More Information--A Review List) or List 4 (Plants of Limited Distribution--A Watch List) may, but generally do not, qualify for protection under CEQA.

Western Bat Working Group Listings. The CDFG maintains a list of bat species designated as "High Priority" by the Western Bat Working Group (WBWG). Species designated as "High Priority" are defined as "imperiled or are at high risk of imperilment based on available information on distribution, status, ecology and known threats (CDFG, 2006b). These species qualify for legal protection under Section 15380(d) of the *CEQA Guidelines*.

Sensitive Natural Communities

Sensitive habitats include: riparian corridors, wetlands, habitats for legally protected species and CDFG Species of Special Concern, areas of high biological diversity, areas providing important wildlife habitat, and unusual or regionally restricted habitat types. Habitat types considered sensitive include those listed on the CNDDB working list of "high priority" habitats for inventory (i.e., those habitats that are rare or endangered within the borders of California) (Holland 1986 and CDFG 2003a; 2010).

Wetlands and Waters of the U.S

Wetlands are areas that are periodically or permanently inundated by surface or ground water, and support vegetation adapted to life in saturated soil. Wetlands are recognized as important features on a regional and national level because of their high inherent value to fish and wildlife, use as storage areas for storm and floodwaters, and water recharge, filtration, and purification functions. The Corps and the USFWS have developed technical standards for delineating wetlands through consideration of three criteria: hydrology, soils, and vegetation.

Under Section 404 of the Clean Water Act, the Corps is responsible for regulating the discharge of fill material into waters of the United States. The term "waters" includes wetlands and non-wetland bodies of water that meet specific criteria as defined in the Code of Federal Regulations. In general, a permit must be obtained before fill can be placed in wetlands or other waters of the U.S. The type of permit depends on the amount of acreage and the purpose of the proposed fill, subject to discretion of the Corps.

Jurisdictional authority of the CDFG over wetland areas is established under Section 1600 of the Fish and Game Code (2005), which pertains to activities that would disrupt the natural flow or alter the channel, bed, or bank of any lake, river, or stream. The Fish and Game Code stipulates that it is unlawful to substantially divert or obstruct the natural flow or substantially change the bed, channel or bank of any river, stream or lake without notifying the CDFG, incorporating necessary mitigation, and obtaining a Streambed Alteration Agreement. The California Wetlands Conservation Policy of the CDFG states that the Fish and Game Commission will strongly discourage development in or conversion of wetlands, unless, at a minimum, project mitigation assures that there will be no net loss of either wetland habitat values or acreage. The CDFG is

also responsible for commenting on projects requiring Corps permits under the Fish and Wildlife Coordination Act of 1958.

Wetlands which fall within the coastal zone are subject to the jurisdiction of the California Coastal Commission (CCC). Certification by the State Water Resources Control Board (SWRCB) is also required when a proposed activity may result in discharge into a wetland.

City of Santa Cruz Riparian Setback Guidelines

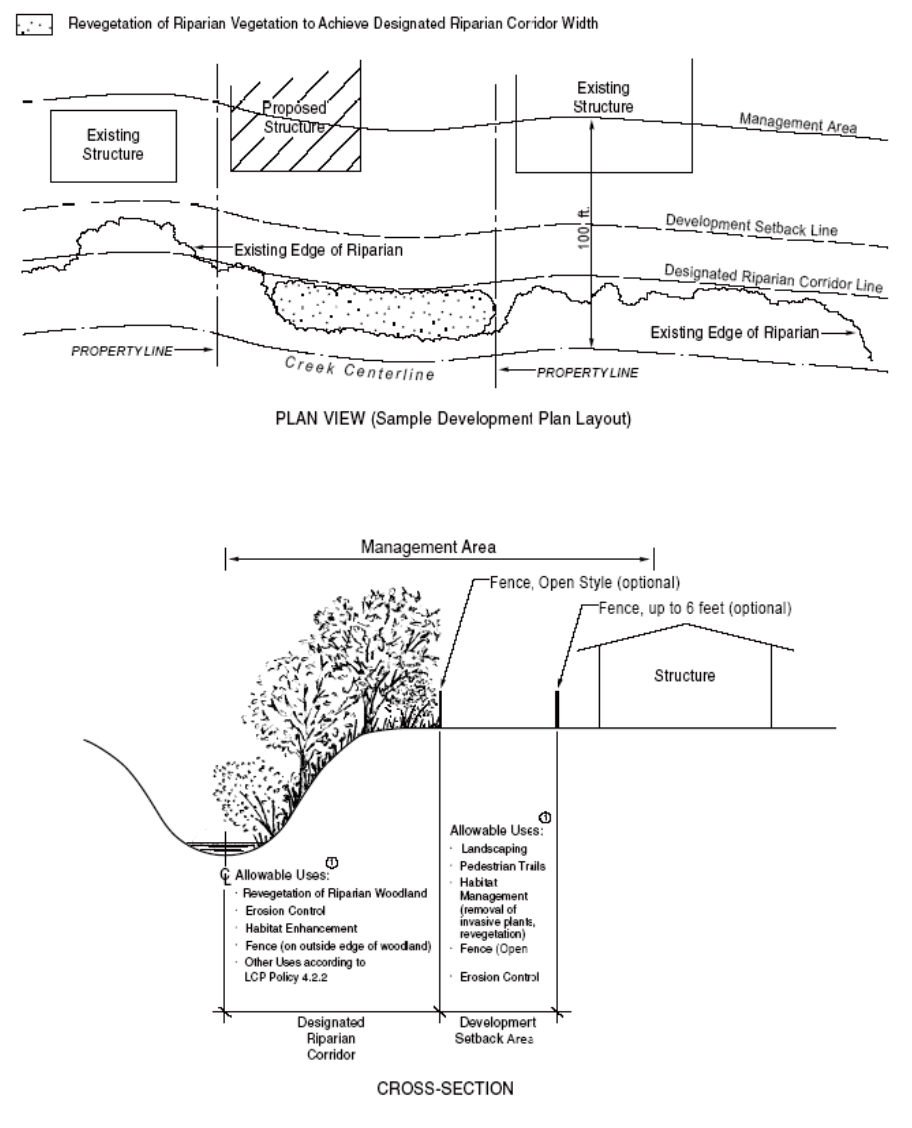
The *City-wide Creeks and Wetlands Management Plan* (Santa Cruz Department of Planning and Community Development 2006) was adopted by the City Council to provide a comprehensive approach to managing all creeks and wetlands within the City. The long-term goals of the *Management Plan* are to reduce and/or eliminate pollutants discharged to aquatic bodies; improve water quality; improve and restore natural habitat; increase biodiversity; lower water temperatures; and increase public awareness of the value of watershed quality.

The *Management Plan* recommends specific setback requirements based on biological, hydrological, and land use characteristics for various watercourse types within the City. The recommended setbacks within a designated management area include a riparian corridor, a development setback area, and an additional area that extends from the outward edge of the development area. The riparian corridor[2] is adjacent to the watercourse and is the width of a riparian and/or immediate watercourse influence area and is measured from the centerline of the watercourse. The development setback area[3] is the area outward from the edge of the designated riparian corridor where development is restricted, providing a buffer between the riparian corridor and development. The management area, riparian corridor, and development setback area distances vary depending on the watercourse area and its categorization[4]. All distances are measured from the centerline of the watercourse outward.

[2] The riparian corridor is intended to provide an adequate riparian width to maintain or enhance habitat and water quality values. Allowable uses within the riparian corridor are limited.

[3] The development setback width is intended to provide an appropriate water quality and habitat buffer between the riparian corridor and development within the remaining management area. New development generally would be limited in this area to landscaping and limited pervious surfaces.

[4] The 25 feet outward from the edge of the development setback is intended to provide an adequate area for permit review and to be consistent with the *Management Plan* goals and City of Santa General Plan/LCP policies to maintain or enhance water quality or riparian habitat values.



SOURCE: Biotic Resource Group (2001).

Figure 1. City of Santa Cruz riparian setback requirements (Santa Cruz Department of Planning and Community Development 2006).

Tree Protection and Preservation Ordinance

The City of Santa Cruz also provides for regulation of Heritage Trees and Shrubs through a Heritage Tree Ordinance (Santa Cruz Department of Planning and Community Development 2003b). The ordinance is intended to protect trees on private property by controlling tree removal while allowing for reasonable enjoyment of private property rights and property development. The ordinance defines parameters for tree protection, tree removal permits, and permit exceptions. A permit is typically required when the tree is to be cut down, destroyed, trimmed by topping, removed, or when trenching, grading, or filling is proposed within the dripline. The Heritage Tree Ordinance defines "heritage trees" as follows:

> Any tree, grove of trees, shrub or group of shrubs, growing on public or private property within the city limits of the city of Santa Cruz which meet(s) the following criteria shall have the "heritage" designation:
>
> (a) Any tree that has a trunk with a circumference of forty-four inches (approximately fourteen inches in diameter or more), measured at fifty-four inches above existing grade
>
> (1) (b) Any tree, grove of trees, shrub or group of shrubs which have historical significance, including but not limited to those which were/are:Planted as a commemorative; (2) Planted during a particularly significant historical era; or (3) Marking the spot of an historical event.
>
> (c) Any tree, grove of trees, shrub or group of shrubs which have horticultural significance, including but not limited to those which are:
>
> (1) Unusually beautiful or distinctive; (2) Old (determined by comparing the age of the tree or shrub in question with other trees or shrubs of its species within the city); (3) Distinctive specimen in size or structure for its species (determined by comparing the tree or shrub to average trees and shrubs of its species within the city); (4) A rare or unusual species for the Santa Cruz area (to be determined by the number of similar trees of the same species within the city); (5) Providing a valuable habitat; or (6) Identified by the city council as having significant arboricultural value to the citizens of the city.

RESULTS

Narrative descriptions of habitat types, sensitive habitats, and special-status plants and wildlife are provided in the sections below. Results from EcoSystems West 2006 surveys of monarch habitat, seabird roosts and rookeries, and vacant parcels are also summarized. Occurrences of breeding birds (protected under MBTA and CEQA) within the City of Santa Cruz are listed in Appendix A, while special-status wildlife not likely to require protection under CEQA is listed in Appendix B.

The accompanying GIS database (geodatabase) contains up-to-date spatial information for many of the biological resources within the City of Santa Cruz listed above. The geodatabase contains nine feature classes, each of which contains polygons representing the locations of resources, and an associated attribute table that provides information about each occurrence (Table 1). The exception is the CNDDB-point layer which contains points (rather than polygons) to identify locations of biological resources. Each feature class also contains metadata—a description of the data, including what it represents and how it was created.

Table 1. City of Santa Cruz biological resource data contained in nine feature classes within the project geodatabase.

Feature Class	Description	Origin
habitat types	Habitat types including vegetation communities.	Data compiled for Habitat Conservation Plan (HCP) (Entrix 2004a) and modified based on assessment for General Plan Update.
sensitive habitats	Sensitive habitats including: riparian, aquatic, freshwater wetland, saltmarsh, and coastal prairie.	Excerpted from vegetation layer, as modified for General Plan Update.
seabird roosts and rookeries	Seabird roosting and nesting sites along the coast.	Based on assessment for General Plan Update.
dispersal corridors	Potential dispersal corridors connecting otherwise disjunct habitat.	Based on assessment for General Plan Update.
monarch butterflies	Condition and use status of habitat (primarily eucalyptus groves) suitable for monarch butterflies.	Based on assessment for General Plan Update.
rare species occurrences	Habitat for three endangered species not fully represented within the California Natural Diversity Database (CNDDB).	Compilation of HCP data and expert observations.
CNDDB (points)	Rare species point occurrences reported as of August 2007.	Excerpted from CDFG database.
CNDDB (polygons)	Rare species and community occurrences reported as of August 2007.	Excerpted from CDFG database.
vacant parcels	Biological resource information for 172 vacant parcels.	Based on assessment for General Plan Update.

Habitat Types

The mapping of habitat types is modified from a previous citywide vegetation mapping conducted by H. T. Harvey & Associates. EcoSystems West botanist Roy Buck ground truthed the mapping in areas where discrepancies were discernible on maps and aerial imagery developed during document review. In developing the classification of vegetation presented here, we also consulted the generalized classification schemes for California vegetation of Holland (1986); Sawyer and Keeler-Wolf (1995); and California Department of Fish and Game (2003a).

Aquatic. Aquatic habitats are areas of permanent, fresh or brackish open water. The water may be either flowing (e.g., the San Lorenzo River) or ponded (e.g., Neary Lagoon, Antonelli Pond). Aquatic habitats generally lack vegetation other than algae except along the shorelines, where moisture-loving plant species may grow partially in the water. Large emergent monocots characteristic of freshwater wetland habitats (below) occasionally grow in shallow water in aquatic habitats, and aquatic habitats sometimes intergrade with permanently inundated freshwater wetlands.

Ponded or partially ponded aquatic habitats within the city include Antonelli Pond and several other ponds and lagoons in the southwestern portion of the city, including Natural Bridges State Park; Neary Lagoon; and the Santa Cruz Small Craft Harbor (Woods Lagoon). The Small Craft Harbor aquatic habitat has been greatly modified by construction and maintenance of the harbor. The San Lorenzo River is the major aquatic habitat with flowing water within the city. Some segments of Branciforte Creek are also broad enough to be mapped separately as aquatic habitat; some of these are partially ponded. Just outside of the City limits, on the University of California Santa Cruz (UCSC) coastal lands, Younger Lagoon is also an aquatic habitat.

Salt marsh. Salt marshes occur in low-lying, relatively sheltered areas adjacent to the immediate coast that are subject to tidal inundation. Except around their uppermost margins, salt marshes are periodically inundated by salt water. The frequency and duration of inundation often vary considerably within a given salt marsh due to slight differences in elevation. This often results in pronounced zonation of the species composition within the marsh, with differing amounts of inundation favoring different species. Salt marshes are dominated by salt-tolerant native herbs and subshrubs, many of them at least somewhat succulent. These include pickleweed (*Salicornia virginica*), saltgrass (*Distichlis spicata*), alkali heath (*Frankenia salina*), marsh jaumea (*Jaumea carnosa*), marsh gum plant (*Grindelia stricta* var. *angustifolia*), spearscale (*Atriplex triangularis*), and salt marsh dodder (*Cuscuta salina* var. *major*).

The only mapped area of salt marsh in the city is within Natural Bridges State Beach, on the west side of Moore Creek just inland of the beach. Topographic conditions suitable for salt marshes do not occur elsewhere in the city except in areas that are now intensively developed.

Freshwater wetland. Freshwater wetland habitats are developed on permanently or seasonally inundated sites. If the inundation is seasonal, the water table is high enough to provide abundant moisture to the vegetation year round. Even where permanently inundated, the water in freshwater wetland habitats is shallow enough to allow emergent vegetation to be rooted on the bottom. The species composition of freshwater wetlands is variable, in part due to variation in the length and depth of inundation. Where inundation is permanent or prolonged, the

characteristic dominants of freshwater wetlands are tall perennial emergent monocots, particularly cattails (*Typha* spp.) and tules (*Scirpus* spp., e.g. *Scirpus californicus*). Where the period of seasonal inundation is relatively short, or where soils are merely saturated for much of the season, dominants may include such species as panicled bulrush (*Scirpus microcarpus*), willow-herb (*Epilobium ciliatum* ssp. *ciliatum*), water smartweed (*Polygonum punctatum*), Pacific silverweed (*Potentilla anserina* ssp. *pacifica*), bog rush (*Juncus effusus* vars. *brunneus* and *pacificus*), Pacific oenanthe (*Oenanthe sarmentosa*), prairie bulrush (*Scirpus maritimus*), and pale spike-rush (*Eleocharis macrostachya*). Some of these species may also be associated with cattails or tules in areas where those species are dominant, but where inundation is not permanent.

Sizable freshwater wetland habitats occur in the extreme southwestern portion of the city (e.g. at Natural Bridges State Park, around the upper margins of Antonelli Pond, and beyond the City limits, on the UCSC coastal lands) and at Neary Lagoon. Smaller, more localized freshwater wetlands occur at scattered locations elsewhere in the city; for example, in the small city park adjacent to Jessie Street, and in lower Hagemann Gulch near the upper end of the Small Craft Harbor.

Riparian forest and scrub. Riparian forest and scrub habitats are developed on sites where the root systems of moisture-loving woody species (trees and shrubs) can obtain abundant subsurface moisture year-round. The largest and best developed riparian forest habitats are generally on floodplain alluvial terraces bordering permanent or intermittent streams. Riparian forest may also occur on lower slopes adjacent to stream courses or canyon bottoms and in isolated upland areas in locations where sufficient subsurface moisture is available. Stands located away from stream courses and canyons are typically small. Riparian scrub is basically an early successional habitat type that develops in areas with abundant subsurface moisture following disturbance. Riparian scrub typically occurs in and adjacent to the channels of rivers and larger streams in areas frequently disturbed by flooding.

Riparian forest habitats are dominated by moisture-loving, mostly deciduous trees and large, arborescent shrubs. The canopy is typically dense, and the density of woody stems is often high enough that stands are virtually impenetrable. In the Santa Cruz area, as in much of lowland California, the most abundant and widespread dominant species in riparian forest stands is arroyo willow (*Salix lasiolepis*), typically a large, arborescent shrub rather than a tree. Arroyo willow is often the only tree-sized species in smaller, more isolated stands of riparian forest. Associated tree species, most commonly occurring in larger, better developed riparian forests on and adjacent to floodplains, may include shining willow (*Salix lucida* ssp. *lasiandra*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), box elder (*Acer negundo* var. *californicum*), red alder (*Alnus rubra*), red willow (*Salix laevigata*), and white alder (*Alnus rhombifolia*). All of these species may be locally dominant or codominant. Coast live oak (*Quercus agrifolia*) and California bay (*Umbellularia californica*), species that are widespread in upland habitats, may also be locally important in riparian forests.

Due to the dense shade and high density of woody stems, understory vegetation in riparian forests is often poorly developed and sometimes nearly absent. Large shrubs that are sometimes present include American dogwood (*Cornus sericea*), coffeeberry (*Rhamnus californica* ssp. *californica*), and straggly gooseberry (*Ribes divaricatum* var. *pubiflorum*). The native woody

vine Pacific blackberry (*Rubus ursinus*) and poison-oak (*Toxicodendron diversilobum*), a native species that may be a small to medium-sized shrub or a vine, are sometimes locally abundant. The invasive non-native vines Himalayan blackberry (*Rubus discolor*) and cape-ivy (*Senecio mikanioides* [= *Delairea odorata*]) are also sometimes locally abundant. The tall native herb American stinging nettle (*Urtica dioica* ssp. *gracilis*) is probably the most widespread herb species in the riparian forest understory in the Santa Cruz area. Other herbs present may include such species as the native species of bracken fern (*Pteridium aquilinum* var. *pubescens*), goose grass or cleavers (*Galium aparine*, possibly non-native), and the non-native herb poison-hemlock (*Conium maculatum*). These generally occur in more open areas in the riparian forest understory, and are of only local importance.

Riparian scrub is generally relatively open, with individuals of large woody species relatively well spaced. Woody species may include relatively small individuals of the tree species characteristic of riparian forests, as well as moisture-loving woody or semi-woody species such as Douglas' baccharis or false willow (*Baccharis douglasii*). A diverse assortment of herbaceous species may occur in between the woody species, although overall herb density is often low.

Extensive riparian forests occur at and near the bottoms of larger canyons and along larger streams within the city, including Moore Creek and its tributaries; Meder Canyon and its tributaries; Carbonera Creek; Branciforte Creek; and Arana Gulch. Extensive riparian forests also occur adjacent to Neary Lagoon. Extensive stands of riparian forest probably once occurred along the San Lorenzo River within the city; however, these were eliminated or greatly altered due to urban development and the channelization of the river, and riparian forest stands now occupy relatively narrow zones inside the levees along the river. The San Lorenzo River channel also supports the only substantial areas of riparian scrub within the city. Smaller stands of riparian forest occur along smaller streams and drainages within the city, as well as at isolated upland locations.

Coastal scrub. Coastal scrub is generally developed on relatively exposed, coast-facing slopes, sometimes extending onto nearly level uplands or lowlands. Coastal scrub habitats range from relatively dry to relatively moist. They are dominated by medium-sized to large shrubs, mostly evergreen sclerophyllous (having relatively small, thick, leathery leaves) species.

Species composition in coastal scrub stands varies considerably, largely in response to soil and moisture conditions and disturbance history. Shrub cover ranges from dense and more or less impenetrable to open. The most abundant and widespread shrub species in coastal scrub habitats in the Santa Cruz area is coyote brush (*Baccharis pilularis*). Associated shrubs may include California sagebrush (*Artemisia californica*), sticky monkeyflower (*Mimulus aurantiacus*), poison-oak (a deciduous species), coffeeberry, and, near the immediate coast, lizard tail (*Eriophyllum staechadifolium*). Associated species often include the subshrub deerweed (*Lotus scoparius*), the woody vine Pacific blackberry, and the herbaceous vines western morning-glory (*Calystegia purpurata* ssp. *purpurata*) and wild cucumber (*Marah fabaceus*).

A diverse assortment of herbaceous species may occur in well developed coastal scrub habitats, growing up through the shrubs or in openings between shrubs. Characteristic species include California bee-plant (*Scrophularia californica*), cudweed (*Gnaphalium* spp.), yarrow (*Achillea millefolium*), bracken fern, climbing bedstraw (*Galium porrigens* var. *porrigens*), cow-parsnip

(*Heracleum lanatum*), California aster (*Aster chilensis*), soap plant (*Chlorogalum pomeridianum*), California corethrogyne (*Lessingia filaginifolia* var. *californica*), and many others. A variety of weedy non-native herb species may also be locally abundant in coastal scrub habitats. Near the immediate coast, a somewhat distinctive suite of herbaceous species is often prominent in coastal scrub; these include seaside daisy (*Erigeron glaucus*), coast buckwheat (*Eriogonum latifolium*), sea lettuce (*Dudleya caespitosa*), piperias (*Piperia* spp.), and sea thrift (*Armeria maritima*).

In addition to successionally stable coastal scrub habitats, scrub in which coyote brush is the only shrub species, or is overwhelmingly dominant, is widespread in and around Santa Cruz. This scrub type, which may be called "coyote brush scrub", appears to be early successional, having developed when coyote brush colonized grasslands or formerly disturbed areas. It often intergrades with annual grassland (below). Along with the shrub component, the native herb component is generally much less diverse than in successionally stable coastal scrub. The characteristic grass and herb species in this scrub are often mostly non-native, often species also characteristic of annual grassland.

Within the city limits, successionally stable coastal scrub is largely confined to the western part of the city, in and near the Moore Creek Preserve, in Meder Canyon, and on the UCSC Long Marine Laboratory coastal lands. Elsewhere in the city, coastal scrub habitats are mostly small and fragmentary, and often represent the early successional "coyote brush scrub" type.

Redwood forest. Redwood forest is the most extensive habitat type in the Santa Cruz Mountains. Redwood forests occur in areas that receive abundant summer fog, but generally do not occur along the immediate coast or on sites with direct coastal exposure. Although redwood forests in the Santa Cruz area may occur on all slope positions and all aspects, they are most extensive and best developed on relatively moist, sheltered sites, including north- and east-facing slopes, canyon bottoms, and lower canyon slopes. It should be noted that redwood forests intergrade so extensively with mixed evergreen forests (below) in the Santa Cruz area that the boundaries between these habitat types are often indistinct, and mapped boundaries are often largely arbitrary.

Where well developed, this habitat type is typically a dense forest, with the canopy closed or nearly so. The principal dominant tree is the coniferous species redwood (*Sequoia sempervirens*). All redwood forest stands within the Santa Cruz city limits are second-growth; that is, the present forest canopy has developed following heavy logging at some time in the past. Individual old-growth redwood trees are, however, occasionally present. Associated tree species, which may be codominants, especially in areas transitional to mixed evergreen forest, include the conifer Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*) and the broadleaved species tanbark oak (tanoak) (*Lithocarpus densiflora*), California bay (*Umbellularia californica*), Pacific madrone (*Arbutus menziesii*), bigleaf maple (*Acer macrophyllum*), coast live oak (*Quercus agrifolia*), and Shreve oak (interior live oak) (*Quercus parvula* var. *shrevei*). The shrub layer in redwood forest habitats is generally sparse and uneven. The large shrub California hazelnut (*Corylus cornuta* var. *californica*) is widespread in redwood forests in the Santa Cruz area, generally occurring as scattered individuals. Evergreen huckleberry (*Vaccinium ovatum*) is another medium-sized to large shrub that is occasionally present. The low shrub creeping snowberry (*Symphoricarpos*

mollis), the woody vine Pacific blackberry, and poison-oak, occurring both as a shrub and as a vine, are widespread and locally abundant.

Redwood forests are typically characterized by deep shade and thick, acidic duff, which tend to inhibit the success of understory species. The forest floor in dense, well developed redwood forest is often nearly devoid of understory vegetation. Nevertheless, a number of herbaceous species are particularly characteristic of redwood forests (although some of these species may occasionally occur in moist mixed evergreen forest as well). These include sword fern (*Polystichum munitum*), redwood sorrel (*Oxalis oregana*), star-flower (*Trientalis latifolia*), trail plant (*Adenocaulon bicolor*), western wake-robin (*Trillium ovatum* ssp. *ovatum*) and two-eyed violet (*Viola ocellata*). Many of the characteristic herbs of the mixed evergreen forest (below) are also widespread in redwood forests, typically in more open areas with relatively thin duff.

Redwood forests occur only in the northern third of the city, on the lower slopes of the Santa Cruz Mountains proper in those portions of the city farthest from the immediate coast, and not on the coastal terraces and intervening canyons of the southern two-thirds of the city. The most extensive redwood forest areas within the city limits are in the northwestern portion of the city, on the UCSC campus and in Pogonip Park. More limited, but still sizable, areas of redwood forest occur in the canyons of Branciforte and Carbonera creeks in the Isbel Drive-Carbonera Drive area and in DeLaveaga Park.

Redwood – Douglas-fir/tanbark oak forest. This habitat type is an intermediate type between the redwood forest and mixed evergreen forest habitat types, and occurs on sites that are somewhat drier than those supporting typical redwood forests. Compared to typical redwood forest, the proportion of redwood in the forest canopy is lower and the proportion of Douglas-fir is higher. Broadleaved evergreen species such as tanbark oak, coast live oak, Shreve oak, and California bay are also more abundant than in typical redwood forest. Shrub and herb associates are primarily those characteristic of the mixed evergreen forest (below).

The only mapped area of redwood – Douglas-fir/tanbark oak forest within the city limits is located in the northern portion of the Moore Creek Preserve. Other areas referable to this habitat type may occur in Pogonip Park, on the UCSC campus, and elsewhere in the northern portion of the city, mapped as redwood forest or mixed evergreen forest.

Mixed evergreen forest. The mixed evergreen forest habitat type is developed on slopes, typically on drier sites than those supporting redwood forests, although mixed evergreen forest habitats are often relatively moist. Mixed evergreen forests are more extensive on south- and west-facing slopes, and often, but not always, occur upslope of redwood forest. As previously noted, mixed evergreen forest and redwood forest intergrade extensively in the Santa Cruz area, often reflecting a continuous moisture gradient.

Mixed evergreen forests range from dense, closed-canopy forests to relatively open forest with large canopy gaps, and may be savanna-like bordering grasslands, with scattered trees and large openings vegetated with typical grassland species. The dominant trees are predominantly broadleaved evergreen species. The most widespread dominant tree in mixed evergreen forests in the Santa Cruz area is coast live oak. In drier, more exposed areas particularly, coast live oak may be essentially the only canopy species, and the distinction between the mixed evergreen

forest and mixed evergreen forest (oak woodland) (below) habitat types is not always consistent in the mapping. Shreve oak is also widespread in mixed evergreen forests in the Santa Cruz area, and locally replaces coast live oak in northern parts of the city, although the two species sometimes occur together. Other tree species that are often dominants or important associates in mixed evergreen forests, especially on relatively moist sites, include California bay, Pacific madrone, Douglas-fir, tanbark oak, and redwood.

The shrub and vine component of mixed evergreen forests is typically similar to, but sometimes denser than, that of redwood forests. California hazelnut is frequent in the understory, and poison-oak, creeping snowberry, Pacific blackberry, and the woody vine hairy honeysuckle (*Lonicera hispidula* var. *vacillans*) are widespread and often locally abundant. A large number of native herbs are particularly characteristic of mixed evergreen forest habitats, although many of them also occur in redwood forests. Species include wood fern (*Dryopteris arguta*), yerba buena (*Satureja douglasii*), California hedge nettle (*Stachys bullata*), wood strawberry (*Fragaria vesca*), bracken fern, California brome (*Bromus carinatus* var. *carinatus*), Pacific sanicle (*Sanicula crassicaulis*), and others.

Mixed evergreen forests are widespread in the northern portions of the city, in Pogonip Park; in the Isbel Drive-Carbonera Drive area; in DeLaveaga Park; bordering Arana Gulch north of Highway 1, and especially on the UCSC campus. A large area of mixed evergreen forest extends southward from Pogonip Park into the area west of Harvey West Park and the Encinal Street area. Only fragmentary remnants of mixed evergreen forest occur elsewhere in the city.

Mixed evergreen forest (oak woodland). This habitat type is similar to mixed evergreen forest and may be regarded as a phase developed on relatively dry sites, often upper slopes. The tree canopy is overwhelmingly dominated by coast live oak, which may be virtually the only tree species present. Overall tree canopy density is typically less than in mixed evergreen forest on moister sites, and savanna-like areas, with large openings between trees containing grassland species, are common. The shrub, vine, and herb components of this habitat type are similar to that in mixed evergreen forest on moister sites, but is often less diverse.

A large area of mixed evergreen forest (oak woodland) is mapped on the slopes of a tributary canyon in the Moore Creek Preserve. Strips of coast live oak-dominated forest referable to this habitat type also occur bordering lower Arana Gulch and Hagemann Gulch. As noted previously, mapping of this habitat type is not consistent, and other areas mapped as “mixed evergreen forest” are referable to this habitat type.

Grassland. All grassland habitats within the city are here recognized as a single habitat type, grassland, with three subtypes, ‘coastal prairie’, ‘annual grassland/coastal prairie’ and ‘annual grassland’; the last two are discussed together. As discussed in more detail below, coastal prairie is characterized by dominance of native perennial bunchgrasses with an assortment of native herb associates (non-native species are generally also present); while annual grassland (California annual grassland) is largely dominated by non-native, mostly annual grasses, although native grasses and herbs are often also present. Although the distinction between these two grassland types is sometimes not sharp in the field, true coastal prairie, where found, represents a remnant of the original presettlement grassland in coastal northern and central California, and is a sensitive habitat type. Within the city limits, true coastal prairie is currently

mapped only in Pogonip Park, but it is likely that other grassland areas referable to coastal prairie occur elsewhere, within areas currently mapped as annual grassland/coastal prairie.

Coastal prairie. Several areas of grassland in Pogonip Park are mapped as coastal prairie (also referred to as coastal terrace prairie) (Santa Cruz Parks and Recreation Department 1998). Coastal prairie is the original, presettlement grassland type in the near-coastal areas of northern and central California (Heady et al. 1977). Coastal prairie is characterized by dominance of native perennial bunchgrasses, with a large suite of associated native annual and perennial herbs. However, grasses that are non-native and mostly annual have largely replaced the native perennial bunchgrasses in most of the remaining coastal grasslands, and such grasslands are referable to the annual grassland habitat type (below). Heady et al. (1977) lists the four major reasons for the decline of coastal prairie habitats as overgrazing; the introduction of aggressive, weedy non-native species; the cessation of frequent fires; and cultivation. Much coastal prairie habitat has also been lost, and much of the remainder fragmented, by urban development. The term "coastal prairie" is restricted to grasslands that retain the original dominance of native perennial bunchgrasses. In the Santa Cruz area, the principal native perennial bunchgrasses are purple needlegrass (*Nassella pulchra*) and California oatgrass (*Danthonia californica*). A variety of native herbs are associated with these bunchgrasses, including, at Pogonip Park, the special-status species San Francisco popcorn flower (*Plagiobothrys diffusus*), Santa Cruz clover (*Trifolium buckwestiorum*), and Gairdner's yampah (*Perideridia gairdneri* ssp. *gairdneri*). The coastal prairie areas at Pogonip Park are described more fully in Habitat Restoration Group's (HRG) Pogonip biotic assessment (1996b).

Annual grassland/coastal prairie and annual grassland. These two mapped habitat types are discussed together because there is often little or no difference between them and mapping is inconsistent. Annual grassland (also referred to as California annual grassland and non-native grassland) is the predominant grassland type in the Santa Cruz area. It occurs on all slope positions and all aspects, although generally on more or less exposed sites. It also occurs in nearly level upland areas and on coastal terraces. Although most areas of grassland in the Santa Cruz area are presumed to have been disturbed at least by heavy grazing at some time in the past, larger areas of grassland, such as the extensive grasslands on the UCSC campus, Pogonip Park, Arana Gulch, Lighthouse Field, Delavega Park and the Moore Creek Preserve, are probably "natural" in the sense that they were grasslands prior to European settlement of the area and were not created by artificial removal of woody vegetation, although the species composition of most of these grasslands has been greatly altered by grazing, other disturbances, and the introduction of weedy non-native species. Smaller areas of grassland within the city may either be remnants of "natural" grassland or grasslands that have developed following intensive disturbance.

Annual grassland is characterized by dominance of grasses that are primarily annual and non-native. In the Santa Cruz area, these include some combination of slender wild oat (*Avena barbata*), Italian rye grass (*Lolium multiflorum*, sometimes biennial), soft chess (*Bromus hordeaceus*), ripgut grass (*Bromus diandrus*), rattlesnake grass (*Briza maxima*), hare barley (*Hordeum murinum* ssp. *leporinum*), purple false brome (*Brachypodium distachyon*), dogtail grass (*Cynosurus echinatus*), six-weeks fescue (*Vulpia bromoides*), and rattail fescue (*Vulpia myuros*). A few non-native perennial grasses, such as Harding grass (*Phalaris aquatica*) and tall fescue (*Festuca arundinacea*), are occasionally dominant or abundant.

The native perennial bunchgrasses purple needlegrass and California oatgrass often occur in grassland areas mapped as annual grassland and annual grassland/coastal prairie, and occasionally one or both of these grasses is dominant. Purple needlegrass is the more abundant and widespread of these native bunchgrasses. Although the two species often occur intermixed, purple needlegrass typically grows on drier sites with better-drained soil, while California oatgrass tends to occupy moister sites, often with less well-drained soil. Areas dominated by one or both of these grasses may be regarded as remnants of the original perennial bunchgrass-dominated coastal prairie grassland of the Santa Cruz area, or as degraded coastal prairie, especially if the diversity of native coastal prairie-associated herbs is high.

Some annual grassland areas, especially, smaller, more isolated areas in the central portions of the city as well as elsewhere, show evidence of intensive and repeated past disturbance and are more or less ruderal[5] in character. In these areas, the vegetation is composed almost entirely of non-native grasses and weedy annual and perennial non-native herbs, and native species are few and uncommon. Where the grasslands have less disturbance history, an assortment of native herb species, many of them more or less associated with coastal prairies, is often present. Characteristic non-native herbs, found more or less throughout the grasslands in the Santa Cruz area, include hairy cat's-ear (*Hypocharis radicata*), long-beaked filaree (*Erodium botrys*), white-stemmed filaree (*Erodium moschatum*), English plantain (*Plantago lanceolata*), common vetch (*Vicia sativa*), wild radish (*Raphanus sativus*), Italian thistle (*Carduus pycnocephalus*), black mustard (*Brassica nigra*), narrow-leaved clover (*Trifolium angustifolium*), and others. Characteristic native species, most abundant and most diverse in larger, less disturbed grassland areas, include California poppy (*Eschscholzia californica*), blue-eyed grass (*Sisyrinchium bellum*), checker bloom (*Sidalcea malvaeflora* cf. ssp. *malvaeflora*), sky lupine (*Lupinus nanus*), sun cups (*Camissonia ovata*), coast tarplant (*Madia sativa*), Johnny-jump-up (*Viola pedunculata*), and golden brodiaea (*Triteleia ixioides*).

Coyote brush frequently invades grasslands in the Santa Cruz Mountains, and there are many areas intermediate between grassland and the coyote brush scrub phase of coastal scrub. Some of these areas may be actively succeeding from grassland to scrub as coyote brush expands in cover and density. This successional trend may be related to prolonged absence of fire, which would largely eliminate invading coyote brush.

Sandy beach. Sandy beaches are often unvegetated. Where vegetated, if native species are present, sandy beaches are referable to the coastal strand habitat type. There is a nearly continuous strip of sandy beach over a mile long in the eastern portion of the city, on both sides of the mouth of the San Lorenzo River. This includes the main city beach adjacent to the Beach Street area. Small, isolated sandy beaches (pocket beaches) occur interspersed with sea cliffs in the western portion of the city, most notably at Natural Bridges State Park and at Younger Lagoon on the UCSC Long Marine Laboratory site. Many of the beach areas within the city are heavily disturbed, primarily by recreational use. These areas are typically either unvegetated or support mostly weedy non-native species. Some areas do support characteristic native coastal strand species, including beach-bur (*Ambrosia chamissonis*), beach evening-primrose

5 "Ruderal" = disturbed by human activities

(*Camissonia cheiranthifolia* ssp. *cheiranthifolia*), beach morning glory (*Calystegia soldanella*), pink sand verbena (*Abronia umbellata* ssp. *umbellata*), and yellow sand verbena (*Abronia latifolia*).

Cliff. The cliff habitat type is used for coastal bluffs directly facing the ocean and for areas of thin, sometimes rocky soil immediately adjacent to the tops of the coastal bluffs. Many areas of this habitat type within the city have a long history of extensive disturbance, and are often dominated by weedy non-native species. The mat-forming non-native succulents ice plant (*Carpobrotus edulis*) and sea fig (*Carpobrotus chilensis*) dominate extensive areas. Native species characteristic of undisturbed coastal bluff habitats, such as the shrub lizard tail (*Eriophyllum staechadifolium*) and herb species such as coast buckwheat (*Eriogonum latifolium*), seaside daisy (*Erigeron glaucus*), yarrow (*Achillea millefolium*), and sea lettuce (*Dudleya caespitosa*), are also often present and are locally dominant, especially in areas protected from disturbance by the steep topography.

The only areas mapped as "cliff" within the city are along the coastal bluffs in the extreme western portion of the city. Other areas referable to this habitat type may occur within areas mapped as "developed" in the vicinity of West Cliff Drive in the western portion of the city and East Cliff Drive in the eastern portion of the city.

Ruderal/landscaped/ornamental. Areas mapped as ruderal/landscaped/ornamental are heterogeneous in character, but all are characterized by some form of development, past or ongoing heavy disturbance or dominance of non-native plant species. This habitat type is not entirely distinct from the developed habitat type (below). The most extensive areas mapped as ruderal/landscaped/ornamental are areas dominated by non-native tree species that are large enough and have a dense enough tree canopy to be considered forests. The most widespread non-native tree in these stands, which often dominates sizable areas, is blue gum eucalyptus (*Eucalyptus globulus*). Other important, and sometimes dominant, non-native trees include Monterey pine (*Pinus radiata*, native to small areas on the coast, including and northwestern Santa Cruz County, but naturalized in the vicinity of Santa Cruz), Monterey cypress (*Cupressus macrocarpa*, native to the Monterey area, but naturalized in the vicinity of Santa Cruz), and acacias or wattles (*Acacia* spp., several species). In some canyons in DeLaveaga Park mapped as this habitat type, English elm (*Ulmus minor*) is the dominant non-native tree species. Native tree species such as coast live oak sometimes occur in these stands, but are never dominant. Other areas mapped as ruderal/landscaped/ornamental include some areas with residential development; some prominent landscaped areas; and some purely ruderal areas (heavily disturbed areas with mostly weedy vegetation).

Agricultural. Exclusive of private gardens, there are only a few small areas within the city limits where crops are cultivated (e.g., off Shaffer Road in the southwestern portion of the city and in the Golf Club Drive area). These are mapped as "developed".

Developed. The developed habitat designation is used for all the heavily urbanized core areas of the city as well as most areas of residential or other development in outlying portions of the city (some are mapped as ruderal/landscaped/ornamental). Developed areas are mostly occupied by buildings, streets, driveways, parking areas, lawns, and landscaped areas, and include many heavily disturbed ruderal sites, including small areas which may be considered ruderal annual

grassland. Many landscaped city park areas are included in this habitat designation. Most of the vegetation in such areas, exclusive of landscaping species, consists of weedy non-native species, although native trees such as coast live oak and redwood are widespread in developed areas, where they have often been planted.

Sensitive Habitats

Five of the habitat types described as occurring within the City of Santa Cruz are recognized as sensitive habitat types: aquatic, salt marsh, freshwater wetland, riparian forest and scrub, and coastal prairie. Except for aquatic habitat and freshwater wetland, these habitat types correspond to habitat types that the California Natural Diversity Data Base (CNDDB) has designated as "high priority" for inventory (CDFG 2003a), as discussed below. In addition, coastal bird rookeries and dispersal corridors may be considered sensitive habitats.

Aquatic. Habitats for listed species are recognized as sensitve. Several aquatic environments within the City of Santa Cruz provide habitat for federally listed species, including the San Lorenzo River for the tidewater goby, steelhead, and coho salmon; and Arana Gulch and the Yacht Harbor for steelhead and the southern sea otter.

Freshwater wetland. Freshwater wetlands are recognized as sensitive habitats because they are subject to the jurisdiction of U.S. Army Corps of Engineers under Section 404 of the federal Clean Water Act (33 U.S.C. 1344) (Environmental Laboratory 1987) and because they provide important wildlife habitat. In the classification scheme of CDFG (2003a; 2010), the freshwater wetlands within the city mostly correspond to marsh habitat types that are not all designated as "high priority" by CNDDB. However, some freshwater wetlands dominated by tules (bulrushes; *Bulboschoenus* spp., *Schoenoplectus* spp.) are referable to alliances of CDFG (2010), which are recognized as CNDDB "high priority" habitat types.

Salt marsh. The salt marsh located within the city corresponds mostly to the *Sarcocornia pacifica* (*Salicornia depressa*) [=*Salicornia virginica*] (pickleweed mats) alliance, which is recognized as a "high priority" habitat type by CNDDB (2010). The only mapped area of salt marsh in the city is within Natural Bridges State Beach, on the west side of Moore Creek just inland of the beach.

Riparian forest and scrub. The riparian forest and scrub habitats within the city mostly correspond to CNDDB "high priority" habitat types (CDFG 2003a, 2010). The most widespread riparian forest type within the city, dominated by arroyo willow, is referable to the CNDDB "high priority" arroyo willow riparian forests and woodlands alliance. Depending on the dominant tree species, other riparian forests are referable to the *Salix lucida* (shining willow groves), mixed willow riparian forests and woodlands, *Populus trichocarpa* [= *Populus balsamifera* ssp. *trichocarpa*] (black cottonwood forest), and *Alnus rubra* (red alder forest) alliances. (The red alder forest alliance is not specifically designated as a CNDDB "high priority" habitat type, but most associations recognized under this alliance by CDFG (2003a, 2010) are recognized as "high priority".) Riparian scrub within the city, which occurs mostly in the San Lorenzo River channel, corresponds to the central coast riparian scrub alliance of CDFG (2003a), which is recognized as a "high priority" habitat type.

Coastal prairie. Coastal prairie in the Santa Cruz area corresponds to the coastal terrace prairie alliance of CDFG (2003a; 2010), previously recognized by Holland (1986), which is designated as a CNDDB "high priority" habitat type. The only areas within the city specifically mapped as coastal prairie by any previous study are those mapped in Pogonip Park (Santa Cruz Parks and Recreation Department 1998). Other areas referable to coastal prairie may occur in grassland areas within the city, but have not been mapped. Distinguishing coastal prairie from annual grassland is often problematical because some local grassland areas may be partly dominated by native perennial bunchgrasses and contain other native coastal prairie species, but also be heavily invaded by non-native species. To be considered coastal prairie, a stand of grassland should be essentially dominated by native perennial bunchgrasses and have a predominance of native over non-native herb species.

Coastal bird habitat. The bluffs, cliffs, seastacks, rock outcrops, and small coastal islands along the shoreline from Cowell's Beach to Younger Lagoon provide roosting and perching, foraging, and breeding habitat for numerous coastal bird species. Structures on the Santa Cruz Municipal Wharf and Santa Cruz Yacht Harbor also provide communal roosting habitat, while other birds nest in the trees and scrub that line the city's aquatic environments. These areas provide suitable breeding habitat because they lie beyond the reach of waves and high tide marks, offer protection from predators, and provide perches for resting and drying out. They are located near the biologically diverse surroundings of estuarine and riverine environments, lagoons and ponds, sandy beaches, and shallow ocean waters. A variety of food sources are available, including insects, fish, crustaceans, mollusks, and aquatic invertebrates, as well as amphibians, small birds and mammals. A number of bird species are known to roost and breed within the coastal habitat of the City of Santa Cruz, including the following special-status birds: brown pelican (*Pelecanus occidentalis*), double-crested cormorant (*Phalacrocorax auritus*), black-crowned night heron (*Nycticorax nycticorax*), and black oystercatcher (*Haemotopus bachmani*); as well as other cormorant (*Phalacrocorax sp.*) and heron species, gulls (*Larus sp.)*, the great egret (*Ardea albus*), the common merganser (*Mergus merganser*), and the pigeon guillemot (*Cepphus Columba*).

During the 2006 summer survey of the coastline within the city that EcoSystems West conducted as part of General Plan Update, we identified 28 nest colonies and communal roost locations. The 'seabirds' feature class within the geodatabase created as part of the project identifies their location, species of birds, and seasonality of the sites' use. Surveys conducted in additional years would likely reveal additional roosting and nesting locations along the coast. Thirteen of the sites observed in 2006 support breeding seabirds. The remaining sites were observed to support roosting seabirds.

The birds identified during the 2006 survey are listed in the Table 2. Occurrences of birds breeding and roosting in coastal habitat compiled from other data sources are also noted.

Table 2. Birds Known to Utilize Coastal Habitat for Roosting and/or Breeding within the City of Santa Cruz.

Common Name *Scientific Name*	**Special-Status**	**General Location**
Brown Pelican *Pelecanus occidentalis*	x	Shoreline from Lighthouse Point to (Younger Lagoon)[1&2] Municipal Wharf[3] San Lorenzo River[4].
Pelagic Cormorant *Phalacrocoraxpelagicus*		Natural Bridges (Younger Lagoon)[1]
Brandt's Cormorant *Phalacrocorax penicillatus*		Natural Bridges Lighthouse Point Area[1]
Double-crested Cormorant *Phalacrocorax auritus*	x	Shoreline from Lighthouse Point to Natural Bridges Antonelli Pond Neary Lagoon Westlake Pond San Lorenzo River Arana Gulch Santa Cruz Yacht Harbor (Schwan Lagoon)[1&2]
Great Egret *Ardea albus*		lower Branciforte Arana Gulch Santa Cruz Yacht Harbor[2]
Great Blue Heron *Ardea herodias*		Pogonip lower Branciforte Creek[2] Arana Gulch Santa Cruz Yacht Harbor[1, 2, & 5]
Green Heron *Butorides virescens*		Antonelli Pond lower Moore Creek San Lorenzo River lower Branciforte Creek[2]
Black-crowned Night Heron *Nycticorax nycticorax*	x	Antonelli Pond Neary Lagoon lower San Lorenzo River Branciforte Creek upper Santa Cruz Yacht Harbor[2]
Common Merganser *Mergus merganser*		lower San Lorenzo River[2]
Black Oystercatcher *Haemotopus bachmani*	x	Shoreline from Cowell's Beach to (Younger Lagoon)[1&2]
Heerman's Gull *Larus heermanni*		Natural Bridges Lighthouse Point Area[1]
Western Gull *Larus occidentalis*		Shoreline and private residences from Cowell's Beach to (Younger Lagoon) Municipal Wharf[2]
Pigeon Guillemot *Cepphus columba*		Shoreline from Cowell's Beach to (Younger Lagoon) Municipal Wharf[1&2]

Notes:
( ) = Locations outside of the city limits.
1 2006 Surveys conducted by EcoSystems West
2 Gerow (2006)
3 Entrix (2004a)
4 Swanson et al. 2002
5 Santa Cruz Parks and Recreation Department 2006

Dispersal Corridors

Dispersal corridors, also called movement corridors, wildlife corridors or landscape linkages, are features whose primary function is to connect at least two isolated habitat areas (Bond 2003). In 1992, Beier and Loe provided a basic description of the functions of corridors:

> Corridors provide avenues along which (1) wide ranging animals can travel, migrate, and meet mates…(2) plants can propagate…(3) genetic interchange can occur…(4) populations can respond to environmental change…[and] (5) locally extirpated populations can be replaced from other areas.

Hilty, Lidicker, and Merenlender (2006) define corridors as any space identifiable by species using it that facilitates the movement of animals and plants over time between two or more otherwise disjunct habitats (Lidicker 1999). In the urban/open space interface, corridors provide links between different types of habitat areas, including core habitat, supportive natural landscapes or habitat patches, and linear habitats, as described below.

Many undeveloped or natural areas serve as core habitats for a variety of plant and wildlife species. Core habitat areas are generally considered to support the viability of rare plant or animal species or consist of exemplary natural communities. Providing functional connectivity between core habitats through corridors is essential to sustaining healthy plants and wildlife populations and allowing for the continued dispersal of native plant and animal species.

Other areas may lack the requisite structural or spatial heterogeneity to be considered core habitat; but still provide relictual habitat for rare plants as well as opportunities to wildlife for forage, cover, and shelter. These areas may be considered habitat patches or supportive natural landscapes. Habitat patches may provide opportunities to manage and enhance rare plant populations.

Riparian corridors and streamside buffers in agricultural or developed landscapes provide habitat for plants, canopy cover, opportunities for foraging, and refuge from predators for wildlife species; in addition, riparian corridors and buffers offer plants and wildlife the opportunity to disperse (Beier and Loe 1992). In these ways, creeks and creekside buffers serve as both linear habitats and corridors. Because riparian corridors support a disproportionate amount of biodiversity compared to other landscapes (Harris et al. 1996), retaining adequate riparian buffers enhances species richness by providing additional habitat (Hilty, Lidicker, and Merenlender 2006) with high quality habitat features. Often the boundaries between riparian corridors and buffers are ecotones or edge habitats, where two or more habitat types share a common boundary, potentially increasing available resources for wildlife. When riparian corridors and buffers serve to link core habitats and habitat patches (and thus allow movement between otherwise separate populations) the persistence of wildlife populations increases (Hilty, Lidicker, and Merenlender 2006). Links between core habitats and supportive natural landscapes also serve as dispersal corridors for plant species, through seed and vegetative dissemination or wildlife transport. Together, corridors, linear habitats, and supportive natural landscape areas help maintain ecological integrity and enhance core habitat.

Interferences to the movement patterns of wildlife through dispersal corridors are considered significant under CEQA. Determining the frequency of wildlife passing through proposed development sites, and determining the buffer width needed to maintain corridor utility should be considered in the planning process of parcels located along potential wildlife dispersal routes. Corridors can be incorporated into the design of a development project by conserving an existing landscape or restoring habitat to function as a connection between larger undeveloped or natural areas (Bond 2003).

Core habitats within the City of Santa Cruz include the open, undeveloped, and natural areas, such as UCSC campus lands, Moore Creek Preserve and Meder Canyon, Pogonip, and Delaveaga Park. Arana Gulch is considered a supportive natural landscape or habitat patch. Many of the undeveloped parcels within the City provide linear habitat or supportive natural landscapes for plants and animals and may fall within dispersal corridors. The City's watercourses serve both as linear habitats and provide dispersal to and from the core habitats and habitat patches listed above. Using the high resolution aerial imagery of the city in the project GIS, we identified three main landscape linkages that could provide connectivity between habitats within or adjacent to the city:

Western Corridor. Intact riparian vegetation along Moore Creek, along with adjacent intact grasslands and forests, could provide a link between core habitat areas on the western portion of the city, including habitat located on UC Santa Cruz campus, Moore Creek Preserve, Natural Bridges and Younger Lagoon (also a part of the UC Santa Cruz Campus). This western corridor includes a mosaic of largely intact vegetation located along the adjacent drainage east of the upper reach portion of Moore Creek. For some wildlife species, Highway 1 could present a barrier to migration, while other species might find this relatively narrow section of the Highway somewhat permeable.

Central Corridor. The San Lorenzo River and two of its main tributaries, Branciforte Creek and Carbonera Creek, create a potential dispersal corridor in the central portion of the city. Here, a relatively narrow strip of riparian habitat could provide opportunities for wildlife movement between the San Lorenzo River lagoon region and core habitat located within and adjacent Pogonip, UC Santa Cruz, and Henry Cowell (via the San Lorenzo River) and De Laveaga Park, via Branciforte and Carbonera Creeks. The majority of this corridor occurs near the western portion of De Laveaga park around Carbonera and Branciforte Creeks.

Eastern Corridor. Intact riparian, grassland, and other native forest along with dense eucalyptus groves located along Arana Gulch create a potential corridor for wildlife movement on the eastern portion of the city. For some species, such as birds, this corridor could link habitat near the mouth of the Yacht Harbor with core habitat on the eastern edge of De Laveaga Park. Other species, including most mammals, are unlikely to be able to migrate between the northern and southern portions of this corridor, which is bisected by Highway 1—a two lane highway that is currently being widened to three lanes in this region.

No studies have been conducted to determine which species utilize the linear habitats and dispersal corridors within the city, the frequency of wildlife movement through corridors, or the buffer width necessary to maintain corridor utility. More research would be needed to obtain this data.

Special-status Plants

Special-status species include species listed as Threatened or Endangered under provisions of the federal ESA (USFWS 2007a); and species listed as Rare, Threatened, or Endangered by the state of California under provisions of the CESA and NPPA (CDFG 2007a). Species formally Proposed for federal listing by the USFWS (2007b) are afforded limited legal protection under ESA. The Natural Heritage Division of CDFG administers the state rare species program and maintains the list of designated Endangered, Threatened, and Rare species.

Other special-status species are those on List 1A, List 1B, or List 2 CNPS *Inventory* (Tibor 2001 and CNPS 2012). These species are subject to state regulatory authority under CEQA.

Also considered as special-status species are those included on List 3 and List 4 of the CNPS *Inventory*. These species are considered to be of lower sensitivity, and generally do not fall under specific state or federal regulatory authority. Specific mitigation considerations are generally not required for species in these categories but are recommended. Table 3 summarizes the habitats and locations of special-status plants known to occur in the City of Santa Cruz.

Santa Cruz manzanita (*Arctostaphylos andersonii*). Santa Cruz manzanita is listed on List 1B of the CNPS *Inventory* (Tibor 2001 and CNPS 2012) and, therefore, falls under CEQA regulatory authority. It has no other federal or state status. Santa Cruz manzanita is a medium-sized to large shrub in the heath family (Ericaceae). It has the smooth, reddish-brown bark characteristic of all manzanita species. The leaves have no petiole (stalk) or only a very short petiole, more or less clasp the stem, and are more or less auriculate (having ear-like projections) at the base of the leaves. These leaf characteristics separate Santa Cruz manzanita from other manzanita species with which it grows, although some other species with similar leaves (all of them also special-status species) have ranges bordering the range of Santa Cruz manzanita. Clusters of white, urn-shaped flowers are produced from November to April. Santa Cruz manzanita apparently does not reproduce except following fire or other disturbances. Unlike some manzanita species, it has no basal burl that can sprout following fire, and so regenerates itself only from seed.

Santa Cruz manzanita grows in maritime chaparral in Santa Cruz, Santa Clara, and southern San Mateo counties (Hickman 1993; Tibor 2001; Baldwin et al. 2012; CNPS 2012). Earlier reports of it ranging into northern San Mateo County and San Francisco (Thomas 1960; Munz and Keck 1973) are based on confusion of this species with closely related but distinct species, especially Kings Mountain manzanita (*Arctostaphylos regismontana*). Santa Cruz manzanita is locally relatively abundant in the central Santa Cruz Mountains. The CNDDB has records for 21 occurrences in Santa Cruz County, some of which may represent portions of larger, extended single occurrences.

Within the city limits of Santa Cruz, EcoSystems West biologist Nick Fisher observed a single individual of Santa Cruz manzanita growing at the top of the cliff on the north side of Kalkar Quarry in fall 2006. Santa Cruz manzanita is also widespread on the U.C. Santa Cruz campus (EcoSystems West 2004), mostly on the northern portion of the campus but extending into the portion of the campus within the city limits. The U.C. Santa Cruz occurrence of Santa Cruz manzanita is CNDDB Occurrence No. 25. Isolated individuals or small colonies of Santa Cruz manzanita may occur at Pogonip Park, Delaveaga Park or in other northern portions of the city.

Table 3. Status, habitat, and location of special-status plants occuring in the City of Santa Cruz, California.

Species Common Name[1]	USFWS Listing[2]	State Status[3]	CNPS Status[4]	Habitat Type[5]	Flowering Period	Occurrence
Arctostaphylos andersonii Santa Cruz manzanita	None	None	List 1B.2	Chaparral; openings in and edges of broadleafed upland forest and north coast coniferous forest	November-April	Kalkar Quarry[6 & 7] Pogonip (P)[8] Delaveaga (P)[8] (UCSC[10])[9]
Chorizanthe robusta var. *robusta* robust spineflower	Endangered	None	List 1B.1	Coastal dunes, coastal scrub, openings in cismontane woodland, in sandy or gravelly soil	April-September	Pogonip[7 & 11] Private Parcel-Market St
Holocarpha macradenia Santa Cruz tarplant	Threatened	Endangered	List 1B.1	Coastal prairie, valley and foothill grassland, coastal scrub, often in clay or sandy soils	June-October	Arana Gulch[7] Delaveaga Park[7]
Perideridia gairdneri ssp. *gairdneri* Gairdner's yampah	None	None	List 4.2	Moist sites in coastal prairie, broadleafed upland forest, chaparral, valley and foothill grassland, vernal pools	June-October	Pogonip[9]
Plagiobothrys chorisianus var. chorisianus Choris's popcorn-flower	None	None	List 1B.2	Moist places in chaparral, coastal prairie, coastal scrub	March-June	Lighthouse Field[12] Arana Gulch[13]
Plagiobothrys chorisianus var. *hickmanii* Hickman's popcorn-flower	None	None	List 4.2	Moist places in closed-cone coniferous forest, chaparral, coastal scrub, marshes and swamps, vernal pools	April-June	Arana Gulch[13]
Plagiobothrys diffusus San Francisco popcornflower	None	Endangered	List 1B.1	Coastal prairie; valley and foothill grassland	March-June	Moore Creek Preserve[7, 14 & 15] Private Parcel- Meder St[14] Pogonip[7 & 9]
Trifolium buckwestiorum Santa Cruz clover	None	None	List 1B.1	Coastal prairie; margins of broadleafed upland forest, cismontane woodland	April-October	Pogonip[7]

Notes:
[1] Nomenclature follows Tibor (2001), Baldwin et al. (2012) and California Native Plant Society (2012).
[2] U.S. Fish and Wildlife Service (2006a,b,c).
[3] Section 1904, California Fish and Game Code (California Department of Fish and Game 2006a)
[4] Tibor (2001) and California Native Plant Society (2012)
CNPS Lists: List 1B: Rare, Threatened, or Endangered in California and elsewhere. List 4: Plants of limited distribution: a watch list
Threat Code extensions: .1: Seriously endangered in California. .2: Fairly endangered in California.
[5] Thomas (1960), Munz and Keck (1973), Hickman (1993), Tibor (2001), Morgan et al. (2005), Baldwin et al. (2012), California Native Plant Society (2012), and unpublished information
[6] EcoSystems West (ESW) 2006 Surveys
[7] CNDDB (2007)
[8] (P) = Potential Habitat
[9] ( ) = Locations outside of the city limits
[10] EcoSystems West (2004)
[11] Santa Cruz Parks and Recreation Department (1998)
[12] Strelow Consulting (2003b)
[13] Brady/LSA (1999)
[14] Santa Cruz Parks and Recreation Department (2002)
[15] Biotic Resources Group with Dana Bland and Associates (2001)

Robust spineflower (*Chorizanthe robusta* var. *robusta*). Robust spineflower was listed as Endangered by the USFWS in 1994 (USFWS 1994, 2007a). It is also listed on List 1B of the CNPS *Inventory* (Tibor 2001 and CNPS 2012). On May 28, 2002, pursuant to the Endangered Species Act of 1973, the USFWS designated critical habitat for robust spineflower (USFWS 2002a). In 2004, USFWS published a recovery plan for the species (USFWS 2004). This recovery plan details actions that are believed by USFWS to be required to recover and protect the species, and establishes criteria for determining the success of recovery.

Robust spineflower is a small, branched, erect to decumbent annual herb in the buckwheat family (Polygonaceae). It germinates following the onset of winter rains and produces a rosette of oblanceolate basal leaves. The plants bolt (produce flowering stems) in the spring and flower primarily from April to June, although some flowers may be present until September or later. The stem leaves (actually bracts) are small and relatively few. The herbage is soft-hairy and generally grayish or reddish in color. The small white (to pale pink) flowers are arranged in dense rounded heads. Each flower, or pair of flowers, is subtended by a six-lobed involucre whose margins are translucent white (rarely pinkish) and whose lobes are tipped by small hooked awns. Each flower produces a single seed. The species is self-compatible and will self-fertilize to some extent in the absence of insect pollination; however, seed set has been shown to be much higher when flowers are pollinated by insects (Murphy 2003). Murphy observed a wide variety of insects that appeared to be effective pollinators of robust spineflower, including members of 13 families in four insect orders. The order Hymenoptera (five families, including solitary bees, social bees, and wasps, were the most frequent visitors; flies (order Diptera, three families), beetles (order Coleoptera, two families), and butterflies (order Lepidoptera, three families) were also important apparent pollinators. Seeds are set in late summer and fall. The involucral awns may be important in facilitating animal dispersal of seed.

The common habitat factor for all known robust spineflower sites is sandy soil (Munz and Keck 1973; Hickman 1993; USFWS 1994, 2002a, 2004; Tibor 2001; Baldwin et al. 2012; CNPS 2012). The substrate can be active dune sands near the immediate coast or old marine sand deposits somewhat further inland. The species occurs on active dunes and in openings within scrub, maritime chaparral, or oak woodland habitats. The relatively nutrient-poor sandy soils on which it grows tend to limit the abundance of competing species, creating relatively open habitat.

Robust spineflower (or forms closely related to it) is known historically from near the coast and around San Francisco Bay from Alameda and San Mateo counties to northern Monterey County, and extending southward into the Salinas Valley in interior Monterey County (Munz and Keck 1973; Hickman 1993; USFWS 1994, 2002a; Tibor 2001; CNDDB 2007; Baldwin et al. 2012; CNPS 2012;). Some botanists familiar with this group of spineflowers have questioned whether the Alameda County and Salinas Valley populations, and one extant population in northern Monterey County, represent "true" *Chorizanthe robusta* var. *robusta* (USFWS 2002a). Several populations of spineflower identified as *Chorizanthe robusta* var. *robusta* have also been found in recent years in Point Reyes National Seashore in Marin County (USFWS 2004 and CNDDB 2007), but the identity of these populations has also been questioned.

Within the city limits of Santa Cruz, robust spineflower is known from two locations at Pogonip Park and from a site on private land between Market Street and Branciforte Creek, just north of Highway 1. The two sites at Pogonip Park are CNDDB Occurrence Nos. 6 and 7, and together are designated (along with surrounding unoccupied habitat) as the Pogonip critical habitat unit,

or Unit A, by USFWS (2002a). Both of these colonies occupy limited areas in open sites with sandy soil (Santa Cruz Parks and Recreation Department 1998 and USFWS 2002a). The larger colony is located off the Pogonip Creek Trail, and the smaller colony is located south of the Brayshaw Trail.

The Market Street/Branciforte Creek population of robust spineflower is not recorded in the CNDDB, but has been designated by USFWS (2002a) as the Branciforte critical habitat unit, or Unit B. On this site, robust spineflower occurs in grassland on a moderate south- to southwest-facing slope, in sandy soil mapped as Baywood loamy sand and Elder sandy loam (Bowman and Estrada 1980; Alexander 2006). Based on surveys and mappings conducted in different years since 2000, it appears that the area occupied by robust spineflower on the site varies somewhat from year to year, while the reported numbers of plants has differed substantially in different years. USFWS (2002a) states that approximately 500 individuals were present in 2001; while USFWS (2004) states that this population "numbers between 1,000 and 2,000 individuals". Harvey & Associates (2004) estimated that approximately 250 spineflower plants were present on the site in 2002. Although no census was conducted, it was estimated that at least 250 plants were present in 2005, and that over a thousand plants were present in 2006 (RBF Consulting 2006). This site is currently proposed for a residential housing development; however, project plans call for the robust spineflower habitat to be preserved as permanent open space and for a management plan to be prepared (RBF Consulting 2006).

Santa Cruz tarplant (*Holocarpha macradenia*). Santa Cruz tarplant was listed as Threatened by USFWS in 2000 (USFWS 2000, 2007a) and was state listed as Endangered in 1979 (CDFG 2007a). It is also listed on List 1B of the CNPS *Inventory* (Tibor 2001 and CNPS 2012). The USFWS designated critical habitat for Santa Cruz tarplant on October 16, 2002 (USFWS 2002b). A recovery plan for this species has not been published to date.

Santa Cruz tarplant is a small to medium-sized, annual herb in the sunflower family (Asteraceae) that glandular, aromatic, and more or less sticky to the touch, and produces solitary or clustered flower heads with short but prominent yellow ray flowers. The lower leaves are broadly linear with slender remote teeth. The upper leaves are narrower and shorter, often crowded or clustered, and tipped by a prominent cup-shaped open pit gland. The flower heads occur singly or in tight clusters of a few heads each at the tips of the branches, and sometimes are also more or less sessile along the upper branches. The heads are subtended by a subglobose involucre composed of a single series of narrow phyllaries (bracts). Each phyllary has about 25 stout gland-tipped projections, and is also tipped by an open pit gland. The rays (outer flowers, simulating petals) are about 8-16 in number, yellow, and three-lobed at the apex, and are more or less enveloped by the phyllaries. The less prominent disk flowers in the center of the head are yellow with black anthers.

Plants germinate following winter rains and produce a basal rosette. The plants bolt in late spring and flower from June to October. The leaves at the base of the plant are mostly lost before flowering. Santa Cruz tarplant is self-incompatible; that is, it cannot produce seed without cross-pollination between different individual plants, generally effected by insects (USFWS 2002b). Seed is set in the fall, and the sticky-glandular phyllaries surrounding the achenes (dry, hard, one-seeded fruits) produced by the ray flowers and presumably aid in the dispersal of the ray-achenes by animals. Numbers of flower heads, and thus the number of seeds produced per plant, varies greatly from plant to plant. Achenes produced by the disk flowers germinate readily but

appear to lose viability within about 18 months, while the ray-achenes germinate much less readily, but remain viable for many years (USFWS 2002b). The disk-achenes thus typically mostly reproduce the population from year to year, while the ray-achenes provide a persistent seed bank whose seeds will germinate slowly over a period of years, and provide some insurance against catastrophic population failure due to one or a few years of unfavorable environmental conditions.

Santa Cruz tarplant occurs, and historically occurred, in grasslands located on coastal terraces and alluvial flats near the coast below 100 meters (330 feet) elevation (Palmer 1987; USFWS 2000, 2002b). Historically, these grasslands belonged to the coastal prairie (coastal terrace prairie) habitat type (Heady et al. 1977), characterized by dominance of native perennial bunchgrasses. Although sites currently supporting Santa Cruz tarplant may retain characteristics of the original coastal prairie grasslands, the native perennial bunchgrasses on most of these sites have largely been replaced by non-native annual grasses characteristic of the California annual grassland habitat type. A wide variety of non-native herb species have also become abundant in these grasslands.

Santa Cruz tarplant occurs both at very low elevation on relatively young coastal terraces near the ocean and on older coastal terraces located slightly more inland and at slightly higher elevations. The species appears to be mostly restricted to certain soil types, especially loams and sandy loams of the Watsonville, Tierra, Elkhorn, Santa Inez, and Pinto soil series (USFWS 2002b). These soils typically have a subsurface clay-rich layer, and therefore hold moisture for relatively late in the growing season.

There is considerable evidence indicating that Santa Cruz tarplant is a poor competitor against aggressive weedy non-native grasses and herbs (USFWS 2000, 2002b; Hayes 2002, 2003; Bainbridge 2003; BMP Ecosciences 2006). Under present-day conditions, grazing or some other periodic disturbance may be required to reduce competition from non-native species and maintain habitat conditions suitable for Santa Cruz tarplant. A variety of active management techniques attempting to enhance habitat for Santa Cruz tarplant, including mowing, raking to remove thatch, scraping of the surface soil, and controlled burns, have been tried, both experimentally (Hayes 2002, 2003; Bainbridge 2003) and as part of actual management regimes (Brady/LSA 1999), often with some success.

Santa Cruz tarplant historically occurred around the northern and eastern sides of San Francisco Bay from Marin County to Alameda County, and around the northern end of Monterey Bay from Santa Cruz to extreme northern Monterey County (Palmer 1987; USFWS 2000, 2002b; Tibor 2001; CNPS 2012). All known historic native populations in the San Francisco Bay area are now extirpated. The only remaining populations in that area are artificially established populations on sites in Contra Costa County that did not historically support the species (USFWS 2000, 2002b). According to CNDDB records, about 24 Santa Cruz tarplant populations were known historically from Santa Cruz County, with one additional population in Monterey County (CNDDB 2007). CNDDB records indicate that at least 11 of the Santa Cruz County populations are extirpated or possibly extirpated. As of 2002, approximately 12 Santa Cruz County populations and the one Monterey County population were known to be extant or had been observed since 1990 (USFWS 2002b). Seven of these populations are located in the vicinity of Santa Cruz and Soquel, and the remaining six are located in the vicinity of Watsonville in southern Santa Cruz and northwestern

Monterey counties. Most of those populations have declined substantially since the early 1990s, apparently due to cessation of grazing and other changes in grassland management practices.

Santa Cruz tarplant is known from two locations within the Santa Cruz city limits: the Arana Gulch Open Space Preserve and within DeLaveaga Park. The Arana Gulch occurrence is CNDDB Occurrence No. 6 and is designated by USFWS (2002b) as the Arana Gulch critical habitat unit, or Unit D. It is located in a grassland area on a low, young coastal terrace on Elkhorn sandy loam soil (Bowman and Estrada 1980). The plants in the Arana Gulch population differ from those in other populations of the species by chromosome arm arrangements (Palmer 1987), making this population especially important for conservation of the genetic diversity of the species. This occurrence has been observed and monitored extensively since its discovery in 1977 or earlier (Stone 1989; HRG 1993, 1996a; Brady/LSA 1999; BMP Ecosciences 2006; Santa Cruz Parks and Recreation Department 2006). Originally, four distinct sub-populations were present, designated as areas A, B, C, and D. Numbers of plants observed fluctuated greatly, from 50-100 in 1977 to approximately 115,000 in 1986 (HRG 1996a and CNDDB 2007). Sometime between 1986 and 1988, cattle grazing on the site ceased. Between 1989 and 1995, Santa Cruz tarplant numbers on the site declined precipitously. In 1993, only 131 plants were present in area D and 2 plants were present in area A, with no plants in the other two historic colonies (HRG 1993), and, in 1994 and 1995, no plants were observed anywhere on the site (HRG 1996).

In 1995, following acquisition of the site by the City of Santa Cruz in 1994, it was decided to undertake intensive management efforts to attempt to revive the Santa Cruz tarplant population on the site by stimulating germination and growth of dormant seed in the soil. Scraping, mowing, weed-whipping, raking, and prescribed burns were used sporadically in area A between 1996 and 1999 (in addition to a 1996 arson fire), and small portions area D were hand scraped in 1996 and 1997. Approximate tarplant numbers in Area A between 1996 and 2005 have ranged from 619 to over 10,000, but have mostly been less than 2,500 (Brady/LSA 1999; BMP Ecosciences 2006; Santa Cruz Parks and Recreation Department 2006). Between 1997 and 2004, numbers of plants in area D have ranged from 1 to 156; none were present in 2005. Since 1999, no management, or only small-scale experimental treatments, has occurred in areas A and D. Areas B and C have never received any management other than periodic mowing, and no plants have been observed in those areas since 1989, except for 1998, when 5 plants were observed in area B and 20 plants were observed in area C. No plants were observed in any of the sub-populations in 2006 (Santa Cruz Parks and Recreation Department 2006). A management plan, prescribing a series of active management measures as well as monitoring and continued experimental research, has been prepared for Santa Cruz tarplant at the Arana Gulch site (BMP Ecosciences 2006).

The DeLaveaga Park occurrence of Santa Cruz tarplant is CNDDB Occurrence No. 47 and is designated by USFWS (2002b) as the DeLaveaga critical habitat unit, or Unit C. It is located in grassland north of the California Army National Guard armory, on a higher, older coastal terrace, on Watsonville loam soil (Bowman and Estrada 1980). Although it is surrounded by the city-owned DeLaveaga Park, the land on which this occurrence is located is owned and managed by the California Army National Guard. This occurrence has been monitored much less extensively than the Arana Gulch occurrence, and has not received any active management. In the last year for which data are available, 2001, this population supported “several thousand” Santa Cruz tarplant individuals (USFWS 2002b).

Gairdner's yampah (*Perideridia gairdneri* ssp. *gairdneri*). Gairdner's yampah is listed on List 4 of the CNPS *Inventory* (Tibor 2001 and CNPS 2012). It has no state or federal status. Gairdner's yampah is a small to medium-sized perennial herb in the carrot or parsley family (Apiaceae). The aerial stems are annual, i.e., the plant dies back to the ground at the end of every season. The species is perennial from a small underground tuber. During the rainy season, it produces a rosette of basal leaves that are divided into long, narrowly linear segments resembling blades of grass. The plant bolts in late spring and flowers from June to October. It produces a flat-topped cluster (umbel) of small white flowers, similar to that of many members of the carrot or parsley family. The basal leaves wither before or shortly after flowering, and the stem leaves are relatively small and inconspicuous, giving the flowering plant a nearly leafless appearance. Seed is set and dispersed in the fall.

Gairdner's yampah occurs, or historically occurred, in most coastal and near-coastal counties in California from San Diego County to Del Norte County, although it is now uncommon south of Monterey County and is believed to be extirpated in some southern California counties in which it historically occurred (Munz and Keck 1973; Hickman 1993; Tibor 2001; Baldwin et al. 2012; CNPS 2012). It grows in seasonally moist, open areas in grasslands and in forest and scrub openings. In northern and central California, it is especially associated with coastal prairie grasslands, or grasslands that were coastal prairies before invasion of weedy non-native grasses.

Within the City of Santa Cruz, Gairdner's yampah is known only from Pogonip Park. Eight distinct colonies of Gairdner's yampah have been mapped in grassland areas throughout the park (Santa Cruz Parks and Recreation Department 1998), some of them within large grassland areas and some in relatively small areas of grassland surrounded by forest. No information is available about numbers of plants or year-to-year fluctuations in these colonies.

Choris's popcorn-flower (*Plagiobothrys chorisianus* var. *chorisianus*) and Hickman's popcorn-flower (*Plagiobothrys chorisianus* var. *hickmanii*). These two taxa are treated together because, for one of the two reported occurrences of *Plagiobothrys chorisianus* within the city limits of Santa Cruz, it is not known which taxon is represented. Choris's popcorn-flower is listed on List 1B of the CNPS *Inventory* (Tibor 2001 and CNPS 2012) and, therefore, falls under CEQA regulatory authority. It has no other federal or state status. Hickman's popcorn-flower is listed on List 4 of the CNPS *Inventory*, and has no state or federal status.

Choris's popcorn-flower and Hickman's popcorn-flower are small annual herbs in the borage family (Boraginaceae). Both have stems that are prostrate to sometimes (in Choris's popcorn-flower) erect. Seeds germinate following the onset of winter rains, and the plants grow vegetatively until the onset of flowering. The leaves are narrowly oblong, opposite on the lower portion of the stem, and alternate above. Plants flower between March and June, and, as in other popcorn-flower species, the flowers are relatively small, white, and radially symmetrical. Seed is set and dispersed following flowering. Technical characteristics of the nutlets (fruits) are important for distinguishing popcorn-flower species, including Choris's popcorn-flower and Hickman's popcorn-flower. Although the taxonomic distinction between them has been questioned (Hickman 1993), Choris's popcorn-flower and Hickman's popcorn-flower are separated from each other by growth habit, characteristics of the lower leaf bases, and flower size (Munz and Keck 1973; Hickman 1993; Baldwin et al. 2012). Choris's popcorn-flower tends to have more erect stems and has lower leaf bases that are fused and prominently sheathing the stems and flowers that are 6-10 mm (0.2-0.4 inches) wide. The stems of Hickman's popcorn-

flower are generally strictly prostrate, the lower leaf bases are separate or nearly so and not or only slightly sheathing, and the flowers are 5-6 mm (approximately 0.2 inches) wide.

Both taxa grow in seasonally wet marshes and other low, moist or seasonally moist, more or less open places within a variety of plant communities (Thomas 1960; Munz and Keck 1973; Hickman 1993; Tibor 2001; Baldwin et al. 2012; CNPS 2012). Choris's popcorn-flower occurs near the coast in the Santa Cruz Mountains region, from San Francisco to southern Santa Cruz County, and may also occur, or had historically occurred, in Alameda County (Munz and Keck 1973; Hickman 1993; Tibor 2001; Baldwin et al. 2012; CNPS 2012). Hickman's popcorn-flower occurs from Santa Cruz and Santa Clara counties south to San Luis Obispo County. Both taxa have a number of known extant or historic localities in Santa Cruz County (Thomas 1960 and Morgan et al. 2005). There are four Santa Cruz County occurrences of Choris's popcorn-flower in CNDDB records, all of them presumed extant. One is located in the Watsonville area, one is in Scotts Valley, and two are in the Swanton area in northern Santa Cruz County. The CNDDB does not maintain occurrence records for Hickman's popcorn-flower.

Forms of *Plagiobothrys chorisianus* have been reported from two locations within the Santa Cruz city limits. There are no CNDDB records for either location. Choris's popcorn-flower has been reported from the grassland at the southwestern corner of Lighthouse Field State Beach (Strelow Consulting 2003b). It is not known when this observation was made, and Choris's popcorn-flower was not found on the site during botanical surveys conducted in spring 2002. A form of *Plagiobothrys chorisianus* was also observed by local California Native Plant Society representatives at Arana Gulch Open Space Preserve in 1998, occurring in the grassland within Santa Cruz tarplant area A (above) (Brady/LSA 1999). These plants could not be positively identified as either Choris's popcorn-flower or Hickman's popcorn-flower (R. Morgan, pers. comm. 2006). This species has apparently not been observed on the site since 1998.

San Francisco popcorn-flower (*Plagiobothrys diffusus*). San Francisco popcorn-flower was state listed as Endangered in 1979 (CDFG 2007a). It is also listed on List 1B of the CNPS *Inventory* (Tibor 2001; CNPS 2012). San Francisco popcorn-flower is a low, often prostrate annual herb in the borage family (Boraginaceae). It is generally similar to Choris's popcorn-flower and Hickman's popcorn-flower, with narrow leaves that are opposite below and alternate above, and small white flowers. Seeds germinate following winter rains, and the plant grows vegetatively until it flowers, from March to June. Seed is set in the summer. As with other species of popcorn-flower, positive identification of this species depends on technical characteristics of the nutlets (fruits). The taxonomic distinctiveness of San Francisco popcorn-flower from netted popcornflower (*Plagiobothrys reticulatus* var. *rossianorum*) has been questioned (Messick 1993), and further research is needed to clarify the issue.

San Francisco popcorn-flower occurs in seasonally moist areas in grassland and possibly in coastal scrub (Thomas 1960; Munz and Keck 1973; Hickman 1993; Tibor 2001; Baldwin et al. 2012; CNPS 2012). It was once thought to have occurred only in San Francisco (Thomas 1960; Munz and Keck 1973) and was thought to be extinct. In recent decades, populations identified as San Francisco popcorn-flower have been found in Alameda, San Mateo, and Santa Cruz counties (Tibor 2001; CNDDB 2007; CNPS 2012). The CNDDB has occurrence records for 12 occurrences that are known or presumed to be extant; nine of these occurrences are in Santa Cruz County.

San Francisco popcorn-flower is known from two areas within the City of Santa Cruz: from the western portion of the city, in and near the Moore Creek Preserve (Santa Cruz Parks and Recreation Department 2002; Biotic Resources Group 2001) and from Pogonip Park (Santa Cruz Parks and Recreation Department 1998). San Francisco popcorn-flower in the Moore Creek Preserve comprises CNDDB Occurrence Nos. 8 and 9. These two CNDDB occurrences apparently are for opposite sides of the West Branch Moore Creek canyon, but San Francisco popcorn-flower is probably best regarded as having one occurrence in this area, with numerous individual colonies. San Francisco popcorn-flower was first discovered in 1989 in the area that became Moore Creek Preserve (Santa Cruz Parks and Recreation Department 2002).

San Francisco popcorn-flower also occurs on a large private parcel, known as the Poliski-Gross property, south of Meder Street and east of the Moore Creek Preserve boundary. In 2000 and 2001, Biotic Resources Group (2001) mapped a total of six distinct colonies of San Francisco popcorn-flower on the Poliski-Gross property. Numbers of plants observed were not reported.

The San Francisco popcorn-flower occurrence at Pogonip Park is CNDDB Occurrence No. 10. San Francisco popcorn-flower occurs in the eastern portion of the Haunted Meadow grassland in the northern portion of the park (Santa Cruz Parks and Recreation Department 1998).

Santa Cruz clover (*Trifolium buckwestiorum*). Santa Cruz clover is listed on List 1B of the CNPS *Inventory* (Tibor 2001 and CNPS 2012) and, therefore, falls under CEQA regulatory authority. It has no other federal or state status.

Santa Cruz clover is a small, decumbent to ascending annual herb in the legume family (Fabaceae). Seeds germinate following the onset of winter rains, and the plant grows vegetatively until flowering, generally from April to June, but sometimes flowering into October. Seed is set and dispersed in the summer and fall. Like most clovers, Santa Cruz clover has leaves that are divided into three leaflets. The very small white to pinkish flowers are borne in heads. Early heads are few-flowered, have no peduncle (stalk) or only a short peduncle, lack an involucre (a disk, made up of fused bracts, at the base of the head), and have cleistogamous flowers (flowers that never open). Later heads have more flowers, are on peduncles several times the length of the head, are subtended by an involucre, and have flowers that open. (No other native California clover has this distinction between early and late flower heads, although one species that is introduced in the state has this characteristic.) The lobes of the calyx (the outer, green portion of the flower) are finely toothed, and are unlike the calyx-lobes of any other involucrate clover. The occurrence of cleistogamous flowers in this species, as well as the generally small size and inconspicuous coloration of the flowers, suggest that the species is largely self-pollinating.

Santa Cruz clover occurs in seasonally moist areas in grassland, and sometimes in disturbed areas (Hickman 1993; Best et al. 1996; Tibor 2001; Baldwin et al. 2012; CNPS 2012). This species was not described in the botanical literature until 1992 (Isely 1992), so all distribution records for this species are relatively recent. It is currently known from Monterey, Santa Cruz, Santa Clara, and San Mateo counties south of San Francisco Bay and from Sonoma and Mendocino counties north of San Francisco Bay (Hickman 1993; Tibor 2001; Baldwin et al. 2012; CNPS 2012; and R. Buck, pers. comm. 2006). The CNDDB has records for six occurrences in Santa Cruz County.

Within the city limits of Santa Cruz, Santa Cruz clover is known to occur only in the Haunted Meadow grassland in the northern portion of Pogonip Park (Santa Cruz Parks and Recreation Department 1998). This is CNDDB Occurrence No. 5. Santa Cruz clover is mapped as occurring in the extreme northeast corner of the Haunted Meadow. Numbers of plants observed were not reported.

Special-Status and Senstive Wildlife Protected Under CEQA

A number of wildlife species that occur within the City of Santa Cruz are considered under CEQA. Those with special status are listed in Table 4 along with their locations and described in the sections below. Nesting birds are protected under the MBTA and CEQA. Birds that are known to nest within the city are listed in Appendix A. Marine mammals are protected under the MMPA. Marine mammals that occur within the City in the San Lorenzo River and the Yacht Harbor include the southern sea otter (*Enhydra lutris neries*), the Pacific harbor seal (*Phoca vitulina richardsi*), and California sea lion (*Zalophus californianus californianus*). These species are included in the table below. Special-status wildlife whose activities within the city limits are unlikely to require protection under CEQA are listed in Appendix B.

Invertebrates

Ohlone Tiger Beetle (*Cicindela ohlone*). The Ohlone Tiger beetle is listed as Federally Endangered. The beetle is listed by the CNDDB as G1S1. The CNDDB ranking indicates global and state status of extremely Endangered (CDFG 2011CDFG 2011).

The Ohlone tiger beetle is associated with coastal prairie, although it has also been found in degraded prairie remnants that are characterized by a mix of annual grasses and other ruderal plants. The beetle often occurs on Watsonville loams (Bowman et al.1980). Other factors that influence habitat suitability include soil particle size, moisture, and depth (D. Arnold pers. comm. 2006).

This species excavates ground burrows in areas that are sparsely vegetated or barren. Adults hunt above ground, preying on smaller, soft bodies insects and invertebrates (Larochelle 1974), while the larvae are found underground. The entrance hole of the burrow is constructed such that the hole goes straight down and is approximately the size of a pencil. The Ohlone tiger beetle‘s activity period is winter-spring (Nagano 1980).

The Ohlone tiger beetle has been known to occupy a varying montage of polygons within the City of Santa Cruz limits, in the Pogonip, on Moore Creek Preserve (R. Arnold pers. comm. 2007) and the adjacent undeveloped Kinzli (Hayes 2000) and Poliski-Gross (Biotic Resource Group with Dana Bland and Associates 2001) properties and at the western end of Meder Street. The beetle also occurs just outside of city limits on nearby UCSC campus lands. Presence of the beetle is assumed in areas that provide potential habitat until the presence and distribution of the beetle are determined.

Table 4. Status, habitat requirements, and location of special-status wildlife occuring in the City of Santa Cruz, California.

Common Name *Scientific Name*	Status[1] Federal/State/Other	Habitat Requirements	Location[2]
Invertebrates			
Ohlone tiger beetle *Cicindela ohlone*	E/--/G1S1	Coastal prairie and open grassland with barren areas for burrow construction.	Pogonip[3] Moore Creek Preserve[4] Private Parcels near Moore Creek Preserve and Meder St[5] (UCSC[6])
Monarch butterfly (wintering sites) *Danaus plexippus*	--/--/G5S3, L	Eucalyptus, Monterey Pine, or Monterey Cypress tree groves.	Lighthouse Field[7] Natural Bridges[7] Lower Branciforte Creek[8]
Fish			
Coho Salmon (Central CA ESU) *Oncorhynchus kisutch*	E/E/G4S2?	Spends the first few years of its life in fresh water before migrating to the ocean. Adults will later return to the freshwater location where they were spawned to breed.	San Lorenzo River[9] (H)
Steelhead (Central CA DPS) *Oncorhynchus mykiss irideus*	T/--/G5S2	Spends the first few years of its life in fresh water before migrating to the ocean. Adults will later return to the freshwater location where they were spawned to breed.	Carbonera Creek[10] Branciforte Creek[10] Arana Gulch[10] San Lorenzo River[10]
Tidewater goby *Eucyclogobius newberryi*	E/SC/G3S2S3	Coastal lagoons and creeks up to 3 miles with protected still water areas.	Moore Creek[11] San Lorenzo River[12] (Younger Lagoon[13])
North American green sturgeon (Southern DPS) Acipenser medirostirs	FT/SC/G3S1S2	Spend the majority of their lives in nearshore oceanic waters, bays, and estuaries. Spawning and early-life stages (less than 4 years old) occur in fresh water.	HP, CHP
Amphibians and Reptiles			
California red-legged frog Rana draytonii	T/SC/G4T2T3S2S3	Requires the presence of surface water until mid to late summer for reproduction; occupies ephemeral and/or perennial water with standing or slow moving flows; upland habitat includes leaf litter and small mammal burrows; adults are known to travel up to 2 miles overland between aquatic sites.	Moore Creek[14 & 15] (B) Antonelli Pond[16] Natural Bridges Marsh[16] (UCSC coastal lands[13 & 17]) (UCSC Arboretum Pond[18 & 19]) (B)
Western pond turtle *Emmys marmorata*	--/SC/G3G4S3	Found in ponds, marshes, rivers, streams, and irrigation ditches containing aquatic vegetation; usually seen sunning on logs, banks, or rocks. Moves up to 3-4 miles within a creek system, especially during "walk-abouts" before a female lays eggs; nests in burrows in upland areas up to several hundred feet away from aquatic habitat, in woodlands, grasslands, or open forest.	Antonelli Pond[20] Neary Lagoon[14] Moore Creek[19 & 21] Natural Bridges Marsh[19] Pogonip-San Lorenzo River[22] (UCSC Arboretum Pond[14])
Birds (protected activity/habitat)			
Brown pelican (communal roosts and rookeries) *Pelecanus occidentalis californicus*	Delisted/Delisted, FP/G4T3S1S2	Nest in large colonies mostly on small coastal islands. Preferred nesting sites provide protection from mammal predators, and sufficient elevation to prevent widescale flooding of nests (USFWS Division of Endangered Species 2007). The nests occur on the ground, in bushes, or in the tops of trees.	Cliffs from Lighthouse Point to (Younger Lagoon[23 & 24]) Municipal Wharf [25] San Lorenzo River [26]
Double-crested cormorant (rookeries) (*Phalacrocorax auritus*)	--/WL/G5S3	Marine and inland aquatic habitats, such as ponds, lakes, rivers, lagoons, estuaries, and open coastline.	San Lorenzo River[24](H) (Schwan Lagoon[24])

Table 4. (continued)

Common Name *Scientific Name*	Status[1] Federal/State/Other	Habitat Requirements	Location[2]
Black-crowned night heron (rookeries) (*Nycticorax nycticorax*)	--/--/G5S3	Roosts among the dense foliage of trees (that are not always adjacent to water). It will also roost within fresh or brackish emergent wetlands, as well as on piers, and pilings (Grinnell and Miller 1944).	Branciforte Creek[24] (H) Neary Lagoon[27] (P)
Sharp-shinned hawk (nesting) *Accipiter striatus*	--/WL/G5S3	Nests in deciduous riparian forest associated with dense stands of smaller conifers.	Arana Gulch[28](P) Meder Canyon[29](P) Pogonip[3] (P) (UCSC[24])
Cooper's hawk (nesting) *Accipiter cooperi*	--/WL/G5S3-	Nests in deciduous riparian forest, live oak, or second growth conifers usually near stream courses with dense canopy cover and open understory.	Moore Creek[30] Pogonip[24] Harvey West Park[24] DeLaveaga[24] (UCSC[24])
Golden eagle (nesting & wintering) Aquila chrysaetos	--/WL, FP/G5S3	Resident in open mountains, foothills, canyons, or plains. Nests in a mass of sticks on cliffs or in trees. Is frequently observed foraging over nearby open fields of UCSC and Moore Creek Preserve lands.	Pogonip[3 & 24] Rincon Gorge[24] (unconfirmed) (UCSC[24])
Ferruginous hawk (wintering) (*Buteo regalis*)	BCC/WL/G5S3S4	Grasslands, agricultural areas, sagebrush flats, low foothills, and desert scrub (Garrett and Dunn 1981).	Antonelli Pond[20]
White-tailed kite *Elanus leucurus*	--/FP/F5S3	Nests in conifers on the margins of open areas including grasslands and sloughs containing a high abundance of small mammals and lizards.	Pogonip[24 & 29] Natural Bridges[30] (UCSC[6])
Merlin (wintering) *Falco columbarius*	--/WL/G5S3	Utilizes a wide variety of habitats, from annual grasslands to ponderosa pine and montane hardwood-conifer habitats. Also favors coastlines, lakeshores, and wetlands. Forages along shorelines in winter, to hunt for shorebirds (CDFG 2005).	Arana Gulch[28 & 31] Lighthouse Field[32] Meder Canyon[29] Antonelli Pond[20] (UCSC Marine Science lands[33])
Black oystercatcher (nesting) *Haemotopus bachmani*	BCC/--/G5S2	Rocky shores of marine habitats, and on adjacent islands. Requires cliffs, rock outcrops, offshore rocky islets, jetties and similar features of coastal rocky intertidal habitats for roosting at high tide.	Natural Bridges/De Anza[23 & 24]
Long-eared owl (nesting) *Asio otus*	--/SC/G5S3	Utilizes abandoned stick nests of other large birds or squirrel nests in a variety of wooded areas, including orchards and usually near aquatic and open areas for foraging; forages mostly on rodents.	Neary Lagoon[27] (P) Pogonip[3] (P)
Burrowing owl (burrow and wintering sites) *Athene cunicularia*	--/SC/G4S2	Open grassland habitats for foraging and nesting. Suitable habitat has low-growing vegetation interspersed with bare ground; and hillocks, berms, fence posts or other slightly elevated objects available for resting/perching.	Pogonip[3] (P) Moore Creek[21] (P) Private parcels adjacent to Moore Creek[21] (P) (UCSC[24])
Vaux's swift (nesting) *Chaetura vauxi*	--/SC/G5S3	Nest in hollow trees in forested environments. Nest made of conifer needles are glued together with salvia and attached to inside wall of hallow tree usually near the bottom. Post breeding flocks up to several hundred may roost together in chimney like tree hollows.	Residential neighborhoods near Natural Bridges, Spring Street and (UCSC Arboretum)[24]
Black swift (nesting) *Cypseloides niger*	--/SC/G4S2	Breeds along coastal bluffs and mountains.	Mitchell's Cove[24] (H) Lighthouse Point[24 & 32] (H)
Loggerhead shrike (nesting) *Lanius ludovicianus*	BCC/SC/G4S4	Grassland and shrub habitats with small reptiles and insects.	Pogonip (P) Moore Creek (P) Private parcels adjacent to Moore Creek[21] (P)

Table 4. (continued)

Common Name *Scientific Name*	Status[1] Federal/State/Other	Habitat Requirements	Location[2]
California horned lark *Eremophila alpestris actia*	--/WL/G5T3QS3	Open, level or gently-sloping California habitats, including sage scrub, grassland, chaparral, alkali playa, as well as agricultural and residential lands. (Grinnell and Miller 1944). Builds a grass-lined nest in a depression on the ground out in the open.	Pogonip[22] Moore Creek (P) Private parcels adjacent to Moore Creek[21] (P)
Oak titmouse (nesting) *Baeolophus inornatus*	BCC/--/G5S3?	Warm, dry oak, pine, or oak-pine woodlands. The breeding pair builds a nest of grass, moss, mud, hair, feathers, and fur (Harrison 1978) in a woodpecker hole, natural cavity, or nest box.	Lighthouse Field[24] Neary Lagoon[24] Garfield Park[24] Westside residential areas[24] lower Branciforte Creek[24] Oceanview Park[24] Jesse Street Marsh area[24] San Lorenzo River (N of Hwy 1) [24] Natural Bridges[24] (unconfirmed)
Yellow warbler *Dendroica petechia brewsteri*	BCC/SC/G5T3?S2	Nests in deciduous riparian woodland with open canopy along streams or other watercourses; forages in dense understory of riparian woodland.	Arana Gulch Neary Lagoon Moore Creek Preserve Antonelli Pond Carbonera Creek Branciforte Creek Westlake Pond San Lorenzo River (H) (P)
Hermit warbler (nesting) *Dendroica occidentali*	BCC/--/G4G5S3?	Mature stands of conifers (ie., Douglas-fir, redwood, and montane hardwood-conifer habitats), with open to dense canopy for breeding and other activities.	Pogonip[24] (UCSC[24])
Saltmarsh common yellowthroat[38] *Geothlypis trichas sinuosa*	BCC/SC/G5T2S2	Nests in overgrown fields with scrub, on the margins of woodlands, and freshwater and saltwater marshes. Builds well-concealed open-cup nests, typically near the ground in grasses, herbaceous vegetation, cattails, tules, and scrub (including coyote brush) (Gardali and Evens date).	Neary Lagoon[27& 34] San Lorenzo River[26] (Younger Lagoon[35])
Yellow-breasted chat (nesting) *Icteria virens*	--/SC/G5S3	Dense riparian vegetation 1-8 ft. above the ground, with a well-developed understory.	San Lorenzo River (H)
Chipping sparrow (nesting) *Spizella passerina*	--/--/G5S3S4	Open wooded habitats with a sparse or low herbaceous layer and few shrubs. Prefers trees for nesting, resting, singing, and other cover, but will also utilize shrubs and ground herbage. Also known to breed or winter in orchards (Grinnell and Miller 1944, McCaskie et al. 1979, Garrett and Dunn 1981).	Moore Creek[24] Pogonip[24] (UCSC[24])
Grasshopper sparrow *Ammodramus savannarum*	--/SC/G5S2	Occurs in dry, dense grasslands, especially in those with a variety of grasses, tall forbs, and scattered shrubs (Grinnell and Miller 1944; McCaskie et al. 1979 and Garrett and Dunn 1981). Builds nests composed of grasses and forbs, located in a slight depression in ground at the base of an overhanging clump of grasses or forbs (Harrison 1978).	Moore Creek[24] Pogonip[24]
Tricolored blackbird (nesting colonies) *Agelaius tricolor*	BCC/SC/G2G3S2	Breeds near fresh water, preferably in emergent wetland with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, tall herbs. Their nests are usually located near fresh water, and tend to be hidden on the ground among low vegetation (Orians 1960).	Neary Lagoon[24] (H) Antonelli Pond[24] (H)

Table 4. (continued)

Mammals			
Townsend's western big-eared bat *Corynorhinus [Plecotus] townsendii townsendii*	--/SC/HP; G4S2S3	Roost sites are highly associated w/ caves and mines; buildings must offer "cave-like" features; known to roost in tree hollows and under bridges.	Pogonip Clubhouse[37] undeveloped lands and open spaces (P)
Pallid bat *Antrozous pallida*	--/SC/HP; G5S3	Roost sites are primarily associated with oak, redwood, ponderosa pine, and giant sequoia forests. Will also roost under bridges and in buildings and rock outcrops.	undeveloped lands and open spaces (P)
Western red bat *Lasiurus blossevillii*	--/SC/HP; G5S3	Roosts in foliage primarily in riparian and wooded habitats.	Arana Gulch[31] undeveloped lands and open spaces (P)
Fringed myotis *Myotis thysanoides*	--/**/HP; G4G5S4	Roosts sites in California are primarily in buildings or mines; will also roost in large conifer snags and in caves.	undeveloped lands and open spaces (P)
Long-legged myotis *Myotis volans*	--/**/HP; G5S4?	Roosts primarily in large hollow tree snags, or live trees with exfoliating bark; also uses rock crevices, mines, and buildings.	undeveloped lands and open spaces (P)
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	--/SC/--	Associated with riparian, oak woodland and redwood forest habitats. Builds stick nests under or in buildings, hollow trees, or in tree canopy.	undeveloped lands and open spaces
American badger *Taxidea taxus*	--/SC/--	Drier open stages of most shrub, forest, and herbaceous habitats, that are composed of friable soils. American badgers dig burrows in friable soil for cover, frequently reusing old burrows. They are also known to dig a new den each night (especially in summer) (Messick and Hornocker 1981).	undeveloped lands and open spaces (P) (UCSC[14 & 19])
Southern sea otter *Enhydra lutris nereis*	T, MMPA/FP/--	Inhabit nearshore coastal waters, bays, harbors, and estuaries along the central California coast, and are often associated with rocky substrate. Most remain inshore of the outer kelp edge, and foraging activity is generally restricted to water depths of 25 meters or less.	Yacht Harbor[39]
California sea lion *Zalophus californianus*	MMPA /--/--	California sea lions reside in shallow coastal and estuarine waters. They haul out on sandy beaches, marina docks as well as jetties and buoys.	Yacht Harbor, Santa Cruz Wharf[39]
Eastern Pacific harbor seal *Phoca vitulina richardsi*	MMPA /--/--	Occur in nearshore coastal California waters, rivers, bays, harbors and estuaries. Hauls out on rock outcroppings, beaches, mudflats, and docks that have easy access to water.	Yacht Harbor[39]

NOTES:

1 **Federal Status (USFWS 2007b, c, d; CDFG 2011)**

E = Endangered: Any species, which is in danger of extinction throughout all, or a significant portion of its range.
T = Threatened: Any species, which is likely to become an endangered species within the foreseeable future throughout all, or a significant portion of its range.
BCC = Considered by Fish and Wildlife Service as a 'Bird of Conservation Concern' with a high priority to study and take action to protect.
MMPA = Marine Mammal Protection Act protects all marine mammals and haul out sites (NOAA NMFS 2004).

State Status (CDFG 2011)

E = Endangered: A native species or subspecies of animal which is in serious danger of becoming extinct throughout all, or a significant portion of its range, due to loss of habitat, change in habitat, over exploitation, predation, competition and/or disease.
T = Threatened: A native species or subspecies that, although no presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of special protection and management efforts.
SC = CDFG Species of Special Concern are taxa given special consideration because they are biologically rare, very restricted in distribution, declining throughout their range, or at a critical stage in their life cycle when residing in California or taxa that are closely associated with a habitat that is declining in California (e.g., wetlands)
WL = CDFG Watch List Birds are a new category created in the 2008 California Bird Species of Special Concern (CDFG et al. 2008). The birds on this watch list are 1) not on the current Special Concern list but were on previous lists; 2) were previously but are not currently state or federally listed; or 3) are on the list of "Fully Protected" species.
FP = Fully Protected: This classification was the State's initial effort in the 1960's to identify and provide additional protection to those animals that were rare or faced possible extinction. Fully Protected species may not be taken or possessed at any time and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock.
** = Included on preliminary list of revised CDFG Mammal Species of Special Concern (CDFG 1996)

Other

L = Local; protected by existing City General Plan (Santa Cruz Department of Planning and Community Development 2003a)
HP = Considered "High Priority" on the Western Bat Working Group's (WBWG) Western Bat Species Regional Priority Matrix (1998)

Table 4. (continued)

NOTES (continued):

CNDDB Ranking (CDFG 2011; NatureServe 2009):
G = Global (worldwide status of a full species): G1 to G5
T = Status of a subspecies throughout its range: T1 to T5
S = State (statewide status of a full species or a subspecies): S1 to S5

where:
1 = Extremely endangered
2 = Endangered
3 = Restricted Range, Rare
4 = Apparently secure
5 = Demonstrably secure: commonly found throughout its historical range
? = Inexact Numeric Rank

2 ( ) = Locations outside of the city limits.
H = Historical Observation
B = Breeding Habitat (except birds—locations correspond to protected activity only—listed by species name)
P = Potential Habitat

3 Santa Cruz Parks and Recreation Department (1998)
4 R. Arnold, pers. comm. (2007)
5 Hayes (2000) and Biotic Resource Group with Dana Bland and Associates (2001)
6 EcoSystems West (2004)
7 T. Hyland pers. comm. (2006), ESW 2006 Surveys, and CNDDB
8 ESW 2006 Surveys; CNDDB 2007
9 Smith 1982
10 Entrix (2004b); HRG (1996); and DWA (2000 and 2002)
11 Smith and Welch (1996); Smith (2001)
12 C. Swift pers. comm. (2005)
13 EcoSystems West (2002a)
14 K. Glinka pers. comm. (2007)
15 Bulger (1999), M. Fusari pers. comm. (2000); and M. Allaback pers. comm. (2000)
16 M. Westphall pers. comm. (1997)
17 Mori (1997); G. Gray pers. comm. (1998)
18 M. Fusari pers. comm. (2000); M. Allaback pers. comm. (2001)
19 CNDDB (2007)
20 LTSCC (2001)
21 Biotic Resource Group with Dana Bland and Associates (2001)
22 Brady LSA (1998)
23 ESW 2006 Surveys
24 Gerow (2006)
25 Entrix (2004a)
26 Swanson Hydrology and Geomorphology et al. (2002)
27 David J. Powers and Associates, Inc. (1998)
28 HRG (1996); Strelow Consulting and EcoSystems West (2000)
29 John Gilchrist and Associates (1998)
30 Strelow Consulting (2002a)
31 Santa Cruz Parks and Recreation Department (2006)
32 Strelow (2003b)
33 Tyler (1987)
34 Jones and Stokes (1992)
35 EcoSystems West (2002b)
36 Suddjian (1990)
37 P. Heady pers. comm. (2006)
38 It is a question of debate in the ornithological community whether the birds identified within the City of Santa Cruz represent the common yellowthroat (*Geothlypis trichas)* or the special-status sub-species, the saltmarsh common yellowthroat (*Geothlypis trichas sinuosa).*
39E. McGinty pers. comm. (2009), P. Clark pers. comm. (2008) and Andrew Church pers. comm. (2007).

Monarch Butterfly (*Danaus plexippus)* (over-wintering sites). The over-wintering sites of the monarch butterfly are given a CNDDB Ranking of G5S3. The CNDDB state ranking indicates a restricted range for the butterfly, and rare based on the number of individuals per area of occupied habitat (CDFG 2011). Over-wintering sites, adequate buffers around the sites, and nectar sources are protected by the local City of Santa Cruz General Plan policy (Santa Cruz Department of Planning and Community Development 2003a).

The monarch butterfly is known for its vast, seasonal, multigenerational migrations, with wintering roost sites providing a vulnerable link in the migratory path (J. Dayton pers. comm. 2007). Two distinct populations of monarchs are recognized in North America, based on two separate migratory routes. The eastern monarch butterfly population overwinters in Mexico, and breeds in regions east of the Rocky Mountains. The western population of the monarch overwinters in a narrow band along the California coast and breeds during the summer in a broader geographic range west of the Rocky Mountains (Dayton and Bell 1992).

Stands of eucalyptus (*Eucalyptus* spp.), Monterey pine (*Pinus radiata*), and Monterey cypress (*Cupressus macrocarpa*) are commonly utilized as over-wintering sites in California (Dayton and Bell 1992). The larval stage of this species feeds upon milkweed, and is capable of incorporating the milkweed toxins into their bodies to acts as a deterrent to predators. Adult monarchs rely soley on the nectar of flowers for nourishment, and aposematic (warning) coloration as protection from potential predators (J. Dayton pers. comm. 2007).

Monarchs are sensitive to even the slightest changes in wind conditions, temperature, and noise disturbance. Location characteristics such as southeast aspect, wind protection, proximity to nectaries, and other abiotic and biotic factors determine habitat suitability for monarchs. In addition, populations may fluctuate widely from year to year, depending upon a number of factors, including the timing of winter rains, winter temperatures, and adequate food supply for larva (J. Dayton pers. comm. 2007). Overall, populations appear to be declining due to general trends of climate change, urban development (San Diego Union Tribune 2006), and farming practices such as herbicide use, which have reduced milkweed populations (J. Dayton pers. comm. 2007).

Both fluctuations in population and changes in location characteristics affect the selection of wintering roost sites from year to year. A site may serve as an autumnal roost in low population years and as an over-wintering site in years with greater numbers of butterflies. Changes in the canopy density of a tree stand may cause a shift in a site from an over-wintering site to autumnal roost. In general, there is great variability from year to year, in terms of which sites will be occupied. For example, within the City of Santa Cruz, in previous years, Lighthouse Field was used by monarchs as an autumnal roosting site, was later unoccupied, and currently supports a large number of over-wintering butterflies (J. Dayton pers. comm. 2007).

Monarch 2006 Survey Results

During our assessment conducted during fall and winter of 2006, we observed suitable monarch butterfly habitat within 36 locations. The majority of these sites consisted of eucalyptus groves,

located primarily on the perimeter of the city. The sites ranged in size from 0.25 to 32.5 acres, with an average size of only 4.5 acres.

Of the 36 areas identified as having suitable habitat, we identified 18 as confirmed monarch butterfly roost sites based on prior records or observations, or our own observations of roosting butterflies during our assessment.

Monarch butterflies were observed flying in the vicinity of 2 of the other 18 sites, which we were unable to conclude as known monarch butterfly sites. We did not observe monarch butterflies during the fall/winter of 2006 within 11 sites which we were able to access. However, we note that monarch butterfly populations were low state-wide during the 2006 fall/winter season (J. Dayton pers. comm. 2007). Finally, we were unable to access the remaining 5 habitat areas, so additional surveys are recommended.

The two main over-wintering sites within the limits of the City of Santa Cruz are at Lighthouse Field and Natural Bridges (EcoSystems West [ESW] 2006 Surveys; Hyland pers. comm. 2006; CNDDB 2007). Lower Branciforte Creek, across from Ocean View Park provides another important over-wintering site, with butterflies numbering in the hundreds during the 2006 survey (T. Hyland pers. comm. 2006; ESW 2006 Surveys; and CNDDB 2007). Autumnal roosting sites include the Home of Peace Cemetery (ESW 2006 Surveys and CNDDB 2007); Kalkar Quarry (Dayton 2001c and CNDDB 2007); Pogonip Creek above Evergreen Cemetery (CNDDB 2007); the Depot Park railroad crossing (Dayton 2001a and Strelow 2002b); Moore Creek north of Highway One (Santa Cruz Parks and Recreation Department 1987 and CNDDB 2007); 515 Highland Way (Dayton 2001b), and Delaveaga Park (CNDDB 2007). Sites that have been occupied in past years, include eucalyptus or cypress groves in the vicinity of Moore Creek, Meder Canyon (Arroyo Seco) (John Gilchrist and Associates 1998 and CNDDB 2007), Graham Hill road, Arana Gulch (Strelow 2003a and Swanson Hydrology and Geomorphology et al. 2002), Murray Street Bridge, and areas adjacent to 515 Highland Way (CNDDB 2007; Santa Cruz Parks and Recreation Department 1987; ESW 2006 Surveys). A number of eucalyptus or cypress groves in residential neighborhoods scattered throughout the city limits provide suitable roosting/ over-wintering habitat (ESW 2006 Surveys).

Fish

Coho Salmon (*Oncorhynchus kisutch*). The central California Evolutionary Significant Unit (ESU) is listed as Federally Endangered, for naturally spawning populations in streams between Punta Gorda in Humboldt County, and the San Lorenzo River in Santa Cruz County. This species is state listed as Endangered (populations south of the San Francisco Bay). The CNDDB Global Ranking for this species is G4S2?. The CNDDB State Ranking indicates an inexact Endangered status for the fish (CDFG 2011).

Coho occur in freshwater pools with extensive cover, adequate food supply, and optimal water temperatures from 54º to 57º F. Coho salmon migrate from the ocean to spawning grounds in freshwater after the first big rains in late fall or winter (Entrix 2004b). Coho spawn once before they die. Eggs are layed in redds constructed by the females in gravels and small cobbles near the head of a riffle (Entrix 2004b). Hatching occurs after four to eight weeks. Hatchlings remain in the gravel

for two to four weeks before emerging as fry. Fry spend there first year in freshwater streams and then one to two years in the ocean before returning to their spawning grounds (Shapovalov and Taft 1954 as cited in Entrix 2004b). Central California represents the southern margin of the species' natural distribution, and coastal streams of Santa Cruz County constitute the southernmost extent of coho distribution (CDFG 2003b).

The coho salmon occurred in the San Lorenzo River historically. The river was stocked with fry from the 1950's to the mid-1970's (DWA 2000), but coho have not been observed in the San Lorenzo since 1981 (Smith 1982 as cited in Entrix 2004b). The draft Recovery Strategy for the Coho Salmon is being initiated by CDFG in response to the documented critical condition of coho (CDFG 2003b). This Strategy estimates that there are approximately 6 miles of mainstem rearing habitat for coho in the San Lorenzo River, and approximately 21 miles of potential rearing habitat in the associated tributaries. Coho are known to occur in streams and creeks north of the City of Santa Cruz limits (Entrix 2004b).

Steelhead (*Oncorhynchus mykiss irideus*) (Central California Coast Distinct Population Segment). The USFWS categorizes watersheds between Aptos Creek in Santa Cruz County and the Russian River to the north in Sonoma County as the Central California Coast Steelhead Distinct Population Segment (DPS) (Federal Register 2006). The City of Santa Cruz falls within this DPS. The steelhead occurring in the Central California Coast DPS is listed as Threatened under the federal Endangered Species Act. The CNDDB Global Ranking for this species is G5S2. The CNDDB State Ranking indicates an Endangered status for the fish (CDFG 2011).

The steelhead migrates from the freshwater location where it was spawned to the ocean. The adult fish will later return to this spawning ground to breed. Steelhead spend their first few years of life in fresh water until they undergo smoltification, which physiologically transforms them into saltwater-adapted fish. Migrations to lagoons and the open ocean offer smolt and juveniles foraging opportunities for rapid growth, enabling them to become reproductive adults. Unlike coho, steelhead are capable of spawning more than once (Shapovalov and Taft 1954 as cited in Entrix 2004b).

Spawning sites require loose gravels mixed with a minimum amount of fine sand and silt that is continually exposed to flowing clean water. Eggs are laid in spawning gravels or coarse sand where water infusion and oxygenation of the substrate is maximized and streambed scour is minimized. Eggs require four to six weeks to incubate and hatchlings (sac-fry) spend another 1 to 2 weeks in the gravel before emerging. Canopies of shoreline and upland vegetation and eddies created by instream structures (e.g., logs, boulders, or emergent vegetation) offer necessary cover, shade, and refuge for steelhead (Entrix 2004b).

Steelhead are known to occur within the City of Santa Cruz limits in Carbonera and Branciforte Creeks, Arana Gulch, and the San Lorenzo River. (Entrix 2004b; HRG 1996; DWA 2000, 2002).

Tidewater goby (*Eucyclogobius newberryi*). The Tidewater goby is listed as Federally Endangered by the USFWS, and designated as a Species of Special Concern by the CDFG. The CNDDB Ranking for this species is G3S2S3. The CNDDB State Ranking indicates a Restricted

Range, Rare to an Endangered status for the fish. This species is also listed as Endangered by the American Fisheries Society (CDFG 2011).

The tidewater goby occupies calm, tidally-influenced creek areas, such as coastal lagoons that are seasonally cut off from the ocean by beach sand bars (Entrix 2004b). This species is also known to occupy creeks up to five river miles inland (Irwin and Soltz 1984 as cited in USFWS 2005a). The fish is a bottom-dweller which typically occupies waters of depths up to 3 feet (Entrix 2004b). Backwater marshes and annual sandbar formation are requisite habitat conditions for the goby. Emergent vegetation is critical for winter survival while open areas are required for spawning (Moyle 2002 as cited in Entrix 2004b). The goby spawns year round, but most often late April to early May, in burrows dug 4 to 8 inches deep in coarse sand. The tidewater goby's life span is approximately one year (Entrix 2004b).

The tidewater goby occurs within the City of Santa Cruz limits in Moore Creek (Smith and Welch 1996 and Smith 2001), and in the lower San Lorenzo River (C. Swift pers. comm. 2005). Despite a 1984 CNDDB record of the goby in Arana Gulch, based on 2004 surveys by Entrix, no suitable habitat for the fish is present in Arana Creek. "Although re-colonization of Arana Creek is possible, current habitat conditions [dredging of the Santa Cruz Yacht Harbor and lack of sandbar formation] make the establishment of a resident population unlikely" (Entrix 2004c). The tidewater goby occurs just outside of the city limits in Younger Lagoon (EcoSystems West 2002b).

North American green sturgeon (*Acipenser medirostirs*) (Southern Distinct Population Segment) (DPS). The North American green sturgeon is listed as Federally Threatened by the USFWS, and designated as a Species of Special Concern by the CDFG. The CNDDB Ranking for this species is G3S1S2. The CNDDB State Ranking indicates an Extremely Endangered to Endangered status for the fish (NOAA 2011a).

Green sturgeon are believed to spend the majority of their lives in nearshore oceanic waters, bays, and estuaries. Early life-history stages (1-4 years) reside in fresh and estuarine water, before dispersing widely in the ocean. Adults return to freshwater to spawn when they are more than 15 years of age and more than 4 feet (1.3 m) in size. Green sturgeon spawn in deep pools or "holes" in large, turbulent, freshwater river mainstems (NOAA 2011a).

The green sturgeon is known to occupy the coastal marine area of the Monterey Bay. The Monterey Bay falls within the designated coastal marine area of the green sturgeon's critical habitat; however no streams, rivers, or estuarine areas within the Monterey Bay are considered critical habitat. The closest riverine habitat occurs within the San Francisco Bay Delta and the San Joaquin/Sacramento River system and green sturgeon are believed to spawn in the Sacramento River (NOAA 2009).

Reptiles and Amphibians

California Red-Legged Frog (*Rana draytonii*). The California red-legged frog (CRLF) is listed as Threatened by the US Fish and Wildlife Service under the federal Endangered Species Act, and as a Species of Special Concern by the State (CDFG 2011). The CNDDB Ranking for the frog is

G4T2T3S2S3. The CNDDB State Ranking indicates a Restricted Range, Rare to an Endangered status for the subspecies throughout its range (CDFG 2011).

The CRLF occurs in a variety of natural and manmade habitats including pools next to or in streams, marshlands, sag ponds, and springs; as well as cattle stockponds, secondary and tertiary sewage treatment ponds, wells, canals, golf course ponds, irrigation ponds, sand and gravel pits (containing water), and large reservoirs (Jennings 1988). In addition, California red-legged frogs are known to occur and reproduce in tidally-influenced coastal marshes under certain conditions (Reis 1999). The key to the presence of CRLF in these habitats is the presence of perennial water and the general lack of introduced predators such as centrarchid fishes (e.g., large mouth bass (*Micropterus salmoides*), green sunfish (*Lepomis cyanellus*), and bluegill (*L. macrochirus*)) and introduced bullfrogs (*Rana catesbiana*). As long as there is standing water present of at least several inches in depth and introduced aquatic predators are rare or nonexistent, CRLF have a chance of being present (H.T. Harvey and Assoc. 1997). If the aquatic habitat hosts introduced aquatic predators, then the CRLF will probably disappear over time unless there is a nearby breeding site available that favors the CRLF and excludes introduced predators (H.T. Harvey and Associates 1997). CRLF and introduced aquatic predators have been observed co-existing in large reservoirs provided microhabitats are available that favor the CRLF, such as isolated pools or small coves containing adequate escape cover (e.g., submerged algae mats, stands of cattails (*Typha* spp.), bulrushes (*Scirpus* spp.) willow (*Salix* sp.), and/or root wads, undercut banks, submerged crevices, or boulders (Cook 1997 and K. Glinka personal observation 2002).

CRLF reproduction occurs at night in ponds, slack water pools of streams, or in pools of intermittent streams isolated from aquatic predators during the winter and early spring (late November through April) after the onset of seasonal rains (Storer 1925; Hayes and Jennings 1989; Jennings and Hayes 1994). Egg masses are attached to emergent vegetation such as cattails, bulrushes, roots, or twigs, at depths of 3-4 inches (Storer 1925). Eggmasses have also been observed loosely attached to floating mats of vegetation in still water conditions (Reis 1999). Typically, CRLF tadpoles require aquatic habitat of water depths greater than 2 feet (0.7 meters) (Hayes and Jennings 1989) for at least 7 months, but are known to occur in minimum water depths of 10 inches (25 centimeters) during their development (Reis 1999 and USFWS 2002). In isolated pond environments containing water year-round, tadpoles are known to overwinter in a larval form (Fellers et al. 2001).

After development, CRLF subadults and adults are known to migrate overland up to 2 miles (3.2 km) between breeding and aquatic sites to forage and/ or breed (Bulger 1998; USFWS 2002). Transient frogs have been observed in a variety of upland areas considered unsuitable for frogs such as open grasslands, croplands, and roads (H.T. Harvey & Associates 1997). They have also been observed in environments providing more available cover and refuge opportunities, in dense thickets of shrub-like vegetation, leaf litter, slash/debris piles, stockpiled boulders/rip-rap, and riparian forests (USFWS 2006). The CRLF is active year-round along the California coast, but may aestivate from late summer to early winter in small mammal and rodent burrows as well as in cracks and crevices in the ground, especially if their associated aquatic habitat becomes dry (Jennings and Hayes 1994).

Within the City of Santa Cruz limits, CRLF are known to occur and reproduce in Moore Creek (K. Glinka pers. comm. 2007; Bulger 1999; M. Fusari pers. comm. 2000; and M. Allaback pers. comm. 2000), and frogs have been observed at Antonelli Pond (Westphal pers. comm. 1997), and the marsh at Natural Bridges (M. Westphal pers. comm. 1997). Two historical records exist for the frog in Branciforte Creek (Museum of Vertebrate Zoology 1959 and California Academy of Sciences 1893). Just outside the city limits the frog is known to occur on the UCSC coastal lands north of the city (Mori 1997 and EcoSystems West 2002a) and in Younger Lagoon (G. Gray pers. comm. 1998 and B. Mori pers. comm. 1997), and known to occur and breed at the UCSC Arboretum pond (CNDDB 2007; M. Allaback pers. comm. 2001; and M. Fusari pers. comm. 2000). Adult frogs have also been observed in the mist houses of the Arboretum (M. Allaback pers. comm. 2001 and M. Fusari pers. comm. 2000).

Western pond turtle [*Emys marmorata*]. The western pond turtle (WPT) is designated as a Species of Special Concern by the California Department of Fish and Game. The CNDDB Ranking for the turtle is G3G4S3. The CNDDB ranking indicates a status from Apparently Secure to Restricted Range; Rare. The State Ranking indicates a Restricted Range, Rare; to Endangered status for the subspecies, and an Endangered status for the species (CDFG 2011).

The WPT is found in ponds, marshes, rivers, streams, and irrigation ditches containing aquatic vegetation. It is usually seen sunning on logs, banks, or rocks near banks. The reproduction of WPT occurs along the banks and upper terraces of slow-moving streams and rivers. During the spring or early summer, females move overland up to 100m to find suitable egg-laying sites in loose sandy substrate or dense vegetation cover (Rathbun et al. 1992). Eggs are laid from March to August depending on local conditions, and hatchlings emerge up to approximately 80 days later (Feldman 1982). Individuals are active all year where climates are warm, but hibernate during cold periods in other seasonal areas of California (Bury and Holland 1994). The turtle nests in burrows in woodlands, grasslands, and open forest up to several hundred feet away from river or pond banks (Bury and Holland 1994).

The WPT has been known to occur within the City of Santa Cruz limits in Antonelli Pond (LTSCC 2001), Neary Lagoon (K. Glinka pers. comm. 2007), Moore Creek (Biotic Resource Group with Dana Bland and Associates 2001, CNDDB 2007)), the marsh at Natural Bridges (CNDDB 2007) and in the Pogonip along the San Lorenzo River north and south of the picnic area at the Sycamore Grove (Brady LSA 1998). A historic occurrence record exists for Westlake Pond (Strelow Consulting 2002a). Potential habitat exists in Meder Canyon and Arana Gulch. Just outside of the City of Santa Cruz limits, a pond turtle was observed at the UCSC Arboretum Pond (K. Glinka pers. comm. 2007).

Birds

Brown Pelican (*Pelecanus occidentalis*) (nesting and communal roosts). Nesting and communal roosts of the brown pelican were previously federally and state-listed as Endangered, but have been delisted at both federal and state levels. The CDFG lists the nesting and communal roosting activities of the brown pelican as Fully Protected. These activities are ranked by the CNDDB as G4T3S1S2. The CNDDB state ranking indicates an Endangered to Extremely Endangered status (CDFG 2011).

The habitat of the brown pelican includes coastal areas such as sandy beaches, lagoons, waterfronts and marinas (Nature Works New Hampshire Public Television 2007). Sand spits and offshore sand bars are used extensively for roosting (USFWS 2007f). Pelicans live in flocks made up of males and females (Nature Works New Hampshire Public Televison 2007). Feeding occurs primarily in shallow estuarine waters with the birds seldom venturing more than 20 miles out to sea (USFWS 2007f). Common prey items include: menhaden, herring, mullet, sheepshead, silversides as well as other fish species, and crustaceans (Nature Works New Hampshire Public Television 2007).

Brown pelicans nest in large colonies mostly on small coastal islands. Preferred nesting sites provide protection from mammal predators, and sufficient elevation to prevent widescale flooding of nests (USFWS 2007f). The nests occur on the ground, in bushes, or in the tops of trees. In most of the pelican's U.S. nesting range peak egg-laying occurs in March and April. A clutch of two or three eggs hatch in approximately 1 month after laying. Both parents incubate the eggs and care for the young. Average age at first flight is 75 days (USFWS 2007f).

Within the City of Santa Cruz limits, communal roost sites are located along West Cliff from Lighthouse Point to Younger Lagoon (Gerow 2006 and ESW 2006 Surveys). The brown pelican is also known to roost on the Santa Cruz Municipal Wharf (Entrix 2004a) and along the San Lorenzo River (Swanson Hydrology and Geomorphology et al. 2002). The brown pelican forages along the city coastline.

Double-crested Cormorant (*Phalacrocorax auritus*) (rookeries). The rookeries of the double-crested cormorant are listed on CDFG's Bird Species of Special Concern Taxa to Watch (CDFG, PRBO Conservation Science, and Western Field Ornithologists 2008). The double-crested cormorant rookeries are ranked by the CNDDB as G5S3. The CNDDB state ranking indicates a restricted range and rare based on the number of individuals per area of occupied habitat.

The double-crested cormorant is found in a variety of marine and inland aquatic habitats, such as ponds, lakes, rivers, lagoons, estuaries, and open coastline. This species requires shallow water for feeding, as well as nearby perches, such as rocks, sandbars, pilings, shipwrecks, wires, trees or docks for resting, and drying out during the day). Double-crested cormorants feed (often in large flocks) primarily on fish, but will also eat insects, crustaceans and amphibians (Cornell 2007).

Double-crested cormorants breed in colonies between April and August, with peak activity occurring in May through July. The nests typically built on the ground, but are occasionally built in trees. The female usually lays 3-4 eggs which hatch asynchronously after 25 to 28 days. Both parents incubate the eggs, and care for the young. The chicks become completely independent of their parents by 10 weeks of age. Double-crested cormorants do not breed until they are at least two years old (Kirschbaum and Ward 2000).

The double-crested cormorant has been know to breed in previous years along the San Lorenzo River within the City of Santa Cruz limits and currently breeds at nearby Schwan Lagoon. Potential breeding habitat for the bird is located in the upper Santa Cruz Yacht Harbor. The

species roosts on bluffs and seastacks along West Cliff Drive between Lighthouse Point and Natural Bridges State Park. The bird also roosts along the lower San Lorenzo River, at Neary Lagoon, Antonelli Pond, Westlake Pond, Arana Gulch and other locations in the vicinity of the Santa Cruz Yacht Harbor (Gerow 2006).

Black-crowned Night Heron (*Nycticorax nycticorax*) (rookeries). The rookeries of the black-crowned night heron are ranked by the CNDDB as G5S3. The CNDDB state ranking indicates a restricted range for the bird's rookeries and rare based on the number of individuals per area of occupied habitat.

The black-crowned night heron roosts among the dense foliage of trees (that are not always adjacent to water). It will also roost within fresh or brackish emergent wetlands, as well as on piers, and pilings (Grinnell and Miller 1944). Black-crowned night herons feed along the margins of lacustrine, large riverine, and fresh and saline emergent habitats as well as (rarely) on kelp beds in marine subtidal habitats. The black-crowned night heron's highly variable diet consists of fishes, crustaceans, aquatic insects and other invertebrates; as well as amphibians, reptiles, small mammals, and (rarely) young birds (Palmer 1962; Wolford and Boag 1971).
The breeding season for the black-crowned night heron is mainly February to July (Cogswell 1977). This monogamous species nests in large colonies within dense-foliaged trees and shrubbery, vine tangles, as well as dense (fresh or brackish) emergent wetlands (Cogswell 1977). This night heron will lay a clutch of 3-4 eggs in nests built of twigs and/or marsh plants (Gill 1977). The eggs are incubated for 24-26 days, and the young are subsequently tended by both parents. Young are able to fly at six weeks of age, but are not independent until some time later (Palmer 1962 and Harrison 1978).

The black-crowned night heron was known to breed historically within the City of Santa Cruz limits along Branciforte Creek (Gerow 2006). The bird was observed roosting at Antonelli Pond, along the lower San Lorenzo River, along the upper Santa Cruz Yacht Harbor and at Neary Lagoon in 2006 (Gerow 2006). Neary Lagoon provides potential nesting habitat (David J. Powers and Associates, Inc. 1998).

Sharp-shinned Hawk (*Accipiter striatus*) (nesting). The nesting sharp-shinned hawk is listed on CDFG's Bird Species of Special Concern Taxa to Watch (CDFG, PRBO Conservation Science, and Western Field Ornithologists 2008). The sharp-shinned hawk is ranked by the CNDDB as G5S3. The CNDDB state ranking indicates a restricted range for the bird and rare based on the number of individuals per area of occupied habitat.

The sharp-shinned hawk is commonly associated with dense stands of smaller conifers, but can nest in a variety of habitats, including deciduous riparian forest (Zeiner et al. 1990). The hawk often hunts near openings in the foliage, using adjacent woodland for cover. Sharp-shinned hawks formerly bred only in small numbers in California. Currently their breeding population appears to be greatly reduced to even smaller numbers, although data are lacking (Remsen 1978).

The sharp-shinned hawk is known to occur in Arana Gulch (HRG 1996 and Strelow Consulting and EcoSystems West 2000), Meder Canyon (John Gilchrist and Associates 1998), Neary Lagoon (David J. Powers and Associates, Inc. 1998 and Jones and Stokes 1992), and Antonelli

Pond (LTSSC 2001). The first two of these locations provide potential breeding habitat within the city limits of Santa Cruz. Potential breeding habitat also exists in the Pogonip (Santa Cruz Parks and Recreation Department 1998). A nest site was confirmed and a begging juvenile observed just outside of the city limits on the North UCSC campus. Adults were also sighted during breeding season in the same area (Gerow 2006).

Cooper's Hawk (*Accipiter cooperi*) (nesting). The nesting Cooper's hawk is listed on CDFG's Bird Species of Special Concern Taxa to Watch (CDFG, PRBO Conservation Science, and Western Field Ornithologists 2008). The nesting Cooper's Hawk is ranked by the CNDDB as G5S3. The CNDDB state ranking indicates a restricted range for the bird and rare based on the number of individuals per area of occupied habitat.

Cooper's hawk nesting habitats include deciduous riparian woodland, live oak, or second-growth conifers, usually near stream courses in dense stands with a relatively high crown closure and open understory (Call 1978, Zeiner et al. 1990). Accipiters partition food on the basis of size and prey type: Cooper's hawks prey on equal proportions of medium-sized birds and small mammals. (Reynolds 1989). Egg laying typically occurs in late April or early May, and young fledge in July (Call 1978).

Although rare throughout their range (Remsen 1978), Cooper's hawks are known to nest within Santa Cruz County (R. Cull pers. observation 1996). Within the city limits of Santa Cruz, nest sites are confirmed in Moore Creek (Strelow 2002a), Pogonip, Harvey West Park near the Pogonip, and De Laveaga Park (Gerow 2006). Another possible nest site occur in upper Redwood Creek also in the Pogonip (Gerow 2006). Potential habitat exists on the Poliski-Gross property adjacent to Moore Creek Preserve, in Meder Canyon on Arroyo Seco Creek and on Arana Creek. A Cooper's hawk was observed at Antonelli Pond (LTSCC 2001). A nest site is confirmed just outside of the city limits on the north UCSC campus (Gerow 2006).

Golden Eagle (*Aquila chrysaetos*) (nesting and wintering). The nesting and wintering golden eagle is listed on CDFG's Bird Species of Special Concern Taxa to Watch (CDFG, PRBO Conservation Science, and Western Field Ornithologists 2008) and Fully Protected by the CDFG. The golden eagle is ranked by the CNDDB as G5S3. The CNDDB state ranking indicates a restricted range for the bird and rare based on the number of individuals per area of occupied habitat. This species is also considered a Bird of Conservation Concern by the USFWS.

The golden eagle perches in stands of trees, on rock outcrops, or ridges overlooking open foraging areas. Foraging habitat consists of grassland, oak savanna, open woodland, and chaparral habitats. The golden eagle primarily forages for reptiles, California ground squirrels, small mammals and carrion. The breeding season for golden eagles begins as early as late January and lasts through July, peaking between March and June (Call 1978). Nest sites are constructed in large trees, on cliff ledges and rock outcrops and require solitude and freedom from human and other noise disturbance (Palmer 1988). Golden eagles maintain alternate nest sites and reuse old nest sites from year to year.

A pair of golden eagles forages over UCSC and the Pogonip (Gerow 2006 and Santa Cruz Parks and Recreation Department 1998). A juvenile was observed in the lower UCSC meadows in

2006 (Gerow 2006). A pair of golden eagles likely breeds in Rincon Gorge in the San Lorenzo Watershed, but nesting is not confirmed (Gerow 2006).

Ferruginous Hawk (*Buteo regalis*) (wintering). The wintering ferruginous hawk is listed on CDFG's Bird Species of Special Concern Taxa to Watch (CDFG, PRBO Conservation Science, and Western Field Ornithologists 2008). This species also has a CNDDB Ranking of G4S3S4, indicating a state CNDDB ranking between Restricted Range/Rare; and Apparently Secure. This bird is also considered a Bird of Conservation Concern by the USFWS.

The ferruginous hawk is a migratory winter resident to California, generally arriving in September and departing by mid-April. This hawk is known to frequent a variety of open habitats, including grasslands, agricultural areas, sagebrush flats, low foothills, and desert scrub (Garrett and Dunn 1981). The ferruginous hawk is a "sit-and-wait" predator that is known to hunt cooperatively. This species searches for prey via low flights over open, treeless areas, sometimes hovering or hunting from high mound perches. Their primary prey species are rabbits, ground squirrels, and prairie dogs, but they will also take mice, birds, reptiles, and amphibians (Bent 1937, Olendorff 1973, Call 1978).

This species has been observed within city limits at Antonelli Pond (LTSCC 2001).

White-tailed Kite (*Elanus leucurus*) (nesting). The white-tailed kite (formerly known as black-shoulder kite) is listed by the CDFG as Fully Protected and by the CNDDB as G5S3. The CNDDB state ranking indicates a restricted range for the bird and rare based on the number of individuals per area of occupied habitat.

The white-tailed kite feeds on rodents, lizards, birds, and insects. Nests are located in herbaceous open stages of most habitats. Stick nests are made near the tops of trees, camouflaged from below but open on top. Breeding season occurs from late February to early August. Occasionally kites will double brood in a single season (Faanes and Howard 1987). Nest sites may be used from year to year with 4 to 5 eggs laid (Ehrlich et al. 1988). Under favorable conditions, kites may nest semi-colonially (Ehrlich et al. 1988). Males feed both the females and young during nesting season (Ehrlich et al. 1988 and B. Walton pers. comm. 1996).

Multiple white-tailed kite nests are located within the city limits in the Pogonip, with the meadows providing foraging territory (John Gilchrist and Associates 1998 and Gerow 2006). White-tailed kites are known to nest in Natural Bridges (Strelow 2002a). White-tailed kites have been observed on Moore Creek Preserve, Neary Lagoon, Antonelli Pond and, occasionally Lighthouse Field. These locations provide foraging and roosting habitat, with Moore Creek Preserve providing potential nesting habitat. Potential habitat also exists in Arana Gulch, Meder Canyon and on the Poliski-Gross property adjacent to Moore Creek Preserve. Outside of the city limits, a white-tailed kite nest was observed on the north UCSC campus (EcoSystems West 2004). Also outside of the city limits, a nest is likely located near Cave Gulch, west of Empire Grade, with Inclusion Area A and the Great Meadow on the UCSC campus providing foraging territory, and another nest is likely located west of the city limits. A pair was observed using the coastal UCSC fields for foraging, and was joined in late summer by two juveniles in 2006

(Gerow 2006). Kites have been observed foraging over this same area in previous years (EcoSystems West 2002b).

Merlin (*Falco columbarius*) (wintering). The wintering merlin i listed on CDFG's Bird Species of Special Concern Taxa to Watch (CDFG, PRBO Conservation Science, and Western Field Ornithologists 2008). The wintering species is listed by the CNDDB as G5S3. The CNDDB state ranking indicates a restricted range for the bird and rare based on the number of individuals per area of occupied habitat (CDFG 2011).

The merlin is an uncommon winter migrant to California from September to May. The adult merlin appears to have large home ranges during the winter (e.g., 196 ha in Saskatoon) (Warkentin and Oliphant 1990). The merlin utilizes a wide variety of habitats, from annual grasslands to ponderosa pine and montane hardwood-conifer habitats. The bird also favors coastlines, lakeshores, and wetlands and is often observed in open habitats at low elevations near water. The merlin utilizes dense strands of trees for cover. The merlin feeds primarily on small birds, but will eat small mammals and insects as well. The merlin also forages along shorelines in winter, to hunt for shorebirds (CDFG 2005).

Merlins have been observed within the city limits of Santa Cruz at Arana Gulch (HRG 1996 and Santa Cruz Parks and Recreation Department 2006), Lighthouse Field (Strelow 2003b), Meder Canyon (John Gilchrist and Associates 1998) and Antonelli Pond (LTSCC 2001). Just north of the City of Santa Cruz limits, the species has been observed on the coastal UCSC lands (Tyler 1987).

Black Oystercatcher (*Haemotopus bachmani*) (nesting). The CNDDB ranking for the bird is G5S2, indicating a state ranking of Endangered. The nesting black oystercatcher is considered a Bird of Conservation Concern by the USFWS (CDFG 2006s).

The black oystercatcher is a permanent resident on rocky shores of marine habitats along almost the entire California coast, and on adjacent islands. It requires cliffs, rock outcrops, offshore rocky islets, jetties and similar features of coastal rocky intertidal habitats for roosting at high tide. This oystercatcher is found along the rocky shoreline of the Pacific Coast, but can also be observed on nearby mudflats in the winter (National Audubon Society 2002). This oystercatcher feeds mostly on the invertebrates of rocky intertidal areas, such as mussels, but its diet also includes limpets, whelks, and other marine organisms. They forage primarily at low tide and then rest at high tide (National Audubon Society 2002).

The black oystercatcher breeds on undisturbed, rocky, open ocean shores, beyond the reach of waves and terrestrial predators. They begin egg-laying in early May, and by late September most chicks will have fledged (Ainley et al. 1971-1980; Hunt et al. 1979). Both sexes incubate a typical clutch of 2-3 eggs, which hatch after about four weeks (National Audubon Society 2002). Both parents care for the chicks, which are able to accompany parents to nearby feeding areas, one week after hatching (Hartwick 1974 and CDFG 2005).

Courtship displays by the black oystercatcher have been observed within the City of Santa Cruz limits in the Natural Bridges/De Anza area (Gerow 2006). The birds roost along the rocky

shoreline from Cowell's Beach to Younger Lagoon. An exceptional roost site is located on the seastack (previously the natural bridge) just offshore from Natural Bridges State Beach (ESW 2006 Surveys).

Long-eared Owl (*Asio otus*) (nesting). The nesting long-eared owl is a State Species of Special Concern. The nesting long-eared owl is ranked by the CNDDB as G5S3. The CNDDB state ranking indicates a restricted range and rare based on the number of individuals per area of occupied habitat.

The long-eared owl occurs in a variety of wooded habitats. The bird typically uses abandoned nests of other raptors and tree squirrels, occasionally nesting in tree cavities, and rarely in hollows on the ground (Harrison 1978). The local breeding season spans February through July.

This species is a rare breeding species in Santa Cruz County. A long-eared owl was observed at Neary Lagoon in 1992 (Jones and Stokes 1992). Potential breeding habitat for the owl is located at Neary Lagoon (David J. Powers and Associates, Inc. 1998) and in the Pogonip (Santa Cruz Parks and Recreation Department 1998).

Burrowing Owl (*Athene cunicularia*) (burrow sites and wintering observations). Breeding and wintering populations of burrowing owls are California Species of Special Concern. The CNDDB ranking for the bird is G5S2, indicating a state ranking of Endangered. This species is also considered a Bird of Conservation Concern by the USFWS (CDFG 2011).

The burrowing owl uses open grassland habitats for foraging and nesting. Suitable habitat has low-growing vegetation interspersed with bare ground; and hillocks, berms, fence posts or other slightly elevated objects available for resting/perching. Burrowing owls are primarily crepuscular foragers, but hunting has been observed over 24 hours (Thomsen 1971 and Marti 1974). Insects are the usual prey during daylight hours, while small mammals are taken more often after dark (Marti 1974; Plumpton 1992; Thomsen 1971).

Burrowing owls use abandoned burrows, especially of ground squirrels, as roost and nest sites. Under pressures from urban development burrowing owls have been known to use less than optimal habitat, including man-made structures such as culverts. Breeding occurs from March to August, and clutches average five to six eggs (Bent 1938).

Potential habitat for the burrowing owl exists on the Pogonip (Santa Cruz Parks and Recreation Department 1998), on Moore Creek Preserve, and on the Poliski-Gross property adjacent to Moore Creek Preserve (Biotic Resource Group with Dana Bland and Associates 2001). Burrowing owls were observed foraging and breeding outside the city limits at UCSC in 2006, along the upper main bike path and below the East Remote Parking Lot (Gerow 2006).

Vaux's Swift (*Chaetura vauxi*) (nesting). The nesting Vaux's swift is a State Species of Special Concern. The bird is listed by the CNDDB as G5S3. The CNDDB state ranking indicates a restricted range for the bird and rare based on the number of individuals per area of occupied habitat (CDFG 2011).

The Vaux's swift is a summer resident of northern California as well as a fairly common migrant throughout most of the California in April, May, August and September. The Vaux's swift prefers redwood, Douglas-fir, and other coniferous habitats (Bent 1940). The bird feeds exclusively on flying insects taken in long, continuous foraging flights. It generally feeds high in the air over most terrains and habitats, but also feeds commonly at lower levels in forest openings, above burns, and especially over rivers (Grinnell and Miller 1944) and lakes (Terres 1980). Flocks of Vaux's swifts roost in hollow trees and snags, and occasionally in chimneys and buildings (Bent 1940). Nests are typically built on the vertical inner wall of a large, hollow tree or snag, especially tall stubs charred by fire (Bent 1940). The swift will also nest in chimneys and buildings. Solitary nesting appears to be typical for this species, that breeds from early May to mid-August. Their normal clutch of 4-5 eggs incubates for 18-20 days. The young are tended by both parents, then leave the nesting tree at about 28 days (Harrison 1978).

Confirmed nesting took place within the City of Santa Cruz limits in chimneys in a residential neighborhood near Natural Bridges State Park in 2005 and 2006. Vaux's swifts have been regularly present in several other neighborhoods suggesting nesting in chimneys in those areas as well: the Spring Street area adjacent to UCSC and the Pogonip and the rural-residential area south of the UCSC Arboretum. Birds have been observed foraging over Moore Creek Preserve. Although Douglas-fir snags may provide natural nest sites, no evidence of nesting in the Preserve was observed (Gerow 2006). Vaux's swifts have also been observed at Arana Gulch (HRG 1996a and CNDDB 2007), Antonelli Pond (LTSCC 2001) and Meder Canyon (John Gilchrist and Associates 1998).

Black Swift (*Cypseloides niger*) (nesting). The nesting black swift is a State Species of Special Concern. The CNDDB ranking for the bird is G4S2, indicating a state ranking of Endangered. This species is also considered a Bird of Conservation Concern by the USFWS (CDFG 2011).

The black swift breeds along coastal bluffs and mountains and migrate south for the winter and are mostly absent from California from October through April. The home range for black swifts is considered very large (Bent 1940; Grinnell and Miller 1944). If there are suitable nest sites for breeding, the black swift will forage over almost any terrain and habitat. The bird forages widely, feeding exclusively on flying insects captured in sustained, long-distance foraging flights (Bent 1940).

The breeding season for the black swift occurs from early June to late August. It usually nests in small colonies, constructing nests of mud mixed with moss, ferns, seaweed, or other plant materials. Nests are built in moist crevices or caves on sea cliffs above the surf, or on cliffs adjacent to waterfalls in deep canyons (Bent 1940). The swift lays only one large egg per year (Harrison 1978), and incubates it for 24-27 days. The young leave the nest after about 45 days, but the nestling period is probably highly variable, as it is for other swifts (Hunter and Baldwin 1962 and Foerster 1987).

Black swifts were known to nest within the City of Santa Cruz limits in the early 1990's in the cliffs along West Cliff (Gerow 2006) and were also observed at Neary Lagoon in 1992 (Jones and Stokes 1992). Known nesting sites were located southwest of Mitchell's Cove along the bluffs (Gerow 2006) and at Lighthouse Point (Gerow 2006 and Strelow 2003). These sites still

provide suitable nesting habitat. Birds were observed all along the West Cliff coastline in 2006 including observations of interactions with previous nest sites and apparent courtship activities, but no recent nesting has been confirmed (Gerow 2006). Black swifts were also observed foraging over the grassland at Moore Creek Preserve in 2006 (Gerow 2006). Just north of the City of Santa Cruz limits, the species has been observed on the coastal UCSC lands (Tyler 1987).

Loggerhead Shrike (*Lanius ludovicianus*) (nesting). The nesting loggerhead shrike is a State Species of Special Concern. This species is also considered a Bird of Conservation Concern by the USFWS (CDFG 2011).

A common resident of lowlands and foothills, this species prefers open habitats with scattered shrubs, trees, fences, or other lookout posts. The loggerhead shrikes occurs only rarely in heavily urbanized areas. The bird hunts insects, snakes, small birds, and rodents, which they often impale on thorns or barbed wire while they eat. Eggs are laid from March to May, with a clutch size of four to seven eggs (Porter et al. 1975), in shrubs and trees with dense vegetation for concealment (Bent 1950 and Miller 1931).

Potential habitat for the shrike is located on the Pogonip, Moore Creek Preserve, and on the Poliski-Gross property adjacent to Moore Creek Preserve (Biotic Resource Group with Dana Bland and Associates 2001). Just north of the City of Santa Cruz limits, the species has been observed on the coastal UCSC lands (Tyler 1987).

California Horned Lark (*Eremophila alpestris actia*). The California horned lark is listed on CDFG's Bird Species of Special Concern Taxa to Watch (CDFG, PRBO Conservation Science, and Western Field Ornithologists 2008). This lark also has a CNDDB Ranking of G5T3S3, indicating a state ranking of Restricted Range; Rare for the species and this subspecies, throughout its entire range (CDFG 2011).

The California horned is a common resident to a variety of open California habitats (Zeiner et al. 1990). The California horned lark breeds in level or gently-sloping shortgrass prairie, montane meadows, "bald" hills, open coastal plains, fallow grain fields, and alkali flats (Grinnell and Miller 1944). This bird utilizes grasses, shrubs, forbs, rocks, litter, clods of soil, and other surface irregularities for cover in these habitats. The horned lark forages individually on the ground in unvegetated areas and agricultural fields with short vegetation (Beason 1995). It consumes mostly insects, snails, and spiders during breeding season, and supplement its diet with plant matter (e.g., grass and forb seeds) during other seasons (Bent 1942).

The California horned lark builds a grass-lined nest in a depression on the ground out in the open. Breeding pairs nest solitarily, and are monogamous within a given breeding season (Beason 1995). This species frequently raises two broods in a season (Bent 1942), usually between March and July. The horned lark lays a clutch of two to five eggs (Beason 1995), that are incubated for 10-14 days. The young are tended by both parents, then leave the nest at 9-12 days (Harrison 1978).

The horned lark is known to occur as a migrant in the Pogonip (Brady/LSA 1998). There is potential for the California horned lark to occur in Moore Creek Preserve, in Meder Canyon, and in Poliski-Gross Property (Biotic Resource Group with Dana Bland and Associates 2001).

Oak Titmouse (*Baeolophus inornatus*) (nesting). The nesting activities of the oak titmouse have a CNDDB ranking of G5S3?, indicating a questionable state status of restricted range and rare . This species is also considered a Bird of Conservation Concern by the USFWS (CDFG 2011).

The oak titmouse is a common year-round resident of warm, dry woodlands in portions of the western United States. The oak titmouse occupies low- to mid-elevation habitats such as oak or oak-pine woodlands (Block 1989, 1990) and open pine forests (Johnson and Cicero 1985). The oak titmouse has a varied diet that is composed of plant and animal foods. The main plant materials consumed by this species include: willow catkins, leaf buds, galls, and berries, cultivated fruits, and seeds (e.g., pines, oats, thistles, weeds, and poison oak) (Bent 1946; Martin et al. 1951; Csuti et al. 1997; and Beal 1907). This species also consumes a variety of invertebrates (e.g., leafhoppers, aphids, caterpillars, beetles, ants, wasps, and spiders (Bent 1946, Martin et al. 1951, Csuti et al. 1997). The oak titmouse breeds from March into July, with peak activity in April and May. This species forms pair bonds during the first breeding season and mates for life. The oak titmouse is a solitary nester that defends its territory year-round. The breeding pair builds a nest of grass, moss, mud, hair, feathers, and fur (Harrison 1978) in a woodpecker hole, natural cavity, or nest box. The pair is also known to partially excavate cavities (Bent 1946). This species lays a clutch of six to eight eggs, which are incubated for 14-16 days (usually by the female). The young are tended by both parents in the nest for about 20 days, and for another three to four weeks after leaving the nest hole (Harrison 1978; Erlich et al. 1988).
The oak titmouse is confirmed as nesting at Lighthouse Field, Neary Lagoon, Garfield Park, in Westside residential areas, on lower Branciforte Creek and Oceanview Park, in the Jesse Street Marsh area, and along the San Lorenzo River (north of Highway One). The bird is likely to be nesting at Natural Bridges (Gerow 2006).

Yellow Warbler (*Dendroica petechia brewsteri*) (nesting). The nesting yellow warbler is a State species of special concern. The CNDDB ranking for the bird is G5T3?S2, indicating a CNDDB state ranking of Endangered. This species is also considered a Bird of Conservation Concern by the USFWS (CDFG 2011).

The yellow warbler forages and breeds in a variety of habitats (Zeiner et al. 1990), but primarily in deciduous riparian woodlands and shrub habitats with open riparian canopy along streams and lakes. The bird prefers dense canopies for inconspicuous nesting and for gleaning insects from foliage (Ficken and Ficken 1966; Bent 1953; Ehrlich et al. 1988).

The yellow warbler has been documented nesting in previous years (until the mid 1990's) along Arana Gulch Creek (HRG 1996; Strelow 2002a; and Gerow 2006), Neary Lagoon (Strelow 2002b; Gerow 2006), Antonelli Pond (LTSCC 2001; Gerow 2006), Moore Creek Preserve (Gerow 2006), Carbonera and Branciforte Creeks (Strelow 2002), and Westlake Pond (Strelow 2002). The yellow warbler, including territorial and nesting birds, has been observed along the San Lorenzo River north of Water Street in previous years (Santa Cruz Parks and Recreation

Department 1998, Strelow 2002 and Gerow 2006). The species was also observed in Meder Canyon (John Gilchrist and Associates 1998). While the species is still known to occur in these locations and while potential nesting habitat exists (David J. Powers and Associates, Inc 1998 and Santa Cruz Parks and Recreation Department 2006), Suddjian (2000) has observed a noticeable decline in nesting yellow warblers in Santa Cruz County. The Pogonip (Santa Cruz Parks and Recreation Department 1998) and the Poliski-Gross property adjacent to Moore Creek Preserve (Biotic Resource Group with Dana Bland and Associates 2001) also provides potential nesting habitat for the bird while Natural Bridges and other open spaces with deciduous trees provide foraging habitat for migrating birds (Gerow 2006).

Hermit Warbler (*Dendroica occidentali*) (nesting). The nesting hermit warbler is listed by the CNDDB as G4G5S3?. The CNDDB state ranking indicates a questionable restricted range for the nesting bird and rare based on the number of individuals per area of occupied habitat (CDFG 2011). This species is also considered a Bird of Conservation Concern by the USFWS (CDFG 2011).

The hermit warbler frequents mature stands of conifers (ie., Douglas-fir, redwood, and montane hardwood-conifer habitats), with open to dense canopy for breeding and other activities. The bird feeds upon insects and spiders gleaned from foliage in the middle to upper canopy (Morrison 1982). The hermit warbler breeds from late April into early July, with peak activity in June. This species usually builds nests 7.6 to 15 m (25-50 ft) above the ground, on a horizontal branch of a conifer (Harrison 1978). The female lays 3-5 eggs per clutch. The hermit warbler adult and its eggs are subject to predation by accipiters and small mammals (Verner and Ritter 1983).

The hermit warbler likely nests in the Pogonip within the City of Santa Cruz limits; two pairs of territorial singing males were observed in 2003 (Gerow 2006). Breeding has been confirmed at UCSC (Gerow 2006). The hermit warbler also occurs in Meder Canyon (John Gilchrist and Associates 1998). This location provides potential nesting habitat as do other open spaces within the city that provide woodland habitat for the bird.

Saltmarsh Common Yellowthroat (*Geothlypis trichas sinuosa*). The saltmarsh common yellowthroat is a State Species of Special Concern. The bird is listed by the CNDDB as G5T2S2, indicating that the subspecies is listed by the CNDDB as Endangered throughout its range and Endangered in the state. This subspecies is also considered a Bird of Conservation Concern by the USFWS (CDFG 2011).

The saltmarsh common yellowthroat breeds in saltwater marshes of the San Francisco Bay area (California) but exact breeding range has not been delimited (Marshall and Dedrick 1994). The saltmarsh common yellowthroat nests in overgrown fields with scrub, on the margins of woodlands, and freshwater and saltwater marshes. The bird uses small and relatively isolated patches of habitat, such as swales and seeps, where groundwater is close to the surface (Hobson et al. 1986). The bird forages on insects gleaned from vegetation, largely spiders, and occasionally takes insects from the ground and seeds. The yellowthroat builds well-concealed open-cup nests, typically near the ground in grasses, herbaceous vegetation, cattails, tules, and scrub (Menges 1998).

Common yellowthroats were observed within the City of Santa Cruz limits in Neary Lagoon (David J. Powers and Associates 1998 and Jones and Stokes 1992) and along the San Lorenzo River (Swanson Hydrology and Geomorphology et al. 2002). Saltmarsh common yellowthroats were observed nesting or showing nesting behaviors outside the city limits at UCSC's Younger Lagoon in 1988 (Tyler 1987), and during 2001 and 2002 surveys (EcoSystems West 2002b). It is a question of debate in the ornithological community whether the birds identified in the vicinity represent the common yellowthroat (*Geothlypis trichas)* or the special-status sub-species, the saltmarsh common yellowthroat (*Geothlypis trichas sinuosa)*.

Yellow breasted chat (*Icteria virens*) (nesting). The nesting yellow breasted chat is a State Species of Special Concern. The bird is listed by the CNDDB as G5S3. The CNDDB state ranking indicates a restricted range for the bird and rare based on the number of individuals per area of occupied habitat (CDFG 2011).

The yellow-breasted chat is associated with dense riparian habitats with well-developed under story (Roberson 1985). The bird forages at various heights by gleaning insects from leaves and bark, and feeding on small fruits. Typically, nests are formed in dense riparian vegetation 1-8 feet above the ground (Harrison 1978 and Ehrlich et al. 1988).

The yellow breasted-chat may be extirpated as a breeder in the County of Santa Cruz (Strelow 2002). Historically, the species likely nested along the San Lorenzo River (Suddjian 1990). The species is known to occur at Neary Lagoon (David J. Powers and Associates, Inc 1998) and may occur in other sites providing suitable riparian habitat such as Arana Gulch (Strelow and Ecosystems West 2000) and Moore Creek Preserve.

Chipping Sparrow (*Spizella passerina*) (nesting). The CNDDB Ranking for the chipping sparrow is G5S3S4, indicating that the nesting areas for this species have a ranking between Restricted Range / Rare; and Apparently Secure (CDFG 2011).

The chipping sparrow prefers open wooded habitats with a sparse or low herbaceous layer and few shrubs. It prefers trees for nesting, resting, singing, and other cover, but will also utilize shrubs and ground herbage. The chipping sparrow is also known to breed or winter in orchards (Grinnell and Miller 1944; McCaskie et al. 1979; Garrett and Dunn 1981). The chipping sparrows often forages in nearby herbaceous and open shrub habitats, including dry margins of wet meadows.

The chipping sparrow eats mostly insects and spiders in the breeding season, and mostly grass and forb seeds the remainder of year (Martin et al. 1961). The bird may forage in small flocks in winter with juncos, Brewer's sparrows, and other sparrows (Ehrlich et al. 1988). In California, the chipping sparrow usually nests in conifers, but will also utilize deciduous trees or shrub (Grinnell and Miller 1944). The chipping sparrow's nests are usually concealed in dense foliage near the end of branch. The chipping sparrow is a monogamous, solitary nester who normally lays a clutch of three to five eggs. The female incubates the eggs for 11-14 days. The young are tended by both parents, then leave the nest at 9-12 days, but do not fly until about 14 days.

Within the City of Santa Cruz limits, the chipping sparrow is known to nest in Moore Creek Preserve and the Pogonip, although confirmed nesting locations vary from year to year. Just outside of the city limits, the bird is a confirmed nester at UCSC, in Inclusion Area A and the north campus (Gerow 2006).

Grasshopper Sparrow (*Ammodramus savannarum*). The grasshopper sparrow is a State Species of Special Concern. The CNDDB ranking for the bird is G5S2, indicating a CNDDB state ranking of Endangered (CDFG 2011).

The grasshopper sparrow occurs in dry, dense grasslands, especially in those with a variety of grasses, tall forbs, and scattered shrubs (Grinnell and Miller 1944; McCaskie et al. 1979 and Garrett and Dunn 1981). The grasshopper sparrow feeds primarily on insects, but will also consume other invertebrates, as well as grass and seeds (Bent 1968). This sparrow build nests composed of grasses and forbs, located in a slight depression in ground at the base of an overhanging clump of grasses or forbs. This species breeds from early April to mid-July, with a peak in May and June. Grasshopper sparrow pairs are known to be solitarily nesters. They usually lay a clutch of four or five eggs, and raise two or three broods per year. The female incubates the eggs for 11-12 days, and is the parent who tends the young (Harrison 1978).

The grasshopper sparrow is a confirmed nester at Moore Creek Preserve. Territorial behavior was also observed at Pogonip (Gerow 2006). Just outside of the city limits a possible nesting site occurs at UCSC in Inclusion Area A (Gerow 2006).

Tricolored Blackbird (*Agelaius tricolor*) (nesting colonies). The tricolored blackbird is a State Species of Special Concern. The CNDDB ranking for the bird is G2G3S2, indicating a global ranking from restricted range; rare to Endangered, and a state ranking of Endangered. This species is also considered a Bird of Conservation Concern by the USFWS.

Large flocks of tricolored blackbirds roost in emergent wetland vegetation, especially cattails and tules, but will also utilize trees and shrubs (Terres 1980). The tricolored blackbird diet is composed mostly of insects and spiders in the spring and summer (Crase and DeHaven 1978). Seeds and cultivated grains compose most of their fall and winter diets. Tricolored blackbirds forage on the ground in croplands, grassy fields, flooded land, and along edges of ponds.

This species breeds near fresh water, preferably in emergent wetland with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, tall herbs. Their nests are usually located near fresh water, and tend to be hidden on the ground among low vegetation. The normal breeding season for this species is mid-April into late July, but active breeding has also been reported in October and November in the Sacramento Valley (Orians 1960). Tricolored blackbirds are polygynous, with each male having several mates nesting in his small territory. These blackbirds usually clutch 3-4 eggs, and may raise two broods per year (Terres 1980). The incubation period lasts about 11 days, and the young are tended by the female or by both parents. The young blackbirds leave the nest after about 13 days (Harrison 1978). Dense breeding colonies of tricolored blackbirds are vulnerable to massive nest destruction by mammalian and avian predators, including Swainson's hawks (Bent 1958).

Tricolored blackbirds were known to nest historically within the city limits of Santa Cruz at Neary Lagoon and Antonelli Pond (Jones and Stokes 1992 and Strelow 2002). The bird is still known to occur at both locations (LTSCC 2001 and D. Laabs pers. comm. 2001). Just north of the City of Santa Cruz limits, the species has been observed on the upland terrace of coastal UCSC lands (Tyler 1987).

Mammals

Insufficient data is available to determine the presence or absence of bats within the City of Santa Cruz limits. All of the special-status bats listed below are known to occur in the vicinity as noted below. Bats are assumed to be present in suitable habitat until surveys can be conducted.

Townsend's Big-eared Bat (*Corynorhinus townsendii*). The Townsend's big-eared bat is a California Species of Special Concern. This species is included on 1998 Western Bat Working Groups preliminary list of revised Mammal Species of Special Concern (CDFG 2011). The Townsend's big-eared bat also has a CNDDB ranking of G4S2S3, which indicates a state status that is between Endangered, and Restricted Range; Rare based on the number of individuals per area of occupied habitat.

The Townsend's big-eared bat is a year-round resident in California occurring from low desert to mid-elevation montane habitats. It is found primarily in rural settings from inland deserts to coastal redwoods, oak woodland of the inner Coast Ranges and Sierra foothills, and low to mid-elevation mixed coniferous-deciduous forests.

The Townsend's big-eared bat typically roosts during the day in caves and mines, but can roost in buildings that offer suitable conditions (Kunz and Martin 1982). Night roosts are in more open settings and include bridges. The bat hibernates in mixed sex aggregations of a few to several hundred individuals for prolonged periods in colder areas and intermittently in non-freezing areas. It arouses periodically and moves to alternative roosts, and actively forages and drinks throughout the winter.

A single young is born per year between May and July. Females form maternity colonies of 35 to 200 individuals, while males roost individually (Kunz and Martin 1982). The Townsend's big-eared bat feeds primarily on small moths that are gleaned from vegetation. Suitable habitat includes "mature" and "medium aged" oak woodland and redwood forest habitats with large cavity structures.

The Townsend's Big-eared bat is known to occur within the City of Santa Cruz limits in the Pogonip clubhouse (P. Heady pers. comm. 2006) and potential habitat for the bat exists along Moore Creek (Strelow 2002); the San Lorenzo River (Strelow 2002); along Branciforte and Carbonera Creeks (Strelow 2002); and Arana Creek (Strelow 2002; Strelow and EcoSystems West 2000). In general, potential roosting sites exists for the bat in bridges and buildings near water courses (Santa Cruz Parks and Recreation Department 2006).

Pallid Bat (*Antrozous pallidus*). The pallid bat is a California Species of Special Concern. The pallid bat is included on 1998 Western Bat Working Groups preliminary list of revised Mammal

Species of Special Concern. The bat is also listed by the CNDDB as G5S3. The CNDDB state ranking indicates a Restricted Range; Rare based on the number of individuals per area of occupied habitat (CDFG 2011).

The pallid bat is a year round resident in California. It is found in arid desert areas, grasslands and oak savanna, coastal forested areas, and coniferous forests of the mountain regions of California. Roost sites are typically rock outcrops, caves, hollow trees, mines, buildings and bridges (Hermanson and O'Shea 1983; Wilkins 1989). The pallid bat makes use of similar structures for night roosts and will use more open sites such as eaves, awnings, and open areas under bridges for feeding roosts. The pallid bat is largely inactive in the winter months. There is evidence for both hibernation and migration. Hibernation aggregations tend to be much smaller than in the summer. The pallid bat has been observed foraging during the winter when prey is available (Hermanson and O'Shea 1983). The pallid bat feeds on large insects and arachnids (20 to 70mm in length). Prey is most often caught on the ground. Jerusalem crickets, scorpions and beetles make up most of the diet of pallid bat in central California.

Copulation occurs in the fall, October through December. The female stores the sperm and ovulation occurs the following spring. Embryonic development usually takes about nine weeks with birth occurring in May or June. Twins are the norm in northern California but in other areas the pallid bat is known to have triplets. Maternity colonies range from 20 to 200 individual adult bats. The male roosts in much smaller groupings (Hermanson and O'Shea 1983).

Potential habitat for the pallid bat exists within the City of Santa Cruz limits in Arana Gulch (Santa Cruz Parks and Recreation Department 2006; Strelow and EcoSystems West 2000), Pogonip (Santa Cruz Parks and Recreation Department 1998), in Meder Canyon, along Moore Creek, the San Lorenzo River, in DeLaveaga Park, along Branciforte and Carbonera Creeks, and the Poliski-Gross property adjacent to Moore Creek Preserve (Biotic Resource Group with Dana Bland and Associates 2001). In general, potential roosting sites exists for the bat in mature woodlands and forests that provide hollows and crevices for roosting as well as in bridges and buildings, especially near water courses. The nearest occurrence record for the pallid bat is located near Summit Road in the headwaters of Soquel Creek (CNDDB 2007).

Fringed Myotis (*Myotis thysanodes*). The fringed myotis is included on 1998 Western Bat Working Groups preliminary list of revised Mammal Species of Special Concern (CDFG 2011).

The fringed myotis is found in western North America from British Columbia to Veracruz and Chiapas. Over most of its range this bat occurs at middle elevations. It has been found at higher elevations in New Mexico and was found in the Sequoia National Forest above 6000 feet (CCBRG 2004). Along the West Coast this bat is found at lower elevations (O'Farrell and Studier 1980) and is associated with redwood forests (CCBRG 2004).

Maternity colonies are large, up to 300 individuals (Nagorsen and Brigham 1993) with the males roosting separately from the maternity colonies. These colonies are in caves, mines, and buildings. Given this bat's association with redwood forests in coastal California, it likely uses redwood hollows. Night roosts are in similar features. In portions of the range of fringed myotis, the bat migrates to lower elevations or more southern locations where they can be active during

the winter months (O'Farrell and Studier 1980). In Coastal California such migrations may not be necessary.

Only one young per year is the norm for the fringed myotis. Little is known of the reproductive cycle of this species. Ovulation and fertilization occur in late spring, May to May 15, with implantation occurring from June 25 to July 7 (O'Farrell and Studier 1980). Young are capable of limited flight at 16 days and are adult size by 21 days. The fringed myotis primarily eats beetles (73%) (O'Farrell and Studier 1980) moths, flies, leafhoppers, lacewings, crickets, and harvestmen. The presence of flightless insects in its diet suggests that some of its prey is gleaned from foliage (Nagorsen and Brigham 1993). Suitable roosting and foraging habitat for the fringed myotis occurs in the oak woodland, redwood forests and riparian habitats.

Potential habitat for the bat exists within the City of Santa Cruz at Arana Gulch (Strelow and EcoSystems West 2000), in Meder Canyon, along Moore Creek, the San Lorenzo River, in DeLaveaga Park, and along Branciforte and Carbonera Creeks. In general, potential roosting sites exists for the bat in mature woodlands and forests that provide hollows and crevices for roosting as well as in bridges and buildings, especially near water courses. The nearest record for the fringed myotis is from UCSC north campus (EcoSystems West 2004).

Long-legged Myotis (*Myotis volans*). The long-legged myotis is included on the 1998 Western Bat Working Group's preliminary list of revised Mammal Species of Special Concern (CDFG 2011).

The long-legged myotis inhabits western North America from southeast Alaska to central Mexico. It is found in an elevation range from sea level to 3,770 m. The long-legged myotis is primarily a coniferous forest bat although it may also be found in riparian and desert habitats (Findley et al. 1975). Suitable roosting and foraging habitat for the long-legged myotis occurs in oak woodland, redwood and mixed-evergreen forests, and riparian habitats (Warner and Czaplewski 1984).

The long-legged myotis is known to live 21 years in the wild (Warner and Czaplewski 1984). This bat feeds primarily on moths but is also known to feed on other soft-bodied prey such as flies, termites, lacewings, wasps, bugs, leafhoppers, and small beetles. The long-legged myotis is a rapid, direct flier pursuing its prey over relatively long distances through, around, under and over forest canopy (Warner and Czaplewski 1984).

Maternity colonies can be up to 300 individuals. Maternity roosts are found in buildings, rock crevices, and under exfoliating bark. Males roost singly or in small numbers in rock crevices, buildings and under tree bark. Night roosts are found under bridges, in caves and mines, and buildings (Nagorsen and Brigham 1993). In the northern reaches of the long-legged myotis' range, hibernation is common (Jones 1965). It is unknown whether this bat migrates in the portion of its range where winters are less severe.

Mating takes in the fall and sperm is stored over winter. Ovulation and fertilization take place from March to May and implantation occurs from May to August. There is extensive variation in

the timing of reproductive activity in this species. California records show pregnant females as late as early July (N. Fisher, personal observation 2006).

Potential habitat for the bat exists within the City of Santa Cruz at Arana Gulch (Strelow and EcoSystems West 2000), in Meder Canyon, along Moore Creek, the San Lorenzo River, in DeLaveaga Park, and along Branciforte and Carbonera Creeks. In general, potential roosting sites exists for the bat in mature woodlands and forests that provide hollows and crevices for roosting as well as in bridges and buildings, especially near water courses. The nearest record for the long-legged myotis is from UCSC north campus (EcoSystems West 2004).

Western Red Bat (*Lasiurus blossevillii*). The western red bat is included on the 1998 Western Bat Working Group's preliminary list of revised Mammal Species of Special Concern (CDFG 2011). This species also has a CNDDB ranking of G4S2S3, which indicates a state status that is between Endangered, and Restricted Range; Rare based on the number of individuals per area of occupied habitat.

The range of the Western red bat is from British Columbia to Central and South America. Migration occurs throughout its range and bats of Canada move into the coastal lowlands of California. The California bats are thought to winter in Central America (Nagorsen and Brigham 1993).

Suitable roosting and foraging habitat for the western red bat occurs in woodlands, forests, and riparian habitats. The Western red bat is a solitary foliage roosting bat. *Lasiurus* designates this species as a member of the hairy tailed bat genera. These bats are adapted for exposed roosting behavior with their hairy tail membrane and small ears. In California, this bat is known to roost in cottonwood trees and willows. Roost height ranges from 3 to 15 meters (Pierson and Heady 1997). Large moths are the primary prey of the Western red bat. This bat is a fast flyer, foraging in straight flights or large circles (Nagorsen and Brigham 1993).
Mating takes place in late summer and fall; sperm is stored over winter and fertilization occurs in early spring. The gestation period is 80 to 90 days and one to four young are born in late May to early July. The young are born small, naked, and under-developed (Nowak 1994). Females leave the young at the roosting site while foraging but will carry them when moving to a new roosting site. Young are capable of sustained flight at six weeks.

A western red bat was observed flying over Arana Creek during surveys for the Arana Gulch Master Plan and EIR (EcoSystems West 2006). Potential habitat for the bat exists within the City of Santa Cruz in Meder Canyon (John Gilchrist and Associates 1998), along Moore Creek, the San Lorenzo River, in DeLaveaga Park, and along Branciforte and Carbonera Creeks. In general, potential roosting sites exists for the bat in woodland, forest, and riparian habitats.

San Francisco Dusky-Footed (*Neotoma fuscipes annectens*). The San Francisco dusky-footed woodrat is a State Species of Special Concern. The CNDDB ranking for the species is G5T2T3S2S3, indicating CNDDB state and subspecies rankings from Endangered to Rare with a Restricted Range (CDFG 2011).

The San Francisco dusky-footed woodrat occurs generally along the Coast Range of California, from the San Francisco Bay Area south to the Pajaro River watershed. It is associated with riparian, oak woodland and redwood forest habitats and builds stick nests to heights of approximately one meter (three to four feet) on the ground, under or in buildings or bridges, and above the ground in trees or shrubs. These nests can be used by multiple generations of the woodrat, and some may be colonized and recolonized over decades (Linsdale and Tevis 1956).

The San Francisco dusky-footed woodrat is known or likely to occur in open spaces with the City of Santa Cruz limits, including Pogonip, Moore Creek Preserve, Meder Canyon, Arana Gulch, DeLaveaga Park, Natural Bridges, Neary Lagoon, Antonelli Pond, along the San Lorenzo River, and on undeveloped parcels or undeveloped portions of larger parcels that provide potential habitat.

American Badger (*Taxidea taxus*). The American badger is a State Species of Special Concern (CDFG 2011).

The American badger is an uncommon, permanent resident found throughout most of the state, with the exception of the northern North Coast area (Grinnell et al. 1937). This species is most abundant in drier open stages of most shrub, forest, and herbaceous habitats, that are composed of friable soils. American badgers dig burrows in friable soil for cover, frequently reusing old burrows. They are also known to dig a new den each night (especially in summer) (Messick and Hornocker 1981). This species is nocturnal and diurnal, and undergoes variable periods of torpor in winter (Long 1973). American badgers are non-migratory, and the area used during winter months is smaller than at other seasons. Home range estimates vary widely by season and geographic region. Fall and winter home ranges as small as 137 ha (338ac), and as large as 627 ha (1549 ac) have been reported for American badgers in Utah and Idaho (Lindzey 1978; Messick and Hornocker 1981). Members of a particular badger family may share the territory of a given female (Seton 1929). Male badgers are generally solitary, except during the breeding season (Messick and Hornocker 1981).

American badgers are carnivorous, with a diet composed of fossorial rodents: rats, mice, chipmunks, and especially ground squirrels and pocket gophers. They also eat various reptiles, insects, earthworms, eggs, birds, and carrion. Their diet shifts seasonally and yearly in response to the availability of prey. American badgers mate in summer and early fall, with a gestation period that varies from 183-265 days (including delayed implantation). The embryo implants about 45 days prior to birth. Badger young are born in burrows that are dug in relatively dry, often sandy soil, that are usually in areas with sparse overstory cover. Their average litter size of 2-3 young are born usually in March and April (Long 1973). Some female badgers have been known to breed in their first year, but males are not sexually mature until their second year. Badgers may live to be 11-15 years old (Flower 1931; Jackson 1961; Long 1973; Messick and Hornocker 1981).

An American badger carcass was found on the UCSC north campus (K. Glinka, pers. comm. 2007 and CNDDB 2007), indicating the presence of the species in the vicinity of the City of Santa Cruz. Because of the large home range and uncommon nature of the badger, the larger open spaces within the city can be assumed to provide potential habitat, including the Pogonip (Santa Cruz Parks and Recreation Department 1998), Moore Creek Preserve, Arana Gulch, and DeLaveaga Park, as well as larger undeveloped parcels adjoining open spaces.

Southern Sea Otter (*Enhydra lutris nereis).* The southern sea otter is federally-listed as Threatened, State-listed as California Fully Protected and is listed under the MMPA as a depleted species.

Southern sea otters inhabit nearshore coastal waters, bays, harbors, and estuaries along the central California coast, from Half Moon Bay to Point Conception, and are often associated with rocky substrate. Most remain inshore of the outer kelp edge, and foraging activity is generally restricted to water depths of 25 meters or less.

Sea otters feed primarily on a variety of large invertebrates, including sea urchins, abalone, rock crabs, kelp crabs, and clams. Their ability to use tools to break open their food makes them unique among marine mammals. Reproduction occurs throughout the year. Most adult female sea otters give birth to one pup each year (USFWS 2007f).

Sea otters are sited regularly in the waters of the Yacht Harbor (P. Clark pers. comm. 2008; A. Church pers. comm. 2007). It is possible that they may also inhabit the estuarine environment of the San Lorenzo River.

California Sea Lion (*Zalophus californianus*). The California sea lion is protected under the MMPA.

California sea lions occur in shallow coastal waters, from the Pacific coast of Central Mexico north to British Columbia, Canada. Haul-outs are located on sandy beaches, offshore rock outcroppings, beaches, jetties, docks, and buoys with a nearby food supply, and easy access to water. They are known to sometimes travel up rivers, bays, and harbors (NOAA 2011b).

California sea lions feed mainly in upwelling areas on a variety of prey such as squid anchovies, mackerel, rockfish, and sardines. They also take fish from commercial fishing gear, sport-fishing lines, and at fish passage facilities at dams and rivers (NOAA 2011b).

California sea lions are sited regularly in the waters of the Yacht Harbor, along the City's coast, and under the Municipal Wharf, and hauled out on Yacht Harbor docks and Wharf structural supports (E. McGinty pers. comm. 2009; P. Clark pers. comm. 2008).

Eastern Pacific Harbor Seal (*Phoca vitulina richardsi*). The Eastern Pacific harbor seal is protected under the MMPA.

The Eastern Pacific harbor seal occur in nearshore coastal waters, rivers, bays, harbors and estuaries from the coastal and estuarine waters off Baja, California, north to British Columbia, west through the Gulf of Alaska and in the Bering Sea. Haul outs are located on rock outcroppings, beaches, mudflats, and docks that have easy access to water. Harbor seals eat a variety of prey consisting mainly of fish, shellfish, and crustaceans (NOAA 2011c).

Harbor seals are regularly sited in the waters of the Yacht Harbor and along the City's coast (E. McGinty pers. comm. 2009; P. Clark pers. comm. 2008).

Vacant Parcel Survey

We examined 172 parcels identified by City Planners as being vacant that were at least 6,000 square feet in size. These parcels ranged from 0.14 acres to 49.49 acres, with a median size of just 0.31 acres. The following summarizes our results of the parcel-specific assessment, which are provided in the attribute table of the vacant parcels feature class within the project geodatabase.

Twelve of the parcels assessed featured some type of development, including agriculture, pavement, or structures. Twelve parcels could not be accessed during the reconnaissance survey and were therefore not examined. We recommend a survey or pre-site assessment be conducted prior to development of 110 of the parcels examined.

Located primarily on the perimeter of the city, 63 vacant parcels feature one or more sensitive habitats, with 40 parcels supporting riparian habitat, 27 parcels supporting grasslands, and two supporting wetlands. Evidence of San Francisco dusky-footed woodrat was observed in 6 parcels, while 2 parcels were observed to support western red bats. Of the 51 sensitive species considered in this assessment, 36 species are thought to have some potential to occur within one or more of the vacant parcels, with a total of 760 potential sensitive species occurrences within the 172 parcels. Located primarily in the center of the city where they are surrounded by development, we found 37 vacant parcels that are unlikely to feature sensitive species or habitats.

Seventy three of the vacant parcels were located at least partially within one of three potential dispersal corridors identified as part of our assessment.

CONSTRAINTS

Constraints on development are regulated by federal, state, and local agencies (as outlined in the Regulatory Setting) for the protection and management of sensitive biological and wetland resources. Much of the land within the City that supports sensitive habitats and special status plants and wildlife is already protected and managed in the City's open spaces by the Parks and Recreation Department. An additional portion of land that provides important habitat falls within the City's riparian corridors, and is regulated by the City-wide Creeks and Wetlands Management Plan. The remaining areas for consideration include vacant parcels and larger parcels that are only partially developed, especially those adjoining open spaces or riparian corridors.

Vacant or partially-developed parcels that lie within a potential dispersal corridor are notable because of the key biological functions that these corridors perform as conduits for plants and wildlife between open spaces in an otherwise developed landscape. In the urban and suburban landscape, dispersal corridors may be considered sensitive habitats; they are areas of high biological diversity and provide important wildlife habitat. In addition, interferences to movement patterns of wildlife through dispersal corridors are considered under CEQA. The City-wide Creeks and Wetlands Management Plan's established buffers along riparian corridors that protect the creek environment and its functions as a corridor, both for the dissemination of plants and seeds, and for wildlife; however, lands adjacent to the riparian corridor may also contribute to riparian corridor functions, both for dispersal between larger open spaces and habitat areas, and by providing linear habitat, including resources for forage, shelter, and cover. These functions are discussed in greater detail in the Dispersal Corridor section of the text.

The following table summarizes assessment protocols to determine if a sensitive biological resource is present and lists constraints on future development when such resources are found to occur or assumed to be present.

Table 5. Constraints on development of lands supporting sensitive biological resources within the City of Santa Cruz.

RESOURCE	REGULATORY AUTHORITY	ASSESSMENT (to determine presence)	CONSTRAINT[1] (if resource is present)
Sensitive Habitats and Dispersal Corridors			
Aquatic	City of Santa Cruz California Coastal Commission (CCC) State Water Resources Control Board (SWRCB) CDFG CEQA Review Army Corps of Engineers (Corps)	Determination of jurisdiction.	Avoid impacts to the extent possible and/or consult with the appropriate jurisdictional agency(s) for review and to determine mitigation. City of Santa Cruz - City setback requirements. CCC- Coastal zone jurisdiction (CCC *Procedures*). SWRCB- Minimize water quality impacts per agency review. CDFG - Streambed Alteration Agreement (1600). Corps- Permit required if jurisdictional.
Freshwater Wetland	City of Santa Cruz California Coastal Commission (CCC) State Water Resources Control Board (SWRCB) California Wetlands Conservation Policy (CDFG) CEQA Review Army Corps of Engineers (Corps)	Wetland delineation and determination of jurisdiction.	No net loss of wetland area or quality. Avoid impacts to the extent possible and/or consult with the appropriate jurisdictional agency(s) for review and to determine mitigation, such as buffers, restoration or enhancement, banking, replacement or enhancement of alternate in kind habitat, and monitoring of mitigation efforts. City of Santa Cruz - City setback requirements. CCC- Coastal zone jurisdiction (CCC *Procedures*). SWRCB- Minimize water quality impacts per agency review. CDFG - Streambed Alteration Agreement (1600). Corps- Permit required for fill or excavation, if jurisdictional.
Saltmarsh	CEQA Review	Habitat characterization	Avoid impacts to the extent possible. Consult with CDFG. Develop management plan and replace or enhance alternate habitat at CDFG approved ratio.
Riparian Forest and Scrub	City of Santa Cruz CEQA Review	Habitat characterization	City setback requirements. Avoid impacts to the extent possible. Consult with CDFG. Develop management plan and replace or enhance alternate habitat at CDFG approved ratio.
Coastal Prairie	CEQA Review	Habitat characterization	See CONSTRAINT for saltmarsh
Coastal Bird Rookeries	CEQA Review Division of Migratory Birds (USFWS)	Habitat characterization Breeding bird survey	Avoid direct impacts. If possible, conduct project activities outside of nesting season to avoid indirect impacts. If project activities will take place during nesting season, establish appropriate buffers based on USFWS and CDFG guidance.
Dispersal Corridors	City of Santa Cruz CEQA Review	Wildlife movement study. Determine buffer width for corridor utility.	City setback requirements when dispersal corridor coincides with riparian corridor. Avoid impacts to the extent possible: Buffer corridors from disturbances such as noise and light, and to retain corridor functions[2]. If avoidance is not possible, mitigate through replacement or enhancement of alternate habitat in consultation with CDFG.

Special-Status Plants			
Arctostaphylos andersonii Santa Cruz manzanita	CEQA Review	Botanical survey	Design plans to avoid removal of individuals and habitat. Plan for long term viability of species (species can carry on normal reproductive cycles given natural seasonal and climatic fluctuations) Develop management plan, such as: buffered habitat units, maintenance of suitable habitat conditions through practices such as controlled burning.
Chorizanthe robusta var. *robusta* robust spineflower	CEQA Review	Botanical survey during flowering period.	Design plans to avoid removal of individuals and habitat. Plan for long term viability of species (species can carry on normal reproductive cycles given natural seasonal and climatic fluctuations) Develop management plan, such as: buffered habitat units, maintenance of suitable habitat conditions through practices such as noxious weed management, mowing, grazing, and/or controlled burning.
Holocarpha macradenia Santa Cruz tarplant	CESA and NPPA (CFGC)	Botanical survey during flowering period.	Design plans to avoid removal of individuals and habitat or consultation with and MOU[3] from CDFG and USFWS for appropriate mitigation.
Perideridia gairdneri ssp. *gairdneri* Gairdner's yampah	None	Botanical survey during flowering period.	Avoidance and/or mitigation recommended.
Plagiobothrys chorisianus *var. chorisianus* Choris's popcorn-flower	CEQA Review	Botanical survey during flowering period.	See CONSTRAINT for robust spineflower.
Plagiobothrys chorisianus var. *hickmanii* Hickman's popcorn-flower	None	Botanical survey during flowering period.	Avoidance and/or mitigation recommended.
Plagiobothrys diffusus San Francisco popcorn-flower	CESA and NPPA (CFGC)	Botanical survey during flowering period.	See CONSTRAINT for Santa Cruz tarplant.
Trifolium buckwestiorum Santa Cruz clover	CEQA Review	Botanical survey during flowering period.	See CONSTRAINT for robust spineflower.

Special-Status Wildlife			
Invertebrates			
Ohlone tiger beetle *Cicindela ohlone*	ESA (USFWS)	Habitat assessment Survey during emergence season.	Design plans to avoid take of individuals and habitat or consultation with USFWS. Take permit through: Section 10 (a) (1) (B) and HCP[4] process (no federal nexus) or Section 7 (federal nexus). Issuance of a Biological Opinion[5].
Monarch butterfly (wintering sites) *Danaus plexippus*	City general plan policy CEQA Review	Habitat assessment Multi-year surveys during winter roosting season.	Design plans to avoid impacts to individuals and habitat, including appropriate buffers to maintain suitable habitat conditions[6]. Conduct project activities outside of winter roosting season or develop appropriate mitigation such as buffers to avoid disturbance such as smoke and fumes.
Fish			
Coho Salmon (Central CA ESU[7]) *Oncorhynchus kisutch*	ESA (NOAA NMFS[8]) CESA (CDFG)	Habitat assessment	Design plans to avoid take or: consultation with NOAA NMFS via: (Section 10 (a) (1) (B) and HCP process (no federal nexus) or Corps (i.e. if project activities occur below bankfull elevation[9]) and Section 7 (federal nexus). Issuance of a Biological Opinion.
Steelhead (Central CA DPS) *Oncorhynchus mykiss irideus*	ESA (NOAA NMFS)	Habitat assessment	See CONSTRAINT for coho salmon.
Tidewater goby *Eucyclogobius newberryi*	ESA (USFWS)	Habitat assessment Protocol level survey (USFWS 2005a Appendix F) during sandbar formation [permit required under Section 10 (a) (1) (A) or Section 7]	Design plans to avoid take or consultation with USFWS. Take permit through: Section 10 (a) (1) (B) and HCP process (no federal nexus) or Section 7 (federal nexus). Issuance of a Biological Opinion. Consultation with CWQRCB for appropriation of water from streams providing habitat. Management plan and consultation with CCC for breaching sandbars (coastal estuaries). Consultation with CDFG for Streambed Alteration Agreement (1600).
North American green sturgeon (Southern DPS) (*Acipenser medirostirs*)	ESA (USFWS)	Assumed present in Bay	Design plans to avoid take or: consultation with NOAA NMFS via: (Section 10 (a) (1) (B) and HCP process (no federal nexus) and Section 7 (federal nexus). Issuance of a Biological Opinion.

Amphibians and Reptiles			
California red-legged frog *Rana draytonii*	ESA (USFWS)	Habitat assessment Protocol Level Survey (USFWS 2005b) or Assume Presence	Avoid take of individuals and impacts to aquatic habitat. Consultation with USFWS. Take permit through: Section 10 (a) (1) (B) and HCP process (no federal nexus) or Section 7 (federal nexus). Issuance of a Biological Opinion Mitigations such as: biological monitoring and wildlife barriers.
Western pond turtle *Emmys marmorata*	CEQA Review (CDFG)	Habitat assessment Focused Surveys	Avoid impacts to individuals in aquatic and upland habitat. Mitigations such as: biological monitoring and wildlife barriers
Birds*			
Brown pelican (communal roosts and rookeries) *Pelecanus occidentalis*	CEQA Review (CDFG)	Habitat assessment Communal roosting/breeding bird survey	Avoid take of individuals and impacts to roosting and nesting habitat. Consultation with USFWS. Take permit through: Section 10 (a) (1) (B) and HCP process (no federal nexus) or Section 7 (federal nexus). Issuance of a Biological Opinion Conduct project activities outside of nesting season. Establish appropriate buffers (based on USFWS and CDFG guidance).
Double-crested cormorant (rookeries) (*Phalacrocorax auritus*)	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	Avoid direct impacts to nesting birds, occupied nests, eggs, and young. If possible, conduct project activities outside of nesting season or develop appropriate mitigation, such as buffers and biological monitoring (based on CDFG guidance).
Black-crowned night heron (rookeries) (*Nycticorax nycticorax*)	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.
Sharp-shinned hawk (nesting) *Accipiter striatus*	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.
Cooper's hawk (nesting) *Accipiter cooperi*	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.
Golden eagle (nesting and/or wintering) Aquila chrysaetos	CEQA Review (CDFG) Division of Migratory Birds (USFWS)	Habitat assessment Wintering/breeding bird survey	Consultation with USFWS (unoccupied nest). Avoid direct impacts to habitat and individuals, including, nests, eggs, and young. If possible, conduct project activities outside of nesting season or develop appropriate mitigation, such as buffers and biological monitoring (based on CDFG guidance).
Ferruginous hawk (wintering) (*Buteo regalis*)	CEQA Review (CDFG)	Wintering habitat assessment and bird survey	Consultation with CDFG.
White-tailed kite *Elanus leucurus*	CEQA Review (CDFG)	Habitat assessment Wintering/breeding bird survey	Avoid direct impacts to habitat and individuals, including occupied nests, eggs, and young. To avoid indirect impacts, develop appropriate mitigation, such as buffers and biological monitoring (based on CDFG guidance).

Merlin (wintering) *Falco columbarius*	CEQA Review (CDFG)	Wintering habitat assessment and bird survey	Consultation with CDFG.
Black oystercatcher (nesting) *Haemotopus bachmani*	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.
Long-eared owl (nesting) *Asio otus*	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.
Burrowing owl (burrow and wintering sites) *Athene cunicularia*	CEQA Review (CDFG)	Habitat assessment Wintering/breeding bird/nest survey	Avoid direct impacts to habitat and individuals, including occupied burrows. To avoid indirect impacts, develop appropriate mitigation, such as buffers and biological monitoring (based on CDFG guidance).
Vaux's swift (nesting) *Chaetura vauxi*	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.
Black swift (nesting) *Cypseloides niger*	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.
Loggerhead shrike (nesting) *Lanius ludovicianus*	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.
California horned lark *Eremophila alpestris actia*	CEQA Review (CDFG)	Habitat assessment Bird survey	Avoid direct impacts to habitat and individuals, including occupied nests, eggs, and young. To avoid indirect impacts, develop appropriate mitigation, such as buffers and biological monitoring (based on CDFG guidance).
Oak titmouse (nesting) *Baeolophus inornatus*	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.
Yellow warbler (nesting) *Dendroica petechia brewsteri*	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.
Hermit warbler (nesting) *Dendroica occidentali*	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.
Saltmarsh common yellowthroat *Geothlypis trichas sinuosa*	CEQA Review (CDFG)	Habitat assessment Bird survey	Avoid direct impacts to habitat and individuals, including occupied nests, eggs, and young. To avoid indirect impacts, develop appropriate mitigation, such as buffers and biological monitoring (based on CDFG guidance).
Yellow-breasted chat (nesting) *Icteria virens*	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.
Chipping sparrow (nesting) *Spizella passerina*	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.
Grasshopper sparrow (nesting) *Ammodramus savannarum*	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.
Tricolored blackbird (nesting colonies) *Agelaius tricolor*	CEQA Review (CDFG)	Habitat assessment Breeding bird survey	See CONSTRAINT for double-crested cormorant.

Mammals			
Special-status bats	CEQA Review (CDFG)	Habitat assessment Emergence and nighttime acoustic surveys	Avoid direct impacts to roosting bats; a qualified biologist must obtain an MOU from CDFG to relocate roosting bats. Conduct project activities outside of maternal roost season or coordinate with CDFG to exclude bats prior to maternal roost season.
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	CEQA Review (CDFG)	Habitat assessment Nest survey	Avoid disturbance of nests and appropriate buffer zone (based on CDFG guidance). Coordinate with CDFG to relocate nests to suitable habitat not already occupied by colonies.
American Badger *Taxidea taxus*	CEQA Review (CDFG)	Habitat assessment Focused survey (burrow, sign, and prey base)	Avoid disturbance to den and buffer zone (based on CDFG guidance). Coordinate with CDFG; a qualified biologist must obtain an MOU from CDFG to relocate.
Southern sea otter *Enhydra lutris nereis*	ESA and MMPA (USFWS and NOAA NMFS)	Survey for presence	Consultation with USFWS and NOAA NMFS via: (Section 10 (a) (1) (B) and HCP process (no federal nexus) or Corps (i.e. if project activities occur in jurisdictional waters) and Section 7 (federal nexus). Issuance of a Biological Opinion. Mitigations such as reduction of noise to non-harmful levels, establishment of a safety zone and biological monitoring.
Nesting Raptors	Division of Migratory Birds- MBTA (USFWS) Fish and Game Codes (CDFG)	Habitat assessment Breeding bird survey	Avoid direct impacts to nesting birds, occupied nests, eggs, and young. If possible, conduct project activities outside of nesting season or develop appropriate mitigation, such as buffers and biological monitoring (based on USFWS and CDFG guidance).
Nesting Birds	Division of Migratory Birds- MBTA (USFWS)	Habitat assessment Breeding bird survey	Avoid direct impacts to nesting birds, occupied nests, eggs, and young. If possible, conduct project activities outside of nesting season or develop appropriate mitigation, such as buffers and biological monitoring (based on USFWS and CDFG guidance).
Marine Mammals	MMPA (NOAA NMFS)	Survey for presence	Consultation with NOAA NMFS. Mitigations such as reduction of noise to non-harmful levels, establishment of a safety zone and biological monitoring.

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[1] Consultation with the appropriate agency is strongly encouraged prior to developing detailed project plans (S. de Leon, pers. comm. 2007).

[2] Corridor functions include connecting otherwise disjunct habitat such that animals can migrate, plants can propagate, genetic interchange can occur, populations can respond to environmental change and locally extirpated populations can be replaced from other areas (Hilty, et al. 2006; Lidicker 1999; Beier and Loe 1992).

[3] MOU = Memorandum of Understanding.

[4] Habitat Conservation Plan

[5] Section 7 of the Endangered Species Act [16 U.S.C 1531 *et seq*.] outlines procedures for federal interagency cooperation to conserve federally listed species and designated critical habitats. Federal nexus = federal agency is present to enact Section 7.
Biological Opinion = a document prepared by the USFWS that presents their effects determination for federally listed species. The Biological Opinion will provide measures to avoid and minimize effects to a species and discuss compensatory mitigation options. Issuance of a Biological Opinion by the U.S. Fish and Wildlife Service typically concludes formal consultation under Section 7 of the Endangered Species Act.

[6] Suitable habitat conditions include southeast aspect, wind protection, and proximity to nectarines.

[7] Evolutionarily Significant Unit (ESU): Pacific salmon population or group of populations that is substantially reproductively isolated from other conspecific populations and that represents an important component of the evolutionary legacy of the species. The ESU policy for Pacific salmon defines the criteria for identifying a Pacific salmon population as a distinct population segment (DPS), which can be listed under the ESA.

[8] NOAA = National Oceanic and Atmosperic Administration
NMFS = National Marine Fisheries Service

[9] Bankfull elevation – the level at which water begins to leave the channel and move into the floodplain and is reached at a discharge which generally has a recurrence interval of one to two years on the annual flood series (NOAA 2005).

GAPS IN THE EXISTING DATA

Coastal Prairie

The data for the characterization of habitat and identification of sensitive plant communities was extracted from a vegetation survey conducted by H. T. Harvey and Associates for the City of Santa Cruz HCP (Entrix 2004a). This data was modified based on aerial imagery and some ground-truthing. Additional surveys would be required to obtain detailed information about the presence of Coastal Prairie within the grassland communities of the City of Santa Cruz.

Dispersal Corridors

Surveys to determine the frequency of wildlife movement through potential corridors within the City of Santa Cruz and the buffer width needed to maintain corridor utility were beyond the scope of this evaluation. These studies are recommended prior to any further development of parcels located along a potential dispersal route.

Monarch Butterflies

Fluctuations in monarch populations as well as changes in roost site characteristics affect the selection of over-wintering roost sites from year to year. Further, monarch butterfly populations were low state-wide during the 2006 fall/winter season (J. Dayton pers. comm. 2007). Therefore, it is possible that sites used for autumnal roosts and/or that were unoccupied during 2006 will be used for overwintering in other years. EcoSystems West recommends on-going monitoring of known monarch butterfly roost sites as well as suitable potential habitat within the City of Santa Cruz.

Birds

EcoSystems West was unable to obtain comprehensive breeding bird data from the Santa Cruz Bird Club during the course of this evaluation. We recommend that the City of Santa Cruz arrange an independent contract with David Suddjian to supplement the database provided by EcoSystems West.

Bats

Insufficient data is available to determine the presence of absence of bats within the City of Santa Cruz. All special status bats listed in Table 4 are known to occur in the vicinity. Surveys of potential habitat, and emergence and nighttime acoustic surveys in locations where suitable habitat features are found, are recommended to determine the presence of special-status bats.

Vacant Parcel Survey

EcoSystems West recommends pre-site assessments to determine the potential for sensitive species or habitats prior to development of vacant parcel that were not accessible during 2006 surveys. Biotic assessments prior to development are recommended for all sites where special-status species have potential or are known to occur.

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APPENDIX A.

Nesting Birds
(Protected under the MBTA and CEQA)

This list includes birds that are known to nest within the City of Santa Cruz; however, this list is not comprehensive. All nesting activities of native birds are protected by the Migratory Bird Treaty Act and CEQA.

Pied-billed Grebe (*Podilymbus podiceps*). Nesting sites located at Kalkar Quarry, Westlake Pond, Antonelli Pond (LTSCC 2001), Neary Lagoon, and along the San Lorenzo River (Gerow 2006).

Brandt's Cormorant (*Phalacrocorax penicillatus*). Nesting occurs at Natural Bridges State Park (ESW 2006 Surveys and Gerow 2006), the bluff just east of Natural Bridges State Park (ESW 2006 Surveys) and on the seastack off Lighthouse Field (Gerow 2006). Nesting sites located just outside of the city limits at Younger Lagoon (ESW 2006 Surveys and Gerow 2006).

Great Egret (*Ardea albus*). One breeding pair is located in the eucalyptus grove on the east side of the Santa Cruz Yacht Harbor (Gerow 2006); historical breeding took place in the eucalyptus grove along lower Branciforte Creek across from Ocean View Park (Gerow 2006).

Great Blue Heron (*Ardea herodias*). Rookeries exist on the east side of Arana Gulch, on the west side of the Santa Cruz Yacht Harbor north of the Murray Street Bridge (Strelow Consulting and EcoSystems West 2000 and Gerow 2006); historical breeding in the eucalyptus grove along lower Branciforte Creek across from Ocean View Park and in the Pogonip (Gerow 2006).

Green Heron (*Butorides virescens*). Nesting sites are located downtown in a tree behind Logos bookstore, along the San Lorenzo River from the rivermouth to the north edge of the city limits at the sycamore grove, along lower Moore Creek from Hwy 1 to Natural Bridges State Park and at Antonelli Pond, and on lower Branciforte Creek across from Ocean View Park (Gerow 2006). In previous years nesting occurred on the Westside of Santa Cruz and in the eucalyptus grove near the base of High Street at the Highway 1 footbridge (Gerow 2006).

Wood Duck (*Aix sponsa*). Breeding occurs at Neary Lagoon and along the San Lorenzo River, just above Water Street (Gerow 2006).

Mallard (*Anas platyrhynchos*). Nesting sites are located along the San Lorenzo River, in Neary Lagoon, at Antonelli Pond, at the butterfly-pond at Natural Bridges State Park, Kalkar Quarry Pond, Westlake Pond, and lower Arana Gulch (Gerow 2006). Outside of the city limits breeding takes place at Younger Lagoon (Gerow 2006).

Cinnamon Teal (*Anas cyanoptera*). Uncommon observation of confirmed breeding in Moore Creek in Natural Bridges State Park (Gerow 2006).

Common Merganser (*Mergus merganser*). Confirmed breeding along the lower San Lorenzo River (Gerow 2006).

Red-shouldered Hawk (*Buteo lineatus*). Probable nesting occurs near Antonelli Pond, at the Pogonip, Harvey West Park, and (possibly more than one pair) in DeLaveaga Park (Gerow

2006). Possible nesting in Meder Canyon (John Gilchrist and Associates 1998). Just outside of the city limits, nesting birds on the UCSC campus, at the Arboretum and the upper campus.

Red-tailed Hawk (*Buteo jamaicensis*). Nesting in Moore Creek Preserve, the upper end of Meder Canyon, DeLaveaga Park, and Arana Gulch (Gerow 2006). Likely nesting in the Moore Creek drainage between Moore Creek Preserve and UCSC and in the Pogonip. Outside the city, likely nesting of more than one pair at UCSC (Gerow 2006).

Peregrine Falcon (*Falco peregrinus anatum*) Adults regularly observed foraging along lower San Lorenzo and coastal areas; and possible nest site within or close to city limits (Gerow 2006). Breeding at the hack site on UCSC Long Marine Lab (Gerow 2006).

American Kestrel (*Falco sparvarius*) Nest sites located in the Pogonip (Santa Cruz Parks and Recreation Department 1998) and in Meder Canyon (John Gilchrist and Associates 1998).

California Quail (*Callipepla californica*). Confirmed breeding in Moore Creek Preserve and adjacent areas in the Moore Creek drainage and Meder Canyon. Population occurs in the eastern portion of DeLaveaga Park. Confirmed breeding on lower UCSC campus (Gerow 2006).

American Coot (*Fulica americana*). At least one breeding pair at Westlake Pond and one or two pairs at Neary Lagoon (Gerow 2006).

Killdeer (C*haradrius vociferous*). Breeding along railroad tracks southeast of Neary Lagoon, at the UCSC Marine Science Center (Terrace Point), and along the San Lorenzo River (Gerow 2006).

Spotted Sandpiper (*Actitis macularia*) Historical breeding along the lower San Lorenzo River, especially along the bluffs (Gerow 2006).

Western Gull (*Larus occidentalis*). Numerous nests at Natural Bridges State Park on the cliffs and on the seastacks, one on top of a nearby chimney structure on West Cliff Drive, on rooftops of private residences all along West Cliff, on the roofs of buildings at the Municipal Wharf, and another nest on a dredging boat at the Yacht Harbor near the Murray Street Bridge. Unconfirmed nesting further inland (ESW 2006 Surveys and Gerow 2006).

Pigeon Guillemot (*Cepphus columba*). Numerous nests along the cliffs and rocky points between Cowell's Cove and Natural Bridges State Park. One or two pairs nesting below the Municipal Wharf. Nesting in the area of the coastal UCSC lands along the cliffs west of Younger Lagoon, just outside of the city limits (ESW 2006 Surveys and Gerow 2006).

Band-tailed Pigeon (*Columba fasciata*). Likely breeder with large foraging areas so difficult to determine actual nest sites. Widespread in evergreen forest and woodlands within the city limits such as Moore Creek Preserve, Meder Canyon, lower Branciforte Creek (across from Ocean View Park) and Arana Gulch. Regular in the residential areas north of King Street and near the north side of Neary Lagoon (Gerow 2006).

Mourning Dove (*Zenaida macroura*). Common and widespread breeder (Gerow 2006).

Barn Owl (*Tyto alba*). Potential nest sites in the Pogonip (Santa Cruz Parks and Recreation Department 1998), Arana Gulch (Strelow and EcoSystems West 2000), and Meder Canyon (John Gilchrist and Associates 1998).

Great Horned Owl (*Bubo virginianus*). Successful nesting at Natural Bridges State Park (Gerow 2006), Meder Canyon (John Gilchrist and Associates 1998), and likely nesting of two or more pairs in Moore Creek Preserve (Gerow 2006). Potential nesting habitat in Pogonip (Santa Cruz Parks and Recreation Department 1998) and Arana Gulch (CNDDB 2007; Strelow and EcoSystems West 2000; and HRG 1996a).

White-throated Swift (*Aeronautes saxatalis*). A few apparent breeding pairs at the UCSC Upper Quarry and one pair at Kalkar Quarry (Gerow 2006).

Allen's Hummingbird (*Selasphorus sasin*). Confirmed nesting at Antonelli Pond (LTSCC 2001) and Meder Canyon (John Gilchrist and Associates 1998). Fairly common to common (likely nesting) in various forested and riparian areas including: Moore Creek Preserve, Natural Bridges, Pogonip, Harvey West Park, the San Lorenzo River (mostly north of Hwy1), DeLaveaga Park, and Arana Gulch. Outside of the city, fairly common to common at UCSC; abundant at the UCSC Arboretum (Gerow 2006).

Belted Kingfisher (*Ceryle alcyon*). One or two nesting pairs likely nesting along the San Lorenzo just north of the city limits (Gerow 2006).

Acorn Woodpecker (*Melanerpes formicivorus*). Present (likely breeder) at Pogonip, DeLaveaga Park, and in Branciforte Creek close to DeLaveaga Park. Colonies in Moore Creek Preserve, and south of Meder Street between the two branches of Moore Creek (Gerow 2006). Present at UCSC (Gerow 2006).

Nuttall's Woodpecker *(Picoides nuttallii*). Nested in previous years at the Sycamore Grove along the San Lorenzo River (north of Highway 1) (Gerow 2006). Occurs at Meder Canyon (John Gilchrist and Associates 1998) and Antonelli Pond (LTSCC 2001).

Downy Woodpecker (*Picoides pubescens*). Along the San Lorenzo River nesting confirmed north of the Highway 1 bridge. Nesting likely south of the bridge in the large riparian trees adjacent to San Lorenzo Park and on the lower Branciforte Creek (across from Ocean View Park). Possible nesting in moister evergreen forest areas of Pogonip, Harvey West Park, Moore Creek Preserve and in some suburban areas, such as the neighborhood north of Lighthouse Field (a territorial pair was noted), along Escalona Street, and along Branciforte Creek near Water Street (Gerow 2006). Possible nesting at UCSC.

Hairy Woodpecker (*Picoides villosus*). Nesting pair in the dead Monterey Pines along the east border of Natural Bridges, in suburban neighborhood near Escalona and Alta Vista Streets; one or two pairs in Meder Canyon and one or two pairs in Arana Gulch. Likely nesting pair in the suburban neighborhood near Columbia and Bay Street, west of Neary Lagoon (Gerow 2006).

Northern Flicker (*Colaptes auratus*). Nesting pair at Natural Bridges State Park, two on the Moore Creek Preserve. Likely breeding on upper UCSC campus, in DeLaveaga Park, and Pogonip (Gerow 2006).

Olive-sided flycatcher (*Contopus cooperi*). Nesting in areas with fairly tall conifers or blue gum eucalyptus groves in Pogonip, Harvey West Park, Evergreen Cemetery, Meder Canyon (also John Gilchrist and Associates 1998), Arana Gulch, Moore Creek Preserve, the west branch of Moore Creek near Meder Street, and Westview Court off Western Drive (Gerow 2006). Scattered territorial birds in upper UCSC campus (Gerow 2006).

Western Wood-peewee (*Contopus Sordidulus*). Nesting near Meder Canyon at the Home of Peace Cemetery, above Evergreen Cemetary, and in Harvey West Park. Territories along the San Lorenzo River from the Sycamore grove to the Hwy 1 bridge. Probable nesting in Moore Creek in the Moore Creek Preserve, on the east branch of Moore Creek near Meder Street, on Westview Court off Western Drive. Fairly common in DeLaveaga Park (Gerow 2006).

Pacific-slope Flycatcher (*Empidonax difficillus*). Confirmed nesting at Antonelli Pond (LTSCC 2001), on lower Branciforte Creek across from Ocean View Park (Gerow 2006). Possible nesting in the walkway of Upper Bay Street, and along the small creeks near Escalona Street (Gerow 2006). Several pairs are likely to be nesting in Meder Canyon, Arana Gulch, and Neary Lagoon (Gerow 2006).

Black Phoebe (*Sayornis nigricans*). Confirmed nesting at Antonelli Pond (LTSCC 2001), along the San Lorenzo River, at Natural Bridges State Park, Neary Lagoon, Arana Gulch and in the vicinity of the Santa Cruz Yacht Harbor, the bluffs along Westcliff Drive, and the Pogonip Club Building (Gerow 2006).

Ash-throated Flycatcher (*Myiarchus cinerascens*). Confirmed nesting at Moore Creek Preserve (on the east branch of Moore Creek), and Meder Canyon. Two possibly-nesting pairs at the Pogonip (Gerow 2006). Nesting at the UCSC Arboretum (Gerow 2006).

Warbling Vireo (*Vireo gilvus*). Confirmed nesting along Brookwood Drive in Delaveaga Park and likely to be nesting in southern Delaveaga Park. Possible nesting (breeding pairs) along the San Lorenzo River (Sycamore Grove area)(Gerow 2006). Historical breeding at Antonelli Pond (LTSCC 2001). Breeding pair at the UCSC Arboretum along Moore Creek

Hutton's Vireo (*Vireo huttoni*). Confirmed nesting common to the Moore Creek Preserve. Possible nesting at Neary Lagoon. Pair likely to be nesting in the Natural Bridges portion of Moore Creek. Territorial display observed in Meder Canyon (Gerow 2006).

Steller's Jay (*Cyanocitta stelleri*). Probable nesting in the vicinity of Lighthouse Field, and in a residential neighborhood on the Westside of the city (Gerow 2006).

Western Scrub Jay (*Aphelocoma californica*). Breeding at Antonelli Pond (LTSCC 2001).

Common Raven (*Corvus corax*). Territorial pairs and possible nesting in the Natural Bridges State Park area, the Pogonip (Gerow 2006). Possible nesting on the upper UCSC campus (Gerow 2006).

American Crow (*Corvus brachyrhynchos*). Confirmed nesting at Natural Bridges State Park, Lighthouse Field, and in tree at corner of Fair and Ingalls Streets. Possible nesting at several locations on lower Westside, downtown, and lower Eastside areas (Gerow 2006).

Northern Rough-winged Swallow (S*telgidopteryx serripennis*). Twelve to fifteen pairs confirmed nesting along the San Lorenzo River Gerow 2006).Breeding at Antonelli Pond (LTSCC 2001). Possible nesting at Kalkar Quarry, Moore Creek, along Westcliff Drive (near surfer statue), Delaveaga Park (old quarry in the southwest corner), and the Santa Cruz Yacht Harbor (south of Murray) (Gerow 2006).

Violet-green Swallow (*Tachycineta thalassina*). Confirmed nesting in woodpecker holes in trees at Natural Bridges State Park, Moore Creek Preserve, restroom building at Delaveaga Park, under roof tiles in building on Mission Street Extension, a hotel building on Beach Street, at houses on Isbel Drive, and other locations within the city (Gerow 2006). This bird in also known to breed at Antonelli Pond (LTSCC 2001).

Tree Swallow (*Tachycineta bicolor*). Confirmed nesting in nest box at Neary Lagoon. Pair likely to be nesting at Antonelli Pond (Gerow 2006).

Cliff Swallow (*Petrochelidon pyrrhonota*). Confirmed nesting on the Raytek buildings on Shaffer Road (100+ nests), the San Lorenzo River bridges, along Westcliff Drive (eastern portion south of Manor Avenue), on the cliffs at Lighthouse Point and the Lighthouse (Gerow 2006).

Barn Swallow (*Hirundo rustica*). Confirmed nesting widespread throughout the city, including the buildings in the Terrace Point area, houses and sewer plant structures near Neary Lagoon, under the eaves of warehouses on the Westside, and houses in the neighborhood just south of UCSC (Gerow 2006).

Chestnut-backed Chickadee (*Poecile rufescens*). Breeding at Antonelli Pond (LTSCC 2001).

Bushtit (*Psaltriparus minimus*). Breeding at Antonelli Pond (LTSCC 2001).

Red-breasted Nuthatch (*Sitta canadensis*)**.** Likely to be nesting at UCSC campus (Gerow 2006).

Pygmy Nuthatch (*Sitta pygmaea*)
Confirmed nesting in Pogonip, Harvey West Park, Delaveaga Park, Moore Creek Preserve, Natural Bridges State Park, Western Drive, various Westside industrial areas, Meder Canyon, Bay Street, Lighthouse Field, in the vicinity of Neary Lagoon, lower Branciforte Creek across from Ocean View Park, Arana Gulch, and other locations within the city limits. Confirmed nesting at scattered locations at the UCSC campus (Gerow 2006).

Brown Creeper (*Certhia americana*)
Confirmed nesting at the cemetery on Meder Street, Meder Canyon, Arana Gulch, Delaveaga Park, Moore Creek (near Western Drive), along the San Lorenzo River just north of Highway One, in Natural Bridges State Park, and Lighthouse Field (Gerow 2006).

Winter Wren (*Troglodytes troglodytes*)
Confirmed nesting at the Pogonip. Possible nesting in Harvey West Park. Breeding behavior observed along Carbonera Creek and Branciforte Creeks. Confirmed nesting at UCSC (Gerow 2006).

Marsh Wren (*Cistothorus palustris*). Breeding population confirmed at Neary Lagoon (Gerow 2006).

Wrentit (*Chamaea fasciata*). Confirmed nesting at and in the vicinity of Antonelli Pond (LTSCC 2001 and Gerow 2006), Natural Bridges State Park, Meder Canyon, Delaveaga Park, and Arana Gulch. Confirmed nesting at UCSC (along Moore Creek and tributaries, the Great Meadow and the Arboretum) (Gerow 2006).

Golden-crowned Kinglet (*Regulus satrapa*)**.** Confirmed nesting at Pogonip. Confirmed nesting on the upper UCSC campus (Gerow 2006).

American Robin (*Turdus migratorius*)**.** Confirmed nesting common and widespread in most residential areas and parks throughout the city (Gerow 2006), including Antonelli Pond (LTSCC 2001).

Swainson's Thrush (*Catharus ustulatus*). Confiemed breeding at Antonelli Pond (LTSCC 2001). Territorial pairs and possible nesting in Meder Canyon, Neary Lagoon, along Pogonip Creek, along the Moore Creek drainage (the Moore Creek Preserve, the east branch of Moore Creek near Western Drive, Natural Bridges State Park, along the San Lorenzo River (north of Highway 1), Delaveaga Park, and Arana Gulch. Possible nesting in the UCSC Arboretum area (Gerow 2006).

Hermit Thrush (*Catharus guttatus*). Possible nesting in Pogonip (northwestern portion and the along Redwood Creek. Likely to be nesting in the upper UCSC campus (Gerow 2006).

Northern Mockingbird (*Mimus Polyglottos*). Confirmed breeding at Antonelli Pond (LTSCC 2001).

California Thrasher (*Toxostoma redivivum*). Confirmed nesting in Meder Canyon (John Gilchrist and Associates 1998 and Gerow 2006). Pairs likely to be nesting in Moore Creek Preserve and Delaveaga Park. Residential pairs at the UCSC Arboretum and on upper UCSC campus (Gerow 2006).

Orange-crowned Warbler (*Vermivora celata*). Confirmed nesting on Moore Creek (Natural Bridges section)**.** Pairs likely to be nesting in Meder Canyon and Arana Gulch. Territorial behavior observed at Neary Lagoon (Gerow 2006).

Black-throated Gray Warbler (*Dendroica nigrescens*). A pair is likely nesting in Pogonip. Territorial behavior by several birds was also observed at the upper UCSC campus (Gerow 2006).

Wilson's Warbler (*Wilsonia pusilla*). Confirmed nesting at Pogonip, Harvey West Park, upper Branciforte and Carbonera Creeks, Delaveaga Park, Arana Gulch, Moore Creek Preserve, Moore Creek (between Mission Street Extension and Antonelli Pond), Natural Bridges State Park, and Neary Lagoon. Possible nesting at Meder Canyon and along the San Lorenzo River (below the Sycamore Grove). Nesting at UCSC. (Gerow 2006).

Black-headed Grosbeak (*Pheucticus melanocephalus*). Confirmed nesting in the Moore Creek drainage (in the vicinity of the UCSC Arboretum and Moore Creek Preserves), Antonelli Pond, Natural Bridges State Park, Meder Canyon, Pogonip, Harvey West Park, the San Lorenzo River (north of Highway 1), Branciforte Creek, Delaveaga Park, and along Arana Gulch. Likely to be nesting in Neary Lagoon. Confirmed nesting in the upper UCSC campus (Gerow 2006).

Spotted Towhee (*Pipilo maculatus*). Confirmed nesting in Moore Creek Preserve, the Moore Creek drainage to Natural Bridges State Park, Meder Canyon, San Lorenzo River (north of Water Street), the Arana Gulch area, lower Branciforte Creek across from Ocean View Park, and in the vicinity of Escalona Street. Confirmed nesting in the entire forest belt north of the city. (Gerow 2006).

Calfornia Towhee (*Pipilo crissalis*). Confirmed nesting common and widespread in residential areas, parks throughout the city (Gerow 2006).

Savannah Sparrow (*Passerculus sandwichensis*). Confirmed nesting at the Moore Creek Preserve, UCSC (Inclusion Area A). Territorial behavior and possible nesting at UCSC (East Field) (Gerow 2006).

Lark Sparrow (*Chondestes grammacus*). Possible nesting at the Moore Creek Preserve (northwest portion) (Gerow 2006).

W**hite-crowned Sparrow** (*Zonotrichia albicollis*). Confirmed nesting at Younger Lagoon and the Long Marine Lab Complex (Gerow 2006).

Song Sparrow (*Melospiza melodia*). Confirmed nesting at Terrace Point, Moore Creek, Meder Canyon, Arana Gulch, Neary Lagoon, and San Lorenzo River, and other small drainages and wetlands (Gerow 2006).

Dark-eyed Junco (*Junco hyemalis*). Confirmed nesting at Moore Creek and tributary canyons on the Preserve, Meder Canyon (upper canyon spring area). Possible nesting in the Arana Gulch

area (Arana and Hagemann Gulches), Santa Cruz Yacht Harbor (upper harbor area and western end of Murray Street Bridge) (Gerow 2006).

Western Meadowlark (*Sturnella neglecta*). Confirmed nesting at the Pogonip, UCSC (East Field area and Inclusion Area A), and Moore Creek Preserve (Gerow 2006).

Red-winged Blackbird (*Agelaius phoeniceus*). Confirmed nesting at Neary Lagoon, Antonelli Pond, a ditch on Delaware Avenue (in vicinity of Lipton building), Kalkar Quarry Pond, Natural Bridges State Park (at pond in butterfly area), San Lorenzo River (south of San Lorenzo Park footbridge), and Westlake Pond. Likely to be nesting at Lighthouse Field (Gerow 2006).

Brewer's Blackbird (*Euphagus cyanocephalus*). Confirmed nesting common and widespread in wooded, suburban and urban areas throughout the city (Gerow 2006).

Bullock's Oriole (*Icterus bullockii*). Territorial behavior and possible nesting in vicinity of upper Western Drive and Meder Street (east of the Moore Creek Preserve and south of the UCSC Arboretum) (Gerow 2006).

Hooded Oriole (*Icterus cucullatus*).Confirmed nesting widespread throughout city in palm fans. Territorial behavior observed along Isbel Drive (Gerow 2006).

Purple Finch (*Carpodacus purpureus*). Confirmed nesting UCSC, Moore Creek Preserve, Pogonip, Harvey West Park, Delaveaga, the Carbonera Heights area, and Neary Lagoon. Possible nesting at the UCSC Arboretum and along the San Lorenzo River (Gerow 2006).

Pine Siskin (*Carduelis pinus*). Confirmed nesting at Delaveaga Park. Possible nesting at UCSC, Pogonip, Harvey West Park, Carbonera Heights / Isbel Drive area, and upper Meder Canyon (Gerow 2006).

Lesser Goldfinch (*Carduelis psaltria*). Confirmed nesting on the Westside (north Mission Street) and the Eastside (Water Street). Apparent breeding on Moore Creek Preserve, Meder Canyon, Pogonip, and Delaveaga Park. Apparent breeding on lower UCSC campus (Gerow 2006).

American Goldfinch (*Carduelis tristis*)
Confirmed nesting at Antonelli Pond (LTSCC 2001 and Gerow 2006), Natural Bridges State Park, Bethany Curve Park, and on the Westside (in the riparian area at the western border of the city limits). Confirmed nesting at and in the vicinity of Younger Lagoon (Gerow 2006).

APPENDIX B.

Special-Status and Sensitive Birds Species Known to Occur but Unlikely to Require Protection Under CEQA within the City Limits of Santa Cruz

This list includes special-status birds that are known to occur in the city limits but whose activities in the vicinity are not likely to warrant require protection from future development; such as, migrating birds whose wintering activities are protected but the birds are rare visitors to Santa Cruz; or birds whose nesting activities are protected under CEQA, but whose nesting ranges lie outside of the City of Santa Cruz, or who are not known to nest within the city due to the rarity of the bird or lack of suitable habitat. These species may occur within the city for wintering, foraging, or roosting activities, or during migrations.

Common Loon (*Gavia immer*) (nesting). The nesting common loon is a State Species of Special Concern. The bird is ranked by the CNDDB as G3S1. The CNDDB state ranking indicates a status of Extremely Endangered.

The common loon winters in the vicinity. Its nesting range lies in the northern United States and Canada. This species has been observed at Antonelli Pond (LTSCC 2001).

American White Pelican (*Pelicanus erythrorhynchus*) (nesting colony)**.** The nesting white pelican is a State Species of Special Concern. The bird is ranked by the CNDDB as G3S1. The CNDDB state ranking indicates a status of Extremely Endangered.

The nesting range of the white pelican lies outside of the vicinity and region of Santa Cruz. This species has been observed at Neary Lagoon (Jones and Stokes 1992).

Northern Harrier Hawk (*Circus cyaneus*) (nesting). The nesting northern harrier (also known as marsh hawk) is a State Species of Special Concern. The bird is ranked by the CNDDB as G5S3. The CNDDB ranking indicates a state status of Restricted Range; Rare based on the number of individuals per area of occupied habitat.

The northern harrier hawk is not known to nest within the city limits. Northern harriers are observed foraging and roosting at Neary Lagoon (David J. Powers and Associates, Inc. 1998 and Jones and Stokes 1992), Antonelli Pond (LTSCC 2001), and Meder Canyon (John Gilchrist and Associates 1998). Potential foraging habitat exists on the Pogonip (Santa Cruz Parks and Recreation Department 1998), Moore Creek Preserve and the adjacent Poliski-Gross undeveloped parcel (Biotic Resource Group with Dana Bland and Associates 2001). A nesting pair and juveniles are regularly observed foraging just north of the city limits over coastal UCSC lands (EcoSystems West 2002b and Gerow 2006).

Bald Eagle (*Haliaeetus leucocephalus*) (nesting & wintering). The nesting and wintering bald eagle has a CESA listing of Endangered. The CNDDB Ranking of G4S2 also reflects this state status of Endangered for this species. The (nesting and wintering) bald eagle has also been given a Fully Protected classification by the CDFG

This species has been observed on rare occasions within city limits at Antonelli Pond (LTSCC 2001).

Osprey (*Pandion haliaetus*) (nesting). The nesting osprey is a California Species of Special Concern. The nesting bird is listed by the CNDDB as G5S3. The CNDDB state ranking indicates

a restricted range for the nesting bird and rare based on the number of individuals per area of occupied habitat.

The City of Santa Cruz lies outside of the breeding range of the Osprey. Ospreys have been observed in Arana Gulch (HRG 1996a and CNDDB 2007), Neary Lagoon (Jones and Stokes 1992 and David J. Powers and Associates Inc., Environmental Consultants and Planners 1998), and Antonelli Pond (LTSCC 2001). There is potential habitat at the Pogonip (Santa Cruz Parks and Recreation Department 1998).

Prairie Falcon (*Falco mexicanus*) (nesting). The nesting prairie falcon is a California Species of Special Concern. The nesting bird is also listed by the CNDDB as G5S3. The CNDDB state ranking indicates a restricted range for the nesting bird and rare based on the number of individuals per area of occupied habitat. This species is also considered a Bird of Conservation Concern by the USFWS.

The prairie falcon is not known to nest within the Santa Cruz County. This species has been observed within the city limits at Antonelli Pond (LTSCC 2001).

Western Snowy Plover (*Charadrius alexandrinus nivosus*) (nesting). The nesting western snowy plover is federally-listed as Threatened and is a State Species of Special Concern. The CNDDB ranking for the bird is G4T3S2, indicating an Endangered state status for the species and a Restricted Range; Rare status for the subspecies throughout its range. This bird is also considered a Bird of Conservation Concern by the USFWS.

The western snowy plover bred historically on Main Beach (David J. Powers and Associates, Inc. Environmental Consultants and Planners 1998)**.** A regular wintering flock is regularly observed at Seabright Beach (Entrix 2004; Gerow 2006; ESW 2006 Surveys). This species is also occasionally observed foraging at Main Beach, and rarely at Natural Bridges (Gerow 2006).

California Gull (*Larus californicus*) (nesting colonies). The nesting colonies of the California gull are listed as California Species of Special Concern. The CNDDB ranking for the bird is G5S2, indicating a state ranking of Endangered.

The City of Santa Cruz lies outside of the breeding range of the California gull. This species has been observed at Neary Lagoon (Jones and Stokes 1992 and David J. Powers and Associates, Inc. Environmental Consultants and Planners 1998), Antonelli Pond (LTSCC 2001), and Meder Canyon (Arroyo Seco) (John Gilchrist and Associates 1998). There is also potential for California gulls to occur on the Poliski-Gross property (Biotic Resource Group with Dana Bland and Associates 2001).

Marbled Murrelet (*Brachyramphus marmoratus*) (nesting). The nesting marbled murrelet is Federally Threatened and State Endangered. The nesting bird is listed by the CNDDB as G3G4S1. The CNDDB state ranking indicates a status of extremely Endangered.

The marbled murrelet is not known to nest within the city limits, but is observed foraging offshore along the city coastline (e.g., Mitchell's Cove). This species has also been observed flying over UCSC (Entrix 2004).

Short-eared owl (*Asio flammeus*) (nesting). The nesting short-eared owl is a California Species of Special Concern. The nesting short-eared owl is ranked by the CNDDB as G5S3. The CNDDB state ranking indicates a restricted range and rare based on the number of individuals per area of occupied habitat.

The short-eared owl is a winter migrant in Santa Cruz; the City of Santa Cruz lies outside of the breeding range of the bird. Wintering/migrating short-eared owls have been observed on the UCSC campus and in the Peasley Gulch area of Wilder Ranch State Park during the fall season and along Moore Ranch Road in the winter (Suddjian 2000, 2001). This species has been observed within the city limits at Neary Lagoon (Jones and Stokes 1992 and David J. Powers and Associates, Inc. Environmental Consultants and Planners 1998) and Antonelli Pond (LTSCC 2001).

Costa's Hummingbird (*Calypte costae*) (nesting). The Costa's hummingbird is ranked by the CNDDB as G5S3? This CNDDB ranking indicates a state status that is best described as Restricted Range; Rare based on the number of individuals per area of occupied habitat.

Costa's hummingbird is a rare visitor to the area. Its breeding range lies south and east of Santa Cruz. There is potential habitat for this species at the Pogonip (Santa Cruz Parks and Recreation Department 1998).

Rufous Hummingbird (*Selasphorus rufus*) (nesting). The nesting bird is listed by the CNDDB as G5S1S2. The CNDDB ranking indicates a state status from Endangered to extremely Endangered. This species is also considered a Bird of Conservation Concern by the USFWS.

The rufous hummingbird is a migrant in Santa Cruz. Its nesting habitat is in the northwestern United States and northwestern Canada. This species has been observed at the Pogonip (Santa Cruz Parks and Recreation Department 1998), and Meder Canyon (Arroyo Seco) (John Gilchrist and Associates 1998).

Willow Flycatcher (*Empidonax traillii*) (nesting). The nesting willow flycatcher is a State Species of Special Concern. This species is also considered a Bird of Conservation Concern by the USFWS.

The City of Santa Cruz lies outside of the breeding range of the willow flycatcher. This species has been observed at Neary Lagoon (Jones and Stokes 1992 and David J. Powers and Associates, Inc. Environmental Consultants and Planners 1998), Antonelli Pond (LTSCC 2001), Meder Canyon (Arroyo Seco) (John Gilchrist and Associates 1998). In addition, there is potential for this species to occur at Arana Gulch (Strelow Consulting and EcoSystems West 2000).

Least Bell's Vireo (*Vireo bellii pusillus*) (nesting). The nesting least Bell's vireo has federal and California state ESA listings of Endangered. The CNDDB Ranking of G5T2S2 also reflects this

state status of Endangered for this species, and the subspecies throughout its entire range. This vireo is also considered a Bird of Conservation Concern by the USFWS.

The Least Bell's vireo is not known to nest within the city limits. There is a potential for this species to occur at Arana Gulch (Strelow Consulting and EcoSystems West 2000).

Bank Swallow (*Riparia riparia*) (nesting). The nesting bank swallow is state-listed as Threatened. The bird is listed by the CNDDB as G5S2S3. The CNDDB state ranking indicates a restricted range; rare to Endangered status for the nesting bird, based on the number of individuals per area of occupied habitat.

The Bank swallow is not known to presently breed within the city limits. This species has been observed at Antonelli Pond (LTSCC 2001) and Neary Lagoon (Jones and Stokes 1992 and David J. Powers and Associates Inc., Environmental Consultants and Planners 1998).

Virginia's Warbler (*Vermivora virginiae*) (nesting). The nesting Virginia's warbler is a State Species of Special Concern. The CNDDB Ranking for this species is G5S2S3. This state ranking indicates a status of Restricted Range; Rare; to Endangered status for the nesting bird, based on the number of individuals per area of occupied habitat. This warbler is also considered a Bird of Conservation Concern by the USFWS.

The Virginia's warbler is a rare visitor in Santa Cruz. Its breeding range lies inland in the southwestern United States. This species has been observed at Neary Lagoon (Jones and Stokes 1992 and David J. Powers and Associates Inc., Environmental Consultants and Planners 1998).

Summer Tanager (*Piranga rubra*) (nesting). The nesting summer tanager is a State Species of Special Concern. The CNDDB ranking for this species is G5S2, indicating a state status of Endangered.

The City of Santa Cruz lies outside of the breeding range of the summer tanager. This species has been observed at Antonelli Pond (LTSCC 2001).