

# University California, Santa Cruz Natural Reserve System

Annual Report 2009-2010



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# Younger Lagoon Natural Reserve



## **Introduction**

This report provides an overview of the activities that were conducted at Younger Lagoon Natural Reserve (YLR) during the 2009-2010 fiscal year (July 1, 2009 - June 30, 2010). Younger Lagoon continued to see increases in use and activity in all areas. The proximity of YLR to campus and the Long Marine Lab provides allows for easy access to experiential learning opportunities. These opportunities have profound impacts on students both professionally and personally. This was the second year we had fulltime staff on sight managing the Reserve. As a direct result, the level of academic and public engagement increased and we are on track to meet our obligations required under the Coastal Long Range Development Plan (CLRDP).

Younger Lagoon represents a unique reserve within the UCSC's Natural Reserve portfolio as it has open public access to a portion of the Reserve. Along with the challenges of public access (i.e. impacts to resources, protecting research equipment, protecting endangered and threatened species, implementing regulations, etc.) having public present on-site provides opportunities for outreach and education. During the past year, we began implementing restoration activities on the Terrace portion of the reserve and, as a direct result, began interacting frequently with public users. These interactions have provided opportunities for reserve staff and students to discuss the short and long-term objectives and goals of the restoration work, interpret the flora and fauna of YLR, and discuss the ongoing planning and development efforts of the Marine Science Campus.

## **CLRDP Activities**

### *Overview*

This year represented the second year of CLRDP related activities at Younger Lagoon Natural Reserve. The CLRDP for the "Terrace Point" property was certified by the California Coastal Commission in 2008. In July of 2008, approximately 47 acres of natural areas of the "Terrace Point" property were incorporated into the University of California Natural Reserve System as part of UCSC's Younger Lagoon Reserve. The inclusion of the 47 acres into YLR, along with continued management of the lagoon portion of YLR, was a requirement of the California Coastal Commission for the UCSC Marine Science Campus development.

The CLRDP requires that entire Reserve be protected and that the newly incorporated Natural Reserves lands are restored over a 20-year period. Fulfilling the University's mission to support research and teaching we have begun to be incorporate research and teaching into all aspects of restoration, monitoring, research and protection throughout YLR. The increased lands and access to restoration and monitoring projects is providing expanded opportunities for undergraduate experiential learning via class exercises, research opportunities, and internships.

### *NOID 10-1 Beach Access Management Plan*

Implementation Measure 3.6.3 of the CLRDP requires that (through controlled visits) the public have access to Younger Lagoon Reserve beach and that a monitoring program be created and

implemented to document the condition of native flora and fauna within Younger Lagoon and its adjacent beach. The monitoring plan is to be implemented over a 5-year time period. At the end of the 5-year period (Winter 2015) results are to be compiled and included in a report that summarizes and assesses the effect of controlled beach access on flora and fauna. The report will be submitted to the California Coastal Commission. In March 2010, the California Coastal Commission (CCC) approved the University of California's Notice of Impending Development Implementation for Implementation Measure 3.6.3 of the CLRDP (NOID 10-1), included as an appendix to this report. As a result, Seymour Marine Discovery Center docent training for the beach tours began in the winter of 2010 and biological monitoring of the lagoon and adjacent beach began in spring 2010.

### *NOID 10-2 Specific Resource Plan for the Enhancement and Protection of Terrace Lands at Younger Lagoon Reserve*

The Resource Management Plan (RMP) within the CLRDP provides a broad outline with general recommendations and specific guidelines for resource protection, enhancement, and management of all areas outside of the mixed-use research and education zones on the MSC site (areas that will remain undeveloped). In addition to resource protection, the CLRDP requires extensive restoration, enhanced public access/education opportunities on site, and extensive monitoring and reporting requirements. The entire project is to be completed over 20 years and, as a condition of inception into the University of California Natural Reserve System, UCSC Campus has committed to providing funding for the project and perpetual management of YLR. A critical component of the CLRDP is the creation of a Specific Restoration Plan (SRP) guided by a Scientific Advisory Committee (SAC).

The SAC was seated in January 2009. Brief bios of the four SAC members are included as an appendix to this report. SAC members met with reserve staff at YLR twice during the spring of 2009 and once in the spring of 2010. SAC members completed three rounds of reviews on the draft SRP for Phase 1A and 1B of restoration (7 years) prior to its submittal to the CCC. Phase 1A projects include Priority 1 weed removal, re-vegetation, baseline monitoring, and selection of appropriate reference systems. Phase 1B projects include work in wetland areas and will require permitting from outside agencies (ACoE, USFWS, CDFG, etc). The SRP for Phase 1A and 1B is complete and slated to be submitted to the CCC in September 2010.

### *Scientific Advisory Committee (SAC) Meetings / Recommendations*

At the SAC's recommendation, Professor Karen Holl and doctoral student Lewis Reed conducted baseline vegetation surveys of YLR and six reference sites in the spring of 2010. The goal of this work was to establish baseline conditions, evaluate and refine reference targets for restoration, refine sampling methodology, and make recommendations for species to be planted as part of the restoration of coastal sage scrub and coastal grassland communities at YLR. A copy of their complete report, entitled "*Reference and baseline vegetation sampling for Younger Lagoon Reserve – spring 2010,*" is included as an appendix to this report. Their findings and recommendations are summarized here.

### Baseline Conditions

Native richness and cover in the target areas at YLR were far lower than those of comparable reference sites; there was no native herbaceous cover in the vast majority of quadrats, although there is substantial cover of native shrubs (primarily *Baccharis pilularis*) in some areas. Reed and Holl believe this presents both a challenge and an opportunity. On the one hand the process of establishing these native communities on such degraded sites is poorly understood and extremely challenging (Corbin et al 2004, Stromberg et al. 2007). On the other hand there is much room for improvement and embarking on restoration efforts using experimental design and both baseline and reference site data will help inform our understanding of restoration and ecosystem assembly in these systems.

### Reference Sites and Target Conditions

Plant assemblages are strongly influenced by abiotic components such as hydrology and geology as well as historical and recent land use and/or management activities. The three reference sites surveyed by Holl and Reed that exhibited the highest native cover and richness (Whitehouse Creek, Point Lobos, and Palo Corona) all have large areas that have not been tilled for conventional agriculture and are currently actively managed using either seasonal cattle grazing or periodic fire. Two of the sites with the lowest native cover and richness (New Brighton and Wilder Ranch) are currently not actively managed (e.g. no grazing or burning). Because of the strong effect of tilling on coastal prairie native plant diversity (Stromberg and Griffin 1996), and the challenge of restoring these systems (Corbin et al. 2004, Stromberg et al. 2007), Reed and Holl believe it is unrealistic to think that the higher cover values of Whitehouse Creek and Point Lobos State Park are achievable in an area with extensive past agricultural usage. Past research has demonstrated the importance of ongoing management such as grazing, fire, or mowing (Hayes & Holl 2003 a,b, Corbin et al. 2004, Hopkinson et al. 2009) in maintaining native cover in many coastal prairie sites. Grazing and fire are problematic at YLR; thus, mowing after the plants establish may be the best method to help promote native cover at YLR.

### Recommendations for Restoration Targets

In comparing data from reference sites to CLRDP restoration targets, Reed and Holl recommend that some CLRDP success criteria be modified. Below we outline the modifications that they recommend.

1. The SRP states that 10%, 25%, and 40% cover of shrubs be reached by years 2, 4, and 6 after planting in areas targeted for coyote brush scrub-grassland. Reed and Holl suggest this is a realistic target, particularly as average shrub cover is already 18.4% in some of these areas, and recommend that restoration efforts focus on diversifying the composition of shrubs as nearly all shrub cover is comprised of entirely of *Baccharis pilularis*.
2. The SRP recommends cover values of 5, 15, and 25% of non-shrub species (grasses and herbaceous forbs) be reached by 2, 4, and 6 years after planting in areas targeted for grassland. Reed and Holl believe this is a fairly optimistic estimate given that some of the "good" reference sites they sampled, and that have been documented in other studies, exhibit cover values that are equal or somewhat lower than SRP targets. If the current cover requirements are retained, they propose that a certain percentage of quadrats be

held to this goal (perhaps 60-80%). This approach takes into account the patchiness of coastal grasslands (e.g. variability in survival and recruitment). Otherwise, they recommend that year 6 cover values should be reduced slightly, perhaps from 25 to 20% by year 6.

3. The SRP recommends species richness of 6, 6, and 8 native species be reached in years 2, 4, and 6 after planting. Reed and Holl believe this goal is ambiguous as the spatial area is not clear and thus needs to be clarified.

#### Recommendations for Species to be Planted

The results of the reference site surveys provide useful information for the refinement of the species pallet at YLR. Two important parameters in this regard are species composition and functional group representation. The list of native species included in Table 2 of Reed and Holl's report includes additional species that were not included as "Possible Revegetation Species" in the SRP. Specifically, *Brodiaea terrestris*, *Carex harfordii*, *Eringium armatum*, *Juncus bufonius*, *Juncus xiphoides*, *Trifolium oliganthum*, *Triphysaria versicolor*, *Triteleia hyacinthine*, and *Triteleia ixioides* were found in multiple reference sites but were not included on the SRP list. In addition, several of other studies (included in Table 3 of their report) also include species lists that could be used to expand the species palette. Finally, Reed and Holl include a figure (Figure 6 of their report) that shows the relative cover contribution of each functional group in the reference sites, which they suggest could be used as a guide in developing composition targets. They also note that maintaining representation of some functional groups, particularly any of the native annuals, may require introducing propagules at higher rates than their proportional representation in established communities.

#### Recommendations for Future Sampling Methodology

Reed and Holl found the methodology currently proposed for sampling to be practical, adequate, and recommend to continue using this approach in future monitoring efforts. During the spring 2010 surveys they made a few minor, but notable, deviations from the written protocol that they recommend be made permanent. They are as follows:

1. Locate transects through group consensus using aerial photographs of the site, rather than randomly. This was done to ensure that transects ran through one type of target habitat and were spread evenly across the site.
2. Orientation of each transect was based on a randomly selected bearing from the center point (not the starting point) of the transect. The bearing was randomly selected from the range of bearings that would allow the entire transect to pass through a target habitat type rather than through the entire range of possible bearings.
3. In the designated coyote brush shrub-grassland areas, herbaceous composition in the shrub understory was quantified when accessible (e.g. on the edge of a shrub). The current protocol states that herbaceous cover will not be quantified in areas where shrubs intercept the transect.



### Recommendations for Timing of Surveys

In reviewing the monitoring and restoration goals outlined in the SRP, Reed and Holl found a mismatch in the proposed timing of the surveys. The specific native species cover and richness targets listed in the SRP are for years 2, 4, and 6 following planting, whereas monitoring is proposed for years 1, 4, and 7. Reed and Holl propose that specific areas should be monitored prior to and then 2, 4, and 6 years after planting so that the timing of monitoring is consistent with evaluating whether the success criteria have been met. For example, an area planted in winter 2010 would be monitored in 2012, 2014, and 2016. This means that specific areas would be monitored each year rather than monitoring the entire site at three year intervals. Reed and Holl think that this level of monitoring is feasible given that the monitoring protocol is relatively rapid.

### Baseline monitoring efforts in 2011

During the 2010-2011 field season Reed and Holl will conduct baseline monitoring in the wetland areas of Younger Lagoon Reserve, as well as monitoring a few coastal sage scrub and freshwater reference sites (although the number of available sites is quite limited due to habitat destruction and/or degradation).

### *Photo Documentation*

Photo point locations were established at ten locations within YLR (Figure 1). These locations were chosen to ensure coverage of all major areas on the Terrace. Photos were taken on March 4, 2010. At each photo point we collected the following information:

1. Photo point number
2. Date
3. Name of photographer
4. Bearing
5. Camera and lens size
6. Coordinates
7. Other comments

Photos are included as an appendix to this report.

### *Restoration Activities*

Restoration activities were initiated on the Terrace area of YLR and continued throughout the lagoon portion of the Reserve. Implementation was conducted largely by undergraduate students and community volunteers; thus, utilizing the reserve in a manner consistent with the programmatic objectives (facilitating research, education, and public service) of the University of California, Natural Reserves. Here we summarize some of the restoration activities that occurred on YLR during the past year.

### Priority One Weed Removal

Under the SRP, all priority-one weeds (Ice plant, Jubata grass, Monterey cypress, Cape Ivy, Panic veldgrass, Harding grass, French Broom and Monterey Pine) are to be controlled as they

are detected throughout the Terrace Lands (Figure 2). Elimination of reproductive individuals is the goal; however, YLR is surrounded by priority-one weed seed sources and it is likely that there will always be a low level of priority-one weeds persisting on the terrace. In FY2009-2010, reserve staff conducted weed patrols of the entire terrace, began removing ice plant from the coastal bluffs (Figure 3), and removed all Jubata grass from the terrace. In FY2010-2011, reserve staff will continue weed control projects and begin work on the cape ivy patch located in the west arm of the lagoon. Removal of new recruit Monterey Pine and Cypress will continue as will targeted removal of current individuals.



Figure 1. Photo documentation points.

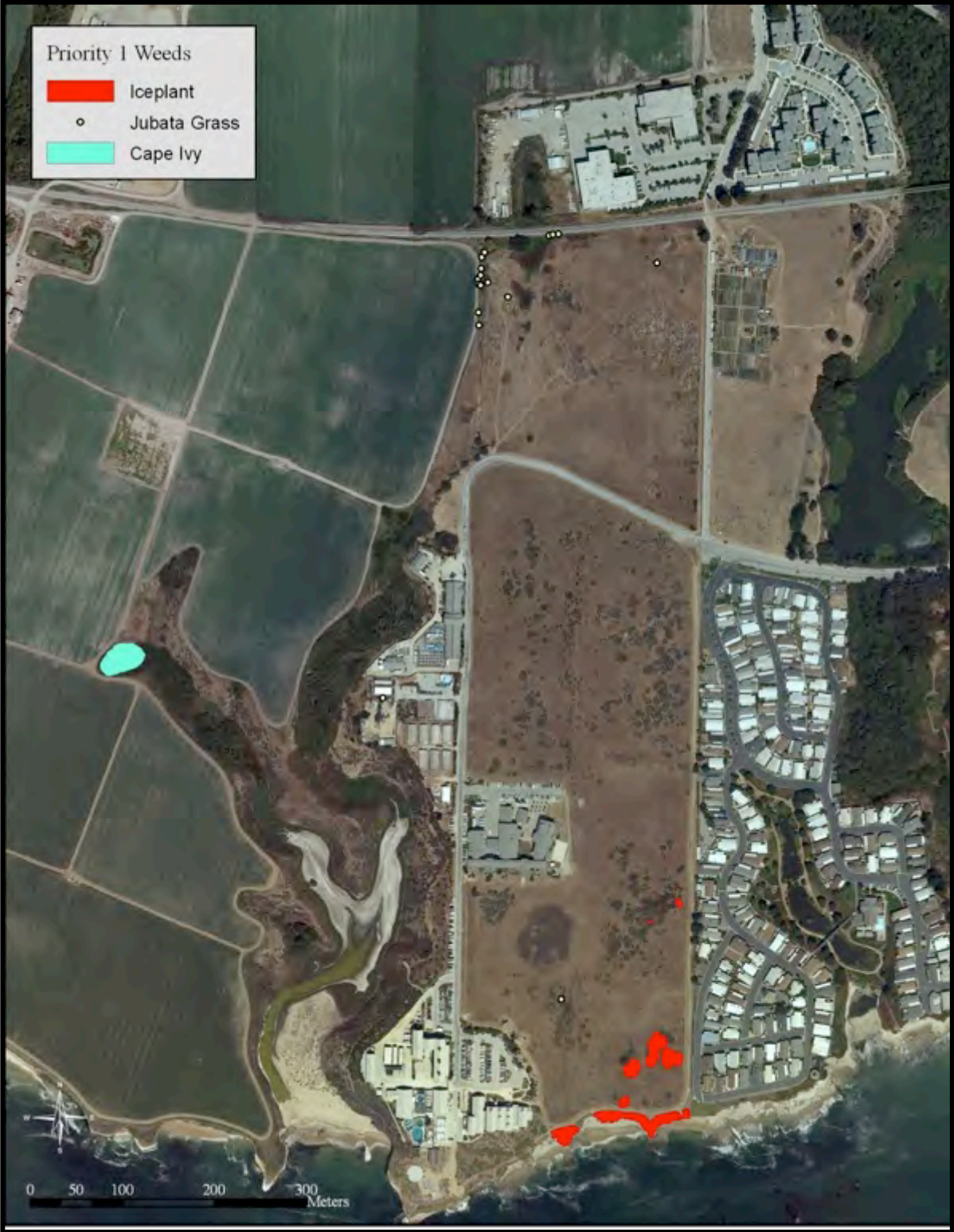


Figure 2. Known locations of priority one weeds.



**Figure 3.** California Native Plant Society habitat restoration team volunteers remove ice plant from YLR bluffs, October 2009.

### Seed Collection and Plant Propagation

In the summer and fall of 2009, reserve staff consulted with local experts to determine appropriate seed collection sites and collected seeds for restoration growing. These seeds were propagated at the UCSC Teaching Greenhouse and Arboretum in the fall and winter of 2009/2010.

### Restoration Planting

In FY2009-2010 areas along the beach cliff formerly covered with ice plant were planted with native seedlings. Reserve staff were able to incorporate hundreds of volunteers and students to assist in the restoration efforts.

## **Education**

Instructional use at Younger Lagoon Natural Reserve continued to increase this year. Courses encompassed a wide variety of disciplines. The increase in course use is a direct result of having fulltime staff on site that are able to actively engage faculty and students through outreach efforts in the classroom as well as providing on-the-ground assistance in teaching activities (Figure 4). The proximity of Younger Lagoon to the campus enables faculty and students to easily use the Reserve for a wide variety of instructional endeavors ranging from Restoration Ecology to Basic Scuba.

### *Undergraduate Students – Providing hands-on learning opportunities for future leaders*

YLR's proximity to the UCSC Campus and Long Marine Laboratory make it an ideal setting for undergraduate teaching and research. In 2009-2010 the reserve hosted classes in Invertebrate Zoology, Freshwater Ecology, Ecology and Conservation in Practice, Perceiving Nature, General Entomology, Restoration Ecology, Freshwater / Wetland Ecology, Restoration of Rivers and Streams, Animal Tracking, and Basic SCUBA (Table 1).

**Table 1.** Courses hosted at Younger Lagoon Reserve during 2009/2010.

Course Title	Institution	Instructor's Name (first & last name)
BIOL 136 - Invertebrate Zoology	UCSC - Ecology and Evolutionary Biology	Baldo Marinovic
BIOL 155 - Freshwater Ecology	UCSC - Ecology and Evolutionary Biology	Jon Moore
BIOE 151ABCD / ENVS 109ABCD - Ecology & Conservation in Practice	UCSC - Ecology and Evolutionary Biology UCSC - Environmental Studies	Don Croll and Gage Dayton
CLEI 61 - Perceiving Nature	UCSC - College Eight	Heather A Jue
ENVS 108/L - General Entomology Lab	UCSC - Environmental Studies	Carlo Moreno
ENVS 160 - Restoration Ecology	UCSC - Environmental Studies	Suzanne Langridge
ENVS 167 - Freshwater / Wetland Ecology (Summer Session 2009)	UCSC - Environmental Studies	Katie Monsen
ENVS 167 - Freshwater / Wetland Ecology (Spring 2010)	UCSC - Environmental Studies	Carol Shennan
ENVS 183 - Environmental Studies Internship	UCSC - Environmental Studies	Karen Holl
LANDSCAPE ARCHITECTURE 227 - Restoration of Rivers and Streams	UCB -Landscape Architecture	Mark Robert Tompkins
OPERS - Animal Tracking	UCSC - Office of Physical Education, Recreation and Sports	Chris Lay
OPERS - Basic Scuba	UCSC - Office of Physical Education, Recreation and Sports	Cecilia Shin



Figure 4. Undergraduate students collect insects during a General Entomology Lab (ENVS 108/L) at YLR, May 2010.

In Spring 2010, students from Assistant Professor of Ecology and Evolutionary Biology, Don Croll and, UCSC Natural Reserves Director Gage Dayton’s “Supercourse” ‘Ecology and Conservation in Practice’ (BIOE 151 ABCD / ENVS 109 ABCD) spent three days at the reserve practicing methods including field sketching, animal tracking, and wetland delineation. A “Supercourse” is one that fills the students entire schedule for that quarter. Students receive 20 academic units for their work, and live, learn, eat and travel together during the ten (10) week Field Ecology (Figure 5).





**Figure 5.** Undergraduate Students from Professors Croll and Dayton’s Field Ecology visit YLR and receive a field lesson on wetland delineation from reserve manager Beth Howard.

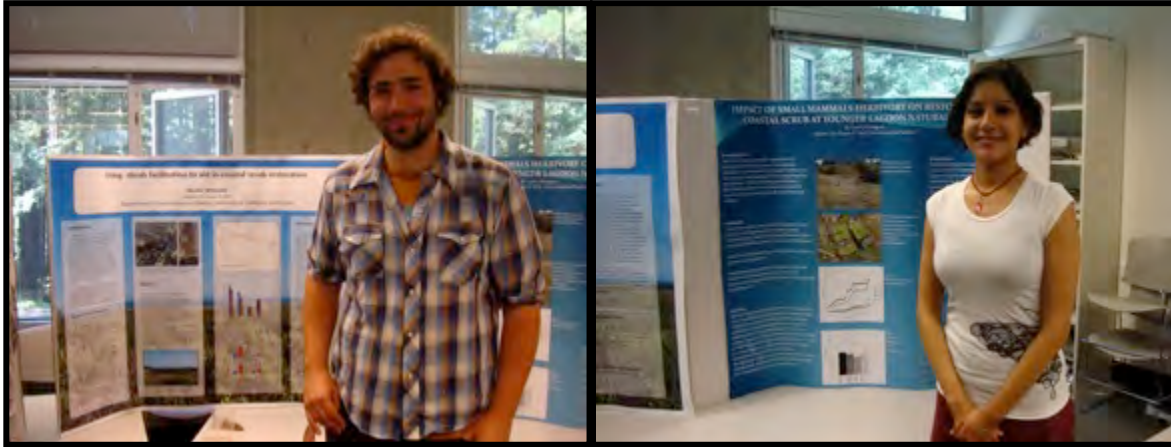
### *Internships and Senior Theses*

In FY 2009-10, YLR sponsored over 35 undergraduate interns through the UCSC Environmental Studies Internship Office. The students ranged from entering freshman to graduating seniors and spent between 6 and 15 hours a week working on restoration projects at the reserve. These projects included invasive species removal, re-vegetation with native species, seed collection, and plant propagation. Student-interns report a deep appreciation for the opportunity to obtain hands-on experience in their field of study.

### Undergraduate Interns Get First Taste of Research at Younger Lagoon Reserve

Inspired in part by their experiences in Professor Karen Holl’s Environmental Studies ‘Restoration Ecology’ course, two undergraduate students, Laura Almaguer and Nicholas (Nick) Whitaker completed senior internship projects with the UCSC Natural Reserves in June 2010 (Figure 6). Nick’s project, entitled ‘Using Shrub Facilitation to Improve Scrub Restoration’ was a comprehensive case study of planting strategies for ecological restoration in coastal scrub systems. Laura’s project, entitled ‘Impact of Small Mammal Herbivory on Restoration of Coastal Scrub at Younger Lagoon Natural Reserve’ investigated the impacts of herbivory on restoration plantings. Both students conducted their research during the winter and spring of 2010 at YLR. Their work included a thorough literature review, experimental design, greenhouse propagation, field plantings, vegetation monitoring, and data collection and analysis.

The two students worked closely with UCSC NRS Director Gage Dayton, reserve Field Manager, Elizabeth Howard and faculty Advisor Karen Holl to ensure that their results and recommendations would assist in future restoration activities at YLR.



**Figure 6.** Undergraduate student investigators Nicholas Whitaker (left) and Laura Almaguer (right) present their work at the UCSC Environmental Studies Undergraduate Research Poster Session, May 2010.

### **Research**

Due in part to its relatively small size and lack of facilities, YLR is unlikely to host many single-site research projects in biology or ecology. However, as one of the few remaining coastal lagoons in California, YLR is well suited to act as one of many research sites in a multi-sited project. Additionally, as described above in the educational section of this report, YLR is an excellent location for hands-on undergraduate educational experiences. In the coming years, Reserve staff hope to attract more researchers to YLR by actively working with a wide array of scientists.

#### *US Geological Survey Groundwater Study*

In FY 2009-2010, a team of researchers from US Geological Survey chose YLR as one of several diverse coastal sites to study submarine groundwater discharge (Figure 7).



**Figure 7.** Dr Peter W. Swarzenski (left) and his series of temporary shallow piezometers across the YLR berm / beach face (right) (Photo courtesy USGS).

Submarine groundwater discharge (SGD) estimates remain one of the most elusive components of a coastal water budget. Despite this general lack of information, environmental effects of SGD may be widespread and persistent. For example, the delivery of nutrients into nearshore waters can contribute towards coastal eutrophication and the initiation or development of algal blooms. Additionally, SGD has also been invoked as a transport mechanism for micro-organisms including bacteria into the sea. To better assess the role of SGD to nearshore ecosystems, new geochemical and geophysical techniques have been developed to quantify rates and scales of SGD. Dr Swarzenski and his team have already used these new techniques to measure the exchange of submarine groundwater with nearshore surface water at four diverse coastal sites: Simpson Bay, in eastern Prince William Sound, Alaska, Puget Sound in Washington, Malibu California, Santa Barbara California, and have now added YLR to their array of field sites.

### **Reserve Use**

YLR was used by UC Santa Cruz, UC Davis, UC Berkeley, Cornell University, Delaware University, Yerba Buena High School, Elkhorn Slough National Estuarine Research Reserve, Seymour Discovery Center, California Department of Fish and Game, California State Parks, United States Fish and Wildlife, Santa Cruz Bird Club, Redwoods to the Sea GeoVentures, Huffman Broadway & Associates, and several local and regional volunteer groups (Table 2). The greatest educational user group for YLR in 2009/2010 was once again undergraduate education, breakdown of all user groups are included in Table 3.

**Table 2.** Younger Lagoon user affiliations.

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<b>University of California Campus</b>	<b>Other Universities</b>
University of California, Santa Cruz	Cornell University
University of California, Davis	University of Delaware
University of California, Berkeley	
<b>Government (Federal and State)</b>	<b>Non-governmental organizations</b>
U.S. Fish and Wildlife Service	Elkhorn Slough National Estuarine Research Reserve
California Department of Fish and Game	Santa Cruz Bird Club
California State Parks	Seymour Marine Discovery Center
United States Geological Service	
California Coastal Commission	
<b>K-12 system</b>	<b>Volunteer Groups</b>
Yerba Buena High School	California Native Plant Society
	Sigma Pi Fraternity, Santa Cruz Chapter
<b>For-profit/business groups:</b>	Seymour Marine Discovery Center
Redwoods to the Sea GeoVentures	UCSC Wilderness Orientation
Huffman Broadway & Associates	Seymour Marine Discovery Center

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**Table 3. Younger Lagoon User groups.**

Days	Home Institution		UC Campus		CSU Campus		Community College		Other CA Campus		Out of State		International		Government		TOTALS	
	Users	Udays	Users	Udays	Users	Udays	Users	Udays	Users	Udays	Users	Udays	Users	Udays	Users	Udays	Users	Udays
<b>UNIVERSITY-LEVEL RESEARCH</b>																		
Research Faculty	7	10	0	0							0	0			1	1	8	11
Research Scientist	1	5	0	0							0	0			9	27	10	32
Research Assistant	2	5	0	0							0	0			3	14	5	19
Research Graduate Student	2	8	1	2							1	1			0	0	4	11
Research Undergraduate Student	15	253	0	0							0	0			0	0	15	253
Subtotal	27	281	1	2							1	1			13	42	42	326
<b>UNIVERSITY-LEVEL INSTRUCTION</b>																		
University Instructor	30	237	0	0							0	0			0	0	30	237
University Student	421	1408	20	20							0	0			0	0	441	1428
Subtotal	451	1645	20	20							0	0			0	0	471	1665
<b>PUBLIC SERVICE</b>																		
K-12 Instructor	1	1	0	0							0	0			3	3	4	4
K-12 Student	0	0	0	0							0	0			33	33	33	33
Government (Fed/State/Local)	0	0	0	0							0	0			2	2	2	2
NGOs / Non-profits Organization*	0	0	0	0							0	0			17	81	17	81
For Profit / Business	0	0	0	0							0	0			0	0	0	0
Volunteer	5	6	0	0							0	0			385	553	390	559
Other	0	0	0	0							0	0			2247	2277	2247	2277
Subtotal	6	7	0	0							0	0			2687	2949	2693	2956
<b>TOTALS</b>	<b>484</b>	<b>1933</b>	<b>21</b>	<b>22</b>							<b>1</b>	<b>1</b>			<b>2700</b>	<b>2991</b>	<b>3206</b>	<b>4947</b>

NOTES:

List all K-12 users in "Public Service."

University-level use that is not formal instruction or research (such as retreats, etc.) is "Public Service."

Research that is part of university-level coursework may be counted as both "Research" and "Instruction."

\* NGO = non-governmental organization. The United Nations defines NGO as "any non-profit, voluntary citizens' group which is organized on a local, national or international level. Task-oriented and driven by people with a common interest, NGOs perform a variety of services and humanitarian functions, bring citizens' concerns to Governments, monitor policies and encourage political participation at the community level. They provide analysis and expertise, serve as early warning mechanisms and help monitor and implement international agreements. Some are organized around specific issues, such as human rights, the environment or health."

\*\*"Other" includes members of the public who took the Seymour Marine Discovery Center's daily tour. All SMDC docents are trained to interpret YLR from the Long Marine Lab Marine Mammal / YLR Overlook, which is a mandatory stop on the daily tour. In FY 2009-2010, 22,368 visitors took the SMDC daily tour. Although all tours include information on YLR, we estimate that 10% of these visitors can be reasonably counted as users.

**Summary**

FY 2009-2010 was a successful year for YLR. The reserve continued to move forward with restoration, initiated new projects, strengthened collaborations, and developed new relationships. The increase in student and course use is a direct result of having superb staff on sight that are actively engaged with students, faculty, and the public. In turn, we are able to achieve our mission of supporting education, research, public education, conservation and stewardship as well as meet the environmental obligations the University of California has committed to with the California Coastal Commission and the State of California in general. We look forward to continuing this exciting and important work in FY 2010-11.

## UCSC Natural Reserves Advisory Committee

### *Charge*

The committee provides oversight of on- and off-campus natural reserves of instructional and research interest. It is responsible for developing program vision and policy for the management and use of the UCSC Campus Reserve and of the four UC Natural Reserves System holdings: Año Nuevo Island Reserve, Landels-Hill Big Creek Reserve, Younger Lagoon Reserve and Fort Ord Reserve. The committee coordinates with the systemwide NRS Advisory Committee that advises on policy for all NRS reserves.

In addition to the chair (Faculty Director), membership of the committee is comprised of faculty advisors to each reserve, one faculty representative at large, one non-senate academic appointment, one staff representative, one graduate student and two undergraduate students. The Faculty Director, in consultation with the Dean and the Administrative Director of the UCSC Natural Reserves, appoints the committee. Membership terms begin September 1 unless otherwise specified.

### **DURATION OF APPOINTMENTS**

Faculty Director: 5 years

Faculty Advisors: 3 years

Non-Senate Academic, Staff, and Students: 1 year

Members may be reappointed at the discretion of the Faculty Director in consultation with the Administrative Director.

Hours/Quarter: Chair/NRS Representative-20, Members-10

Reports to: Division of Physical & Biological Sciences Dean

### *MEMBERSHIPS (effective 1/1/09)*

Faculty Director of the  
Natural Reserve System

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Fort Ord Reserve Faculty Advisor	Laurel Fox Professor, Ecology & Evolutionary Biology EE Biology/Earth & Marine Sciences (831) 459-2533 - <a href="mailto:fox@biology.ucsc.edu">fox@biology.ucsc.edu</a>
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#### 4 Ex-Officio

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# Appendices

## **Appendix 1. Scientific Advisory Committee Biographies**

### **Dr. Karen Holl- Professor, Environmental Studies, University of California at Santa Cruz**

Dr. Karen Holl has been on the faculty in the Environmental Studies Department at the University of California, Santa Cruz for 12 years. She has conducted research on restoration ecology in a wide variety of ecosystems, including tropical rain forests, eastern hardwood forests, chaparral, grassland, and riparian systems in California. She has published over 50 journal articles and book chapters on restoring damaged ecosystems and is on the editorial board of the journal *Restoration Ecology*. She teaches the Restoration Ecology class at UCSC and supervises many of the undergraduate students who work on the UCSC Natural Reserves. She regularly advises numerous public and private agencies along the Central California Coast on land management issues. She recently was selected as an Aldo Leopold Leadership Fellow. Dr. Holl's expertise in restoration ecology, experimental design and data analysis, as well as her affiliation with UCSC and her excellent rapport with University students and staff make her an irreplaceable member of the Scientific Advisory Committee.

Dr. Holl received a Ph.D. in Biology from Virginia Polytechnic Institute and State University, and a Bachelors degree in Biology from Stanford University.

### **Tim Hyland - Environmental Scientist, State Parks, Santa Cruz District.**

Mr. Hyland has worked in the field of wildlands restoration for over 15 years. Much of his work has focused on coastal scrub, dune, and wetland restoration at sites throughout the Central Coast, including Wilder Ranch State Park (located approximately one mile west of YLR). He has extensive experience in restoration planning and implementation, vegetation mapping, exotic species control, and native plant propagation. In addition, Mr. Hyland is highly skilled in public education and outreach. His long tenure with California State Parks and direct experience in designing and implementing large-scale restoration projects make him a valuable member of the Scientific Advisory Committee.

Mr. Hyland has a B.A. from California Polytechnic State University, San Luis Obispo.

### **Bryan Largay - Tidal Wetland Project Director, Elkhorn Slough National Estuarine Research Reserve (ESSNER).**

Mr. Largay has worked in the fields of hydrology, water quality, and wetlands for fourteen years with a focus on restoration and wildlife habitat. He has conducted wetland restoration, watershed hydrology, and water quality investigations and designed measures to control erosion and treat water quality problems using vegetation. Much of his work has focused on collaborative water quality protection projects with agricultural landowners and growers. He has worked to solve water resource problems with a broad array of individuals, including scientists, planners, engineers, growers, private landowners, and contractors. Prior to joining the staff of

ESSNER, he participated in the Tidal Wetland Project as a member of the Science Panel and Model Advisory Team. Mr. Largay's experience working on complex, large-scale restoration projects with agricultural neighbors in a non-profit setting make him a very important addition to the Scientific Advisory Committee.

Mr. Largay received an M.S. in Hydrologic Sciences at U.C. Davis, and a Bachelor's degree at Princeton University.

**Dr. Lisa Stratton - Director of Ecosystem Management, Cheadle Center for Biodiversity and Ecological Restoration, U University of California, Santa Barbara (UCSB).**

Dr. Lisa Stratton has worked in the field of science-based restoration for over 10 years. She has extensive experience in restoration planning and implementation in conjunction with campus construction projects. Much of her work at UCSB has focused on involving students and faculty in the Cheadle Center's restoration projects. Dr. Stratton's work at the UCSB has provided her with a rare understanding of some of the unique challenges and opportunities YLR staff face as they undertake the restoration project at YLR. Her combined experience in wildlands restoration and management, scientific research, and working within the University of California system make her a very important member of the Scientific Advisory Committee.

Dr. Stratton received a Ph.D. in Botany and Ecology from the University of Hawai'i, a M.S. in Conservation Biology and Sustainable Development from the University of Wisconsin-Madison, and a Bachelors degree in Comparative Literature from Stanford University.

## Appendix 2. Monitoring Photos



YLR Terrace Photopoint #1. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 200°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #1. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 240°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #1. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 290°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





YLR Terrace Photopoint #1. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 320°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #1. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 340°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #2. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 190°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #2. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 225°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #2. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 270°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #2. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 320°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 220°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 260°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





YLR Terrace Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 300°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 310°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 350°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 30°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 60°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 80°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #4. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 340°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #4. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 40°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





YLR Terrace Photopoint #4. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 60°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #4. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 110°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #4. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 170°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #4. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 200°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #5. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 100°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #5. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 130°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #5. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 170°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #5. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 200°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





YLR Terrace Photopoint #5. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 240°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #5. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 260°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 300°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 340°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 60°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 110°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 140°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing:170° . Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





YLR Terrace Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 220°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #7. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 210°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #7. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 240°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #7. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 270°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #7. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 290°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #7. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 340°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #8. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 350°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #8. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 20°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





YLR Terrace Photopoint #8. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 80°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #8. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 160°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #8. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 210°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #9. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 200°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #9. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 120°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #9. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 70°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #9. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 20°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #9. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 330°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





YLR Terrace Photopoint #10. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 270°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #10. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 300°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Terrace Photopoint #10. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 340°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #1. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 300°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #1. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 330°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #1. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 350°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #2. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 170°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #2. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 240°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





YLR Beach Photopoint #2. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 310°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #2. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 350°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 170°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 225°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 270°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR

Beach Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 305°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 345°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 15°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





YLR Beach Photopoint #4. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 335°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #4. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 25°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #4. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 45°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #4. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 110°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #5. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 150°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #5. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 190°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #5. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 240°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #5. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 290°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





YLR Beach Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 240°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 270°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 290°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 315°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 340°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 370°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 70°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 100°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





YLR Beach Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 180°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



YLR Beach Photopoint #6. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 200°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.

## Appendix 3. Holl and Reed Baseline Vegetation Survey Report

**REFERENCE AND BASELINE VEGETATION SAMPLING FOR YOUNGER LAGOON  
NATURAL RESERVE – SPRING 2010**

Karen D. Holl (Younger Lagoon Reserve Scientific Advisory Committee Chair) and

Lewis K. Reed (UCSC Environmental Studies Doctoral Student)

*Reviewed and approved by the entire YLR Scientific Advisory Committee on Sept. 13, 2010*



## **Introduction**

Coastal grassland and coastal scrub exist as a dynamic gradient from herbaceous to woody plant communities along a narrow strip of California that is strongly influenced by proximity to the Pacific Ocean (Ford and Hayes 2007). Extensive modification of coastal lands for agricultural and urban development has led to drastic reductions in these once vast habitats. Given the disproportionately high biodiversity, including a multitude of rare and endemic species, and continued pressure for development in coastal lands, these habitats are of extremely high conservation value (Stromberg et al. 2002). Even on protected lands two factors challenge conservation management of these communities: presence of persistent or invasive exotic species and lack of appropriate disturbance regimes. The opportunity to embark on restoration of native coastal prairie and coastal scrub habitats at Younger Lagoon Reserve (YLR) will add great ecological, aesthetic, and educational value to the reserve as the process enriches local native biodiversity, enhances onsite beauty, and yields understanding of restoration and community assembly in these poorly understood habitats.

Restoration can broadly be defined as: “the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed” (Society for Ecological Restoration 2004). At Younger Lagoon Reserve coastal terrace communities have been degraded by historic cultivation and subsequent invasion by exotic species. The predicted potential vegetation for much of this site is a mosaic of mesic coastal prairie, coastal scrub, and freshwater wetlands but the site has been altered to the extent that there is currently little native representation of these communities on site. Moreover, this site has been subjected to decades of cultivation and a past survey of coastal California grasslands indicates that past cultivation is the single factor that most strongly negatively affects native cover and species richness (Stromberg and Griffin 1996), since cultivation alters soil stratigraphy, topography, drainage, and the soil microbial communities; depletes the native seed bank, and facilitates invasion of exotic species. The terrace lands were used for grazing dairy cattle in the early 1900s, and then were used for agriculture, primarily Brussels sprouts, from the late 1920s until the late 1980s (Hunt 2009). In order to have any measure of success in efforts to restore these communities, manipulation of the landscape must be preceded by two important steps: onsite baseline surveys to characterize existing conditions and establishment of reasonable restoration targets.

The specific resource plan for the "Enhancement and Protection of Terrace Lands at Younger Lagoon Reserve" (UCNRS 2010) specifies a series of targets for the restoration of ruderal, coyote brush scrub-grassland, and grassland areas. These targets include six or more native species of plants established, 10% cover of shrubs, 5% cover of non-shrubs, and evidence of natural recruitment two years after planting; six or more native species of plants established, 25% cover of shrubs, and 15% cover of non-shrubs, and evidence of natural recruitment four years after planting; and eight or more native species of plants established, 40% cover of shrubs, and 25% cover of non-shrubs, and evidence of natural recruitment six years after planting and thereafter. However, these criteria were originally drawn from the earlier Coastal Campus Long Range Development Plan for UCSC Long Marine Laboratory (Appendix A), and then revised based on expert opinion from a Scientific Advisory Committee, rather than determined from data collected at comparable sites. Therefore, a goal of this study was to collect data at reference sites in order to evaluate whether achieving these targets was a feasible and realistic goal.

Conducting baseline surveys is a relatively straight forward task but defining restoration targets can be more complicated. This is particularly true in cases such as that of the coastal prairie in which onsite analogs are entirely non-existent and variability in composition and percent native cover of local reference sites is not well known and notoriously variable. To overcome this challenge we consulted local experts and conducted extensive surveys of local reference sites. The following report summarizes the results of both the baseline surveys and a series of reference site surveys with an emphasis on native coastal prairie. The specific goals of this survey were:

1. To establish baseline conditions of native cover and species richness on the terrace lands at the University of California, Younger Lagoon Natural Reserve, in areas being restored during the first 7-yr phase of the restoration. This baseline will serve as a comparison to evaluate the efficacy of restoration efforts over time.
2. To characterize the highest quality coastal prairie reference systems with respect to native cover (both total amount and variability), native species richness, and native composition in order to provide realistic targets for restoration, as well as refine the restoration species list.

3. To refine the sampling methodology and determine the number of samples needed to achieve a certain level of power to detect changes in native cover.

## **Materials and Methods**

### *Baseline Conditions at Project Site*

To assess existing pre-treatment conditions we conducted a series of baseline surveys in upland communities of the Younger Lagoon Reserve project area including coastal bluff, grassland, and coyote bush scrub habitats. Target areas were those that had been designated earlier in the planning process for restoration of each habitat type in the first 7-yr phase of the restoration. Using an aerial map of these areas, a series of sampling locations were chosen by Dr. Karen Holl (chair of the Younger Lagoon Scientific Advisory Committee), Lewis Reed (a graduate student advised by Karen Holl who conducted the sampling), Elizabeth Howard (YLR Field Manager), and Gage Dayton (UCSC Natural Reserves Director) with the aim of capturing the inherent variation in vegetation within each community type (two in the narrow strip of coastal bluff, four in the grassland, and nine in the larger coastal scrub areas). These locations were identified through group consensus over the map and then located in the field based on the map to minimize sample selection bias.

At each location a 50-m transect was established along a randomly selected bearing. Herbaceous species composition was measured by visual estimation of absolute cover for each species in ten 0.25-m<sup>2</sup> quadrats along the transect. Quadrats were laid every 5 m on alternating sides of the transect starting at a randomly selected point between 1 and 5 meters (a total of 10 quadrats per transect). A clear plastic card with squares representing 1, 5, and 10% of the sampling frame was used to help guide visual cover estimations. Cover of each species (both native and exotic), bare ground, and litter were estimated at 5% intervals. Litter was specifically defined as residue from previous year's growth while any senescent material that was recognizable as growth from earlier in the current growing season was counted as cover for that species. Shrub seedlings that were <0.25 m tall and wide were also included in these estimates. After all cover estimates had been made, observers surveyed within 2 m of either side of the transect (a 4 × 50 m belt) for any species not encountered in the frames. When transects

intersected shrub cover, the starting and ending point of each shrub species' canopy was recorded to the nearest 0.10 m as a measure of shrub cover.



In the future the SRP calls for monitoring recruitment of native species, but since the restoration is just beginning, this monitoring was not appropriate at this time.

### *Reference Sites*

To inform the process of defining restoration goals, we identified and characterized a network of local remnant coastal prairie reference sites. Initially eight sites between Point Lobos at the south end of the Monterey Bay and Franklin Point just north of Davenport were identified as potential reference sites through consultation with local experts (Grey Hayes – Elkhorn Slough Coastal Training Program, Tim Hyland - California State Parks and YLR SAC member, Karen Holl – UCSC and YLR SAC chair). The main criteria were for sites to have a known high abundance of native grassland species and to be either located on the first marine terrace (an important geographic formation with unique edaphic features) or particularly close to the project location. Of the initial eight sites selected two (Lighthouse Field and Arana Gulch Greenbelt) were removed after field surveys revealed their relatively low abundance of native grassland species as compared to the rest of the reference sites (Table 1). The remaining six sites were surveyed



between late-April and mid-May 2010 to capture peak cover for most species. Vegetation in reference sites was assessed following the same methods used in the baseline surveys; however transects were located specifically (not randomly) in areas of high native cover within each site based on field observations during the site visit. In addition literature was reviewed for other data on coastal terrace prairie plant composition; this included both published papers, as well as ongoing monitoring data from grasslands on the UCSC main campus.

### *Data analysis*

We report means and standard deviation throughout. In summarizing the cover data we used midpoints of each cover class (e.g. 2.5, 7.5, 12.5) for absolute values. We calculated relative native cover as native cover/(native + exotic cover) excluding litter and bare ground from the calculation. We treated the quadrat as the sampling unit for averaging native cover values. We calculate species richness at the quadrat, transect, and site level, as the spatial area to evaluate species richness targets was not specified in the SRP.

We conducted power analyses by using a statistical power calculator provided by DSS Research ([http://www.dssresearch.com/toolkit/sscalc/size\\_a1.asp](http://www.dssresearch.com/toolkit/sscalc/size_a1.asp)). We compared the native cover and standard deviation values recorded at each reference site to a fixed value that was 2.5 or 5% greater than that value; in other words, this tested the power needed to detect a difference of 2.5 or 5% from the target value. We specified an 80% power level ( $\beta = 0.2$ ) and  $\alpha = 0.1$  based on the level recommended in the SRP and standard practice.

## **Results**

### *Baseline at Younger Lagoon Terrace Area*

Of the three target community types sampled only one (coyote bush scrub) had substantial native cover at the time of the field surveys. Among the nine transects surveyed in areas designated for coyote bush scrub restoration average native shrub canopy percent cover was  $18.4 \pm 18.7$  (SD) with an additional  $4.7 \pm 13.0\%$  cover of native herbaceous or shrub species that were small

enough to fit inside the 0.25 m<sup>2</sup> sampling quadrats. Litter and bare ground cover were  $77.3 \pm 28.6\%$  and  $3.3 \pm 11.8\%$  respectively. Total native richness throughout the designated area was five species, whereas the mean native richness among these transects was  $1.9 \pm 1.3$  (SD). The dominant native species was *Baccharis pilularis* with *B. douglasii* and *Rubus ursinus* present in some areas.

In the designated native grassland area native herbaceous cover was 1.9%; however, there were 39 quadrats with no native cover and one quadrat with 77.5% native cover. Native richness totaled five species throughout this area including two shrubs that occurred within the site (*Leymus triticoides*, *Epilobium ciliatum*, *Juncus effusus*, *Baccharis pilularis* and *Rubus ursinus*). Similarly, native cover and richness was almost non-existent in the designated coastal bluff restoration area except for a few small shrubs totaling  $12.5 \pm 0.1\%$ . Litter cover in designated grassland and coastal bluff areas was  $68.8 \pm 38.1\%$  and  $72.0 \pm 38.8\%$ , respectively, whereas bare ground covered  $1.9 \pm 7.2\%$  and  $8.0 \pm 21.7\%$ .

#### *Reference sites*

Reference sites exhibited wide variation both in native cover and composition of native plant species. Absolute native cover ranged from 20.2% (Moore Creek) to 39.5% (Whitehouse Creek) (Fig. 1, Table 1). Relative native cover was much higher than absolute cover at some sites where there was substantial litter cover (e.g. Point Lobos) or bare ground (e.g. Whitehouse Creek). Litter cover and bare ground ranged from 5.3% to 77.8% and 0 to 12.8%, respectively (Table 1).

The variability in absolute native cover across these sites was high with an average standard deviation of 18.1% across all sites (Fig. 1, Table 1) and a wide range of native cover classes represented within all sites (Fig. 2). In order to detect a 5% difference in cover from a set standard using reference site data, the range of samples (quadrats) needed were 33, 38, 44, 68, 72, and 116 with the number of samples increasing with the variance. In order to detect a 2.5% difference 133-465 samples were needed. These large sample sizes required reflect the high variation in cover within sites which ranged from <10% cover to >50% cover in individual quadrats at each reference site. It was impossible to do a power analysis for YLR since most quadrats had no native cover.

Native species richness at both the plot and transect scale varied widely among sites but was relatively consistent among transect within the same site (Figs. 3 & 4). The total number of species at a given site ranged from 5 at New Brighton to 41 at Point Lobos (Fig. 5).

Nearly 75% of native cover was comprised of native perennial grasses (Fig. 6) although they constituted only 8 of the over 50 species recorded. Common native community dominants included the perennial grasses *Danthonia californica*, *Nassella pulchra*, *Deschampsia cespitosa*, and *Hordeum brachyantherum*. Perennial graminoids in the genera *Carex* and *Juncus* were also prominent in these sites and these were accompanied by a suite of at least 31 identified native forbs (Table 2). Native perennial forb cover was over twice as high as native annual forb cover.

### *Review of literature*

Reference sites – Review of available numbers from the literature (Stromberg et al. 2001, Hayes and Holl 2003 a,b, Hopkinson et al. 2009) and monitoring data on the main UCSC campus indicate a high variability in the cover of both native grasses and forbs. Average native grass cover at multiple sites was 50-60% in Stromberg et al. (2001), 36-71% (relative cover) in Hopkinson et al. (2009), and 30-35% in Hayes and Holl (2003a); all three studies targeted sites where native cover was known to be high. On the UCSC main campus native grass cover values range from 0-25% (Table 3). Absolute native forb cover (primarily perennials) was 10-15% in Stromberg et al. (2001) and Hayes and Holl (2003a), and annual forb cover was always <1%.

Restoration – Rein et al. (2007) aimed to establish native grass buffer strips adjacent to agricultural lands at two sites near Elkhorn Slough. At both sites they found that seeded native grasses took two years to establish fully. At Azevedo Ranch, native grasses (primarily *Bromus carinatus*) reached >80% cover in the second year, but by the fourth year native cover dropped to <5% due to competition with exotic grasses (*Lolium multiflorum* and *Vulpia myuros*) and forbs (primarily *Picris echioides* and *Senecio* sp.). At Blohm Ranch native cover only reached 20-25% in the second year, after which time monitoring ceased. Corbin and D'Antonio (2004) found that densely planted (12-cm separation) native grass plugs established well and were able to withstand exotic invasion over the four years of their study at a coastal prairie site in Marin County. Stromberg et al. (2007) summarize a number of California grassland restoration projects, mostly from inland grasslands. Their results show that while many grassland

restoration projects have good native establishment in the first few years that competition from exotics is an ongoing issue and that in many sites native cover drops to 30% or less a few years after planting.

## **Discussion**

The goal of this work was to establish baseline conditions, evaluate and refine the reference targets for restoration, refine the sampling methodology, and make recommendations for species to be planted as part of the restoration of coastal sage scrub and coastal grassland communities at Younger Lagoon Reserve (YLR). We address each of these points below.

### *Baseline conditions*

Native richness and cover in the target areas at YLR are far lower than those of comparable reference sites; there was no native herbaceous cover in the vast majority of quadrats, although there is substantial cover of native shrubs (primarily *Baccharis pilularis*) in some areas. This presents both a challenge and an opportunity. On the one hand the process of establishing these native communities on such degraded sites is poorly understood and extremely challenging (Corbin et al 2004, Stromberg et al. 2007). On the other hand there is much room for improvement here and embarking on restoration efforts using experimental design and both baseline and reference site data will help inform our understanding of restoration and ecosystem assembly in these systems.

### *Reference sites and target conditions*

A variety of site histories and recent management may strongly influence the likelihood for a site to support native assemblages. The three reference sites with the highest native cover and richness (Whitehouse Creek, Point Lobos, and Palo Corona) all have large areas that have not been tilled for conventional agriculture and all of the sites are actively managed with either seasonal cattle grazing or periodic fire. Two of the sites with the lowest native cover and richness (New Brighton and Wilder Ranch) are neither grazed nor burned (Table 1). Given past research showing the strong effect of tilling on coastal prairie native plant diversity and richness (Stromberg and Griffin 1996) and the challenge of restoring these systems (Corbin et al. 2004,

Stromberg et al. 2007), it is unrealistic to think that the higher cover values of Whitehouse Creek and Point Lobos State Park are achievable in an area with extensive past agricultural usage. Much past research has shown the importance of ongoing management such as grazing, fire, or mowing (Hayes & Holl 2003 a,b, Corbin et al. 2004, Hopkinson et al. 2009) in maintaining native cover in many coastal prairie sites. Grazing and fire are problematic at YLR so mowing after the plants establish may help to promote native cover, given the high litter values at YLR.

In comparing the reference site results with the restoration targets we think that some of the targets need modification and clarification. The first requirement is for 10%, 25%, and 40% cover of shrubs by years 2, 4, and 6 after planting in areas targeted for coyote brush scrub-grassland. We think this is a realistic target, particularly as average shrub cover is already 18.4% in these areas. Restoration efforts should focus on diversifying the composition of shrubs in these areas, as nearly all shrub cover is comprised of *Baccharis pilularis*.

The second requirement is for 5, 15, and 25% non-shrub cover 2, 4, and 6 years after planting in areas targeted for grassland. We think this is a fairly optimistic estimate given that some of the "good" reference sites we sampled and past studies have shown values that are equal or somewhat lower than this value; in fact, 46% of the quadrats from our reference sites had <25% cover. Even in the highest quality reference sites native cover and richness was highly variable. Basing restoration targets on mean cover values from these sites may be unrealistic since the means are not consistently represented throughout any of these sites. After consulting with the Scientific Advisory committee we recommend that the year 6 average cover value requirement be reduced from 25 to 20%. There is no specific target for the herbaceous cover in coyote-brush grassland areas. Presumably herbaceous cover below shrubs will be low overall due to shading.

The third requirement is for a species richness of 6, 6, and 8 native species in sites at years 2, 4, and 6 after planting. This goal is ambiguous as the spatial area is not clear and needs to be clarified. If this number of species needs to be established in the entire area to be restored during phase 1 then the goal is reasonable. But, our data clearly show that two of our reference sites do not meet this goal at a transect level of analysis. Evaluating it across the entire restored area is problematic since that area will continue to increase over time, but there is no requirement that a minimum number of species be established in newly restored areas. The Scientific

advisory committee recommends that the species richness target for each transect through coastal scrub, coyote brush grassland, and coastal prairie be set at 4, 4, and 5 native species in years 2, 4, and 6. This would ensure that the species richness targets are met throughout the site since the transects are run in a different random direction for each sampling period.

#### *Recommendations for species to be planted*

The results of the reference site surveys provide useful information for the refinement of a species pallet at YLR. Two important parameters in this regard are species composition and functional group representation. The list of native species in Table 2 includes additional species that were not included in the "Possible Revegetation Species" in the SRP. Specifically, *Brodiaea terrestris*, *Carex harfordii*, *Eringium armatum*, *Juncus bufonius*, *Trifolium oliganthum*, *Triphysaria versicolor*, *Triteleia hyacinthine*, and *Triteleia ixioides* were found in multiple reference sites but were not included on the SRP list. Spatial and temporal variation in species composition in these grasslands limit the amount of diversity that can be captured in any one survey so this list is certainly not a complete list of appropriate native species that might be found in local reference sites. Several of the studies included in Table 3 also include species lists that could be consulted in expanding the species palette. Figure 6 shows the relative contribution of each functional group to cover in the reference sites, which could be used as a guide in developing composition targets. It should be noted that maintaining representation of some functional groups, particularly any of the native annuals, may require introducing propagules at higher rates than their proportional representation in established communities.

#### *Sampling methodology and size*

The methodology currently proposed for sampling is practical, adequate, and recommended for future monitoring. During the spring 2010 surveys there were a few minor but notable deviations from the written protocol that should be permanently modified.

1. Transects were located through group consensus based on aerial photographs of the site as described in the above methods section, rather than randomly. This was done to ensure that the transects ran through one type of target habitat and were spread evenly across the site.

2. Orientation of each transect was based on a randomly selected bearing from the center point (not the starting point) of the transect. The bearing was randomly selected from the range of bearings that would allow the entire transect to past through a target habitat type rather than through the entire range of possible bearings.
3. In the designated coyote brush shrub-grassland areas, herbaceous composition in the shrub understory was quantified when accessible. The current protocol states that herbaceous cover will not be quantified in areas where shrubs intercept the transect. As shrub cover increases in these areas it may be necessary to develop an algorithm for randomly selecting the nearest herbaceous areas to survey.

The fact that grasslands are notoriously patchy is widely known and makes it difficult to evaluate whether restoration sites, are in fact, meeting the stated success criteria. An important question is how many samples are required to rigorously compare the restored areas to the targets conditions. This year we collected 40 samples in grassland areas and 90 in areas designated a coastal scrub. This intensity of sampling should be increased by to 60 samples (two additional transects) in the area designated for grassland and power analyses should be repeated when post-restoration data from YLR are collected, as the number of samples needed largely depends on the variance. Our power analysis suggests that the minimum difference from the final target cover that could be realistically determined is 5%. The number of samples needed to detect a smaller interval is prohibitive (>100). Transects at Younger Lagoon took ~45 min to complete; both the sampling and data entry time could be shortened if exotic species with <5% cover were not identified individually. Since all the targets are for native species or priority 1 weeds, in fact, only those groups need to be monitored, but we think it is informative to record the more common exotic species.

#### *Future monitoring*

During the 2010-2011 field season we are planning on conducting baseline monitoring in the wetland areas of Younger Lagoon Reserve, as well as monitoring a few coastal sage scrub and freshwater reference sites, although the number of those available is quite limited.

In reviewing the monitoring and goals for the restoration we found a mismatch in the timing proposed for the SRP. The specific native species cover and richness targets listed are for

years 2, 4, and 6 following planting, whereas monitoring is proposed for years 1, 4, and 7. We propose that specific areas should be monitored prior to and then 2, 4, and 6 years after planting so that the timing of monitoring is consistent with evaluating whether the success criteria have been met; for example, an area planted in winter 2010 would be monitored in 2012, 2014, and 2016. This means that specific areas would be monitored each year rather than monitoring the entire site at three year intervals. We think that this level of monitoring is feasible given that the monitoring protocol is relatively rapid.

*Summary of specific Scientific Advisory committee recommendations*

These recommendations were discussed and agreed upon by all members at the 9/13/2010 SAC meeting.

1. The year 6 average cover value requirement for coastal grassland should be reduced from 25% to 20%.
2. The species richness targets for coastal scrub, coyote brush grassland, and coastal prairie should be specified per transect rather than for the entire site. These targets should be set at 4, 4, and 5 native species in years 2, 4, and 6.
3. The committee agrees with the minor sampling modifications listed in the section on sampling methodology and size.
4. Two additional baseline grassland transects should be added during the 2011 sampling season.
5. A few coastal scrub and freshwater wetland reference sites should be monitored during spring 2011.
6. Transects should be monitored prior to and then 2, 4, and 6 years after planting so that the timing of monitoring is consistent with evaluating whether the success criteria have been met.



## Acknowledgements

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## Tables and Figures

**Table 1.** Site history and management based on personal communication with managers at each site (specific to sampling areas within site). Cover values are mean  $\pm$  SD.

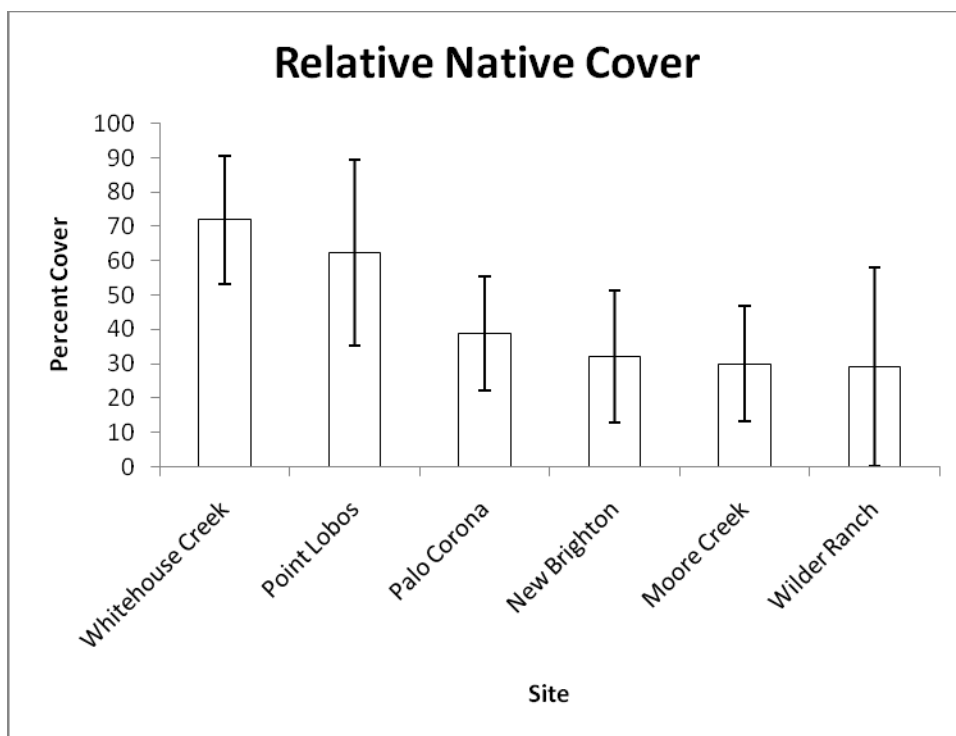
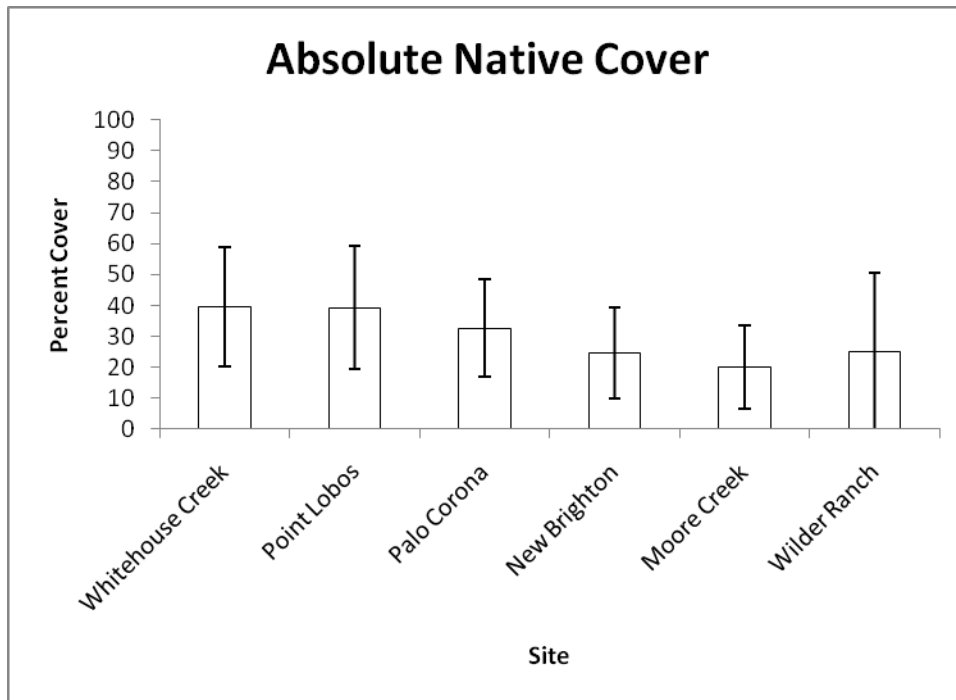
<b>Site</b>	<b>Tilled</b>	<b>Recent Management</b>	<b>Native Cover (%)</b>	<b>Litter Cover (%)</b>	<b>Bare Ground (%)</b>
Whitehouse Creek – Año Nuevo SP	No	Fall burn every two years for last 15, herbicide for gorse and Harding grass	39.5 $\pm$ 19.4	5.3 $\pm$ 6.7	12.8 $\pm$ 8.7
Point Lobos SP	No	Grazed in past, burned a few times in last 15 years	39.2 $\pm$ 20.0	52.8 $\pm$ 33.5	7.0 $\pm$ 13.9
Palo Corona Ranch	No	Winter and spring cattle grazing.	32.6 $\pm$ 15.7	18.7 $\pm$ 21.3	0.0
New Brighton SP	Unknown (unclear whether sampling was done in known historically tilled areas)	Manual and herbicide removal of exotic shrubs	24.6 $\pm$ 14.6	72.0 $\pm$ 26.2	2.5 $\pm$ 5.6
Moore Creek	Unknown	Seasonal cattle grazing	20.2 $\pm$ 13.5	43.2 $\pm$ 24.8	0.8 $\pm$ 1.7
Wilder Ranch SP	Unknown	None	25.1 $\pm$ 25.4	77.8 $\pm$ 18.2	0.0

**Table 2.** Native species encountered during reference site surveys in spring 2010. AG=annual grass, AGRM=annual graminoid, AF=annual forb, AL=annual legume, PG=perennial grass, PGRM=perennial graminoid, PF=perennial forb, GEO=geophyte

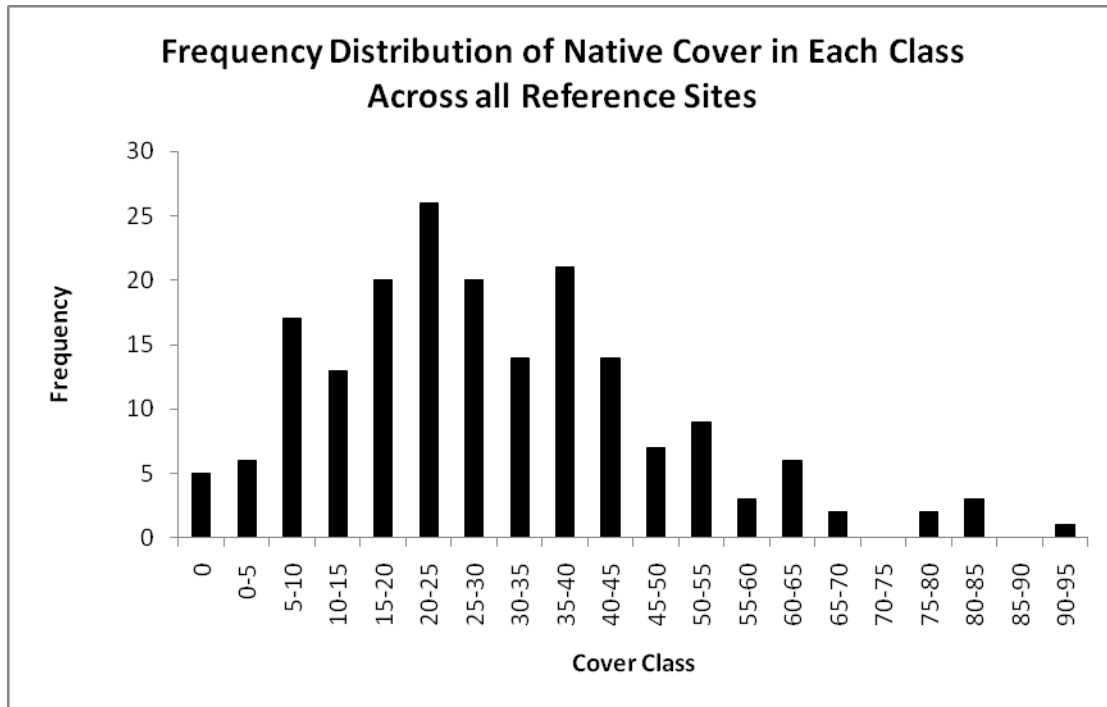
<b>Species</b>	<b>Functional Group</b>	<b>Species</b>	<b>Functional Group</b>
<i>Achillea millefolium</i>	PF	<i>Juncus patens</i>	PGRM
<i>Armeria maritima</i>	PF	<i>Juncus sp1</i>	PGRM
<i>Aster chilensis</i>	PF	<i>Juncus sp2</i>	PGRM
<i>Baccharis pilularis</i>	SHRUB	<i>Juncus phaeocephalus</i>	PGRM
<i>Brodiaea terrestris</i>	GEO	<i>Lasthenia sp</i>	AF
<i>Bromus carinatus</i>	PG	<i>Leymus triticoides</i>	PG
<i>Camissonia ovata</i>	PF	<i>Lotus formosissimus</i>	PL
<i>Carex harfordii</i>	PGRM	<i>Lupinus nanus</i>	AL
<i>Carex sp. 1</i>	PGRM	<i>Lupinus veriicolor</i>	PL
<i>Carex sp. 2.</i>	PGRM	<i>Luzula comosa</i>	PGRM
<i>Chlorogalum pomeridianum</i>	GEO	<i>Mimulus aurantiacus</i>	SHRUB
<i>Cirsium brevistylum</i>	PF	<i>Nassella pulchra</i>	PG
<i>Cirsium quercetorum</i>	PF	<i>Perideridia sp</i>	PF
<i>Cryptantha angustifolia</i>	AF	<i>Ranunculus californica</i>	PF
<i>Danthonia californica</i>	PG	<i>Rubus ursinus</i>	SHRUB
<i>Deschampsia cespitosa</i>	PG	<i>Sidalcia malviflora</i>	PF
<i>Distichlis spicata</i>	PG	<i>Sisyrinchium bellum</i>	PF
<i>Elymus glaucus</i>	PG	<i>Stachys bullata</i>	AF
<i>Eryngium armatum</i>	PF	<i>Toxicodendron diversilobum</i>	SHRUB
<i>Eschscholzia californica</i>	AF	<i>Trifolium oliganthum</i>	AL
<i>Gnaphalium sp</i>	PF	<i>Triphysaria versicolor</i>	AF
<i>Grindelia sp</i>	PF	<i>Triteleia hyacinthina</i>	GEO
<i>Hemizonia sp</i>	AF	<i>Triteleia ixioides</i>	GEO
<i>Hordeum brachyantherum</i>	PG		
<i>Juncus bufonius</i>	AGRM		
<i>Juncus effusus</i>	PGRM		
<i>Juncus occidentalis</i>	PGRM		

**Table 3.** Review of past research on native grass and forb cover in coastal prairie along the central California coast

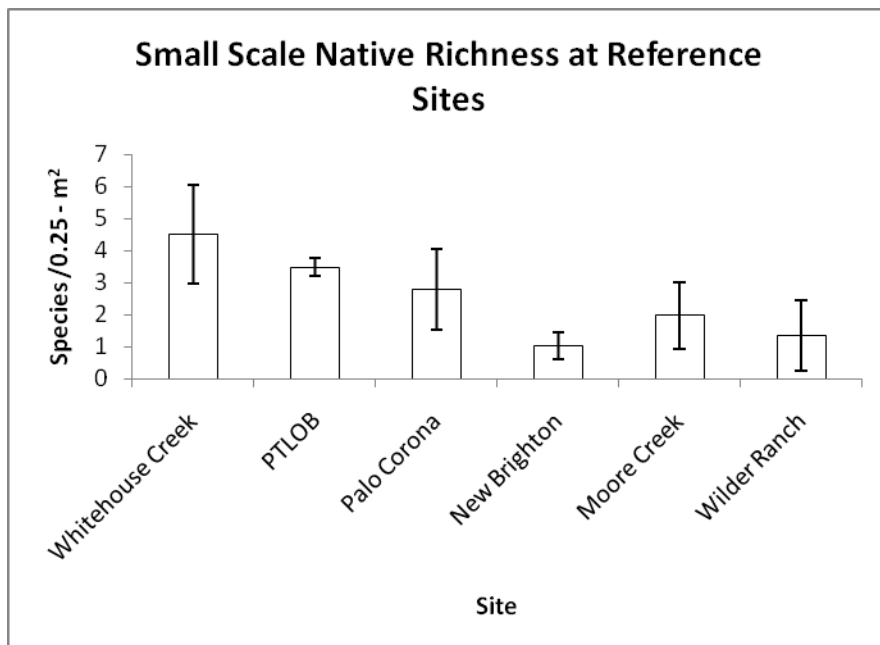
<b>Location of Sites</b>	<b>History of site</b>	<b>Year sampled</b>	<b>cover of native grasses</b>	<b>cover native forbs</b>	<b>Source of data</b>
UCSC - Marshall Meadows	burned periodically, not tilled	2006-2007	17-26	ND	Lynn 2007
UCSC - Inclusion Area A	grazed, mima mounds, not tilled	2005-2007	2-6	ND	Lynn 2007
UCSC - Inclusion Area D	mowed in recently years	2006-2007	15-18	ND	Lynn 2007
UCSC - Great Meadow	parts mowed but not managed in most of the area in recent years	2004-2007	1-7	ND	Lynn 2007
UCSC - Lower Hagar Meadow	grazed	2006-2007	2-8	ND	Lynn 2007
UCSC - East Field	grazed	2004-2007	1-3	ND	Lynn 2007
25 paired grazed-undergrazed plots along the California coast	half were grazed and half ungrazed	2000-2001	30-35	8-18	Hayes and Holl 2003a
UCSC - East Field	research plots with different clipping regimes	1999-2008	0-1	0-1	Hayes and Holl 2003b and unpublished data
Swanton Pacific Ranch	research plots with different clipping regimes	1999-2008	10-20	0-1	Hayes and Holl 2003b and unpublished data
Porter Ranch - Elkhorn Slough	research plots with different clipping regimes	1999-2008	15-50 in clipped or grazed plots, 1-20 in controls	0-1	Hayes and Holl 2003b and unpublished data
33 coastal grassland stands from Morro Bay to San Francisco	not recently cultivated or grazed, selected because of known high native grass cover	1996-1997	50-60	12.2 ± 2.7 (perennial forbs)	Stromberg et al. 2001
Wilder Ranch State Park	targeted areas with high native grass cover	2008	61	1	Hopkinson et al. 2008
Año Nuevo State Park	targeted areas with high native grass cover	2008	46	31	Hopkinson et al. 2008



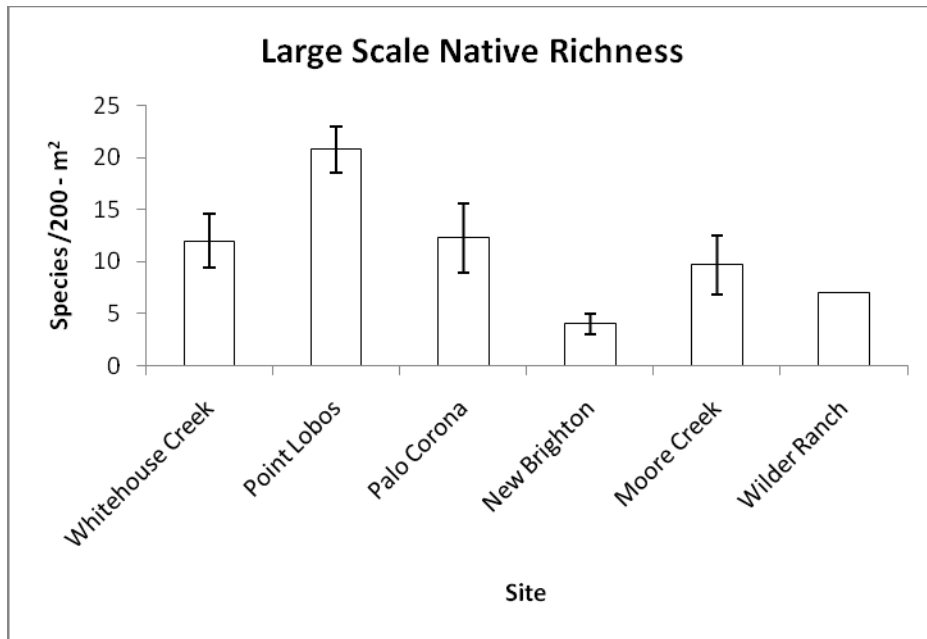
**Figure 1.** Absolute cover (top) and relative cover (bottom) of native species at six reference sites. Values are means of all quadrats (n=20-40) and errors bars indicate 1 SD.



**Figure 2.** Number of quadrats (frequency) with different native cover classes across all reference sites.

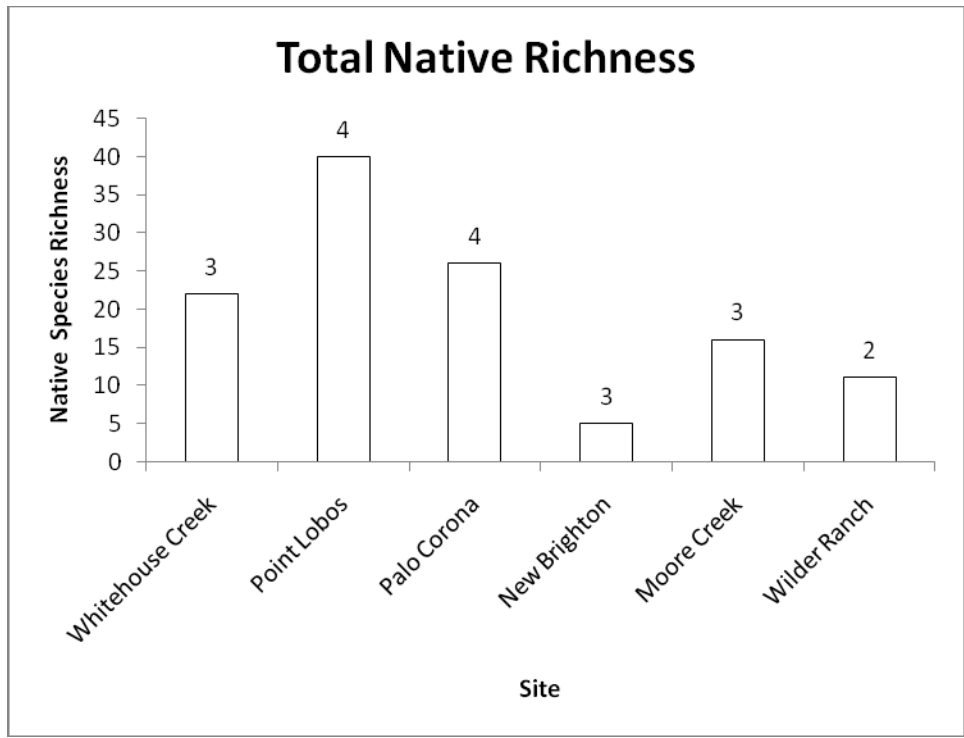


**Figure 3.** Average number of species (S) in individual 0.25-m<sup>2</sup> quadrats at each reference site. Values are means of all quadrats (n=20-40) and errors bars indicate 1 SD.

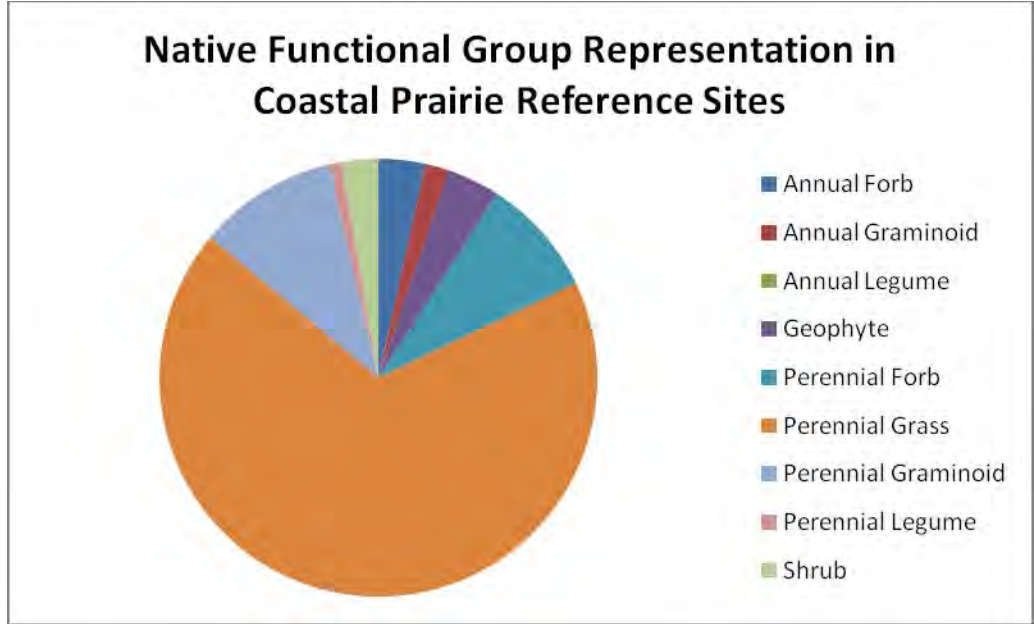


**Figure 4.** Average number of species along each belt transect ( $4 \times 50$  m) at each site. Values are means of all transects ( $n=2-4$ ) and errors bars indicate 1 SD. Note that both transects at Wilder Ranch had the same number of species so there was no error estimate.





**Figure 5.** Number of total species found at each site. The number above the bar indicates the number of transects taken at that site.



**Figure 6.** Relative contribution of each functional group to native community cover.

## Appendices

### Appendix 1a. Younger Lagoon Reserve transect GPS points.

<b>Transect</b>	<b>Start</b>		<b>Center</b>		<b>End</b>	
Bluff 1	10S 0583455	4089659	10S 0583434	408966	10S 0583412	4089673
Bluff 2	10S 0583321	4089633	10S 0583341	4089655	10S 0583353	4089670
Grassland 1	10S 0583228	4089882	10S 0583251	4089871	10S 0583272	4089859
Grassland 2	10S 0583324	4089900	10S 0583339	4089881	10S 0583356	4089863
Grassland 3	10S 0583433	4090012	10S 0583410	4090003	10S 0583385	4089995
Grassland 4	10S 0583332	4089995	10S 0583336	4090018	10S 0583392	4090043
Baccharis Scrub 1	10S 0583464	4089668	10S 0583436	4089679	10S 0583417	4089690
Baccharis Scrub 2	10S 0583454	4089721	10S 0583431	4089710	10S 0583408	4089705
Baccharis Scrub 3	10S 0583368	4089740	10S 0583352	4089760	10S 0583338	4089777
Baccharis Scrub 4	10S 0583423	4089777	10S 0583402	4089789	10S 0583380	4089804
Baccharis Scrub 5	10S 0583441	4089820	10S 0583425	4089837	10S 0583394	4089859
Baccharis Scrub 6	10S 0583434	4089858	10S 0583404	4089858	10S 0583400	4089881
Baccharis Scrub 7	10S 0583431	4089915	10S 0583410	4089919	10S 0583393	4089908
Baccharis Scrub 8	10S 0583442	4089955	10S 0583409	4089961	10S 0583406	4089975
Baccharis Scrub 9	10S 0583446	4090039	10S 0583432	4090029	10S 0583415	4090074

**Appendix 1b.** Reference site transect GPS point.

<b>Transect</b>	<b>Start</b>		<b>End</b>	
Whitehouse Creek 1	10S 0558844	4111132	10S 0558800	4111109
Whitehouse Creek 2	10S 0558528	4111012	10S 0558494	4110974
Whitehouse Creek 3	10S 0558395	4110803	10S 0558407	4110752
Wilder Ranch 1	10S 0581890	4090542	10S 0581955	4090516
Wilder Ranch 2	10S 0581890	4090551	10S 0581933	4090522
Moore Creek 1	10S 0582870	4091732	10S 0582880	4091689
Moore Creek 2	10S 0582934	4091755	10S 0582901	4091798
Moore Creek 3	10S 0583015	4091646	10S 0583023	4091692
New Brighton 1	10S 0595781	4093352	10S 0595735	4093351
New Brighton 2	10S 05095428	4093141	10S 05095417	4093099
New Brighton 3	10S 0595778	4093357	10S 0595810	4093371
Palo Corona 1	10S 0596970	4043190	10S 0596916	4043167
Palo Corona 2	10S 0596880	4043259	10S 0596851	4043223
Palo Corona 3	10S 0596834	4093117	10S 0596883	4043126
Palo Corona 4	10S 0596904	4043124	10S 0596953	4043141
Point Lobos 1	10S 0594346	4041479	10S 0594322	4041513
Point Lobos 2	10S 0594540	4041439	10S 0594598	4041445
Point Lobos 3	10S 0594619	4041407	10S 0594656	4041419
Point Lobos 4	10S 0594953	4042015	10S 0594956	4041974



**Appendix 3.** Reference site richness data. S quadrat is the number of species found in all quadrats in a transect. S belt is the additional species found in the belt transect but not in individual quadrats and S total is the sum of the two numbers.

<b>Transect</b>	<b>S Quad.</b>	<b>S Belt</b>	<b>S Total</b>
Wilder1	5	2	7
Wilder2	2	5	7
WHCRK1	6	3	9
WHCRK2	10	3	13
WHCRK3	13	1	14
PTLOB1	13	8	20
PTLOB2	12	8	20
PTLOB3	15	9	24
PTLOB4	12	7	19
MRCRK1	7	6	13
MRCRK2	5	3	8
MRCRK3	5	3	8
NBR1	3	1	4
NBR2	2	1	3
NBR3	3	2	5
PALCOR1	10	2	12
PALCOR2	8	2	10
PALCOR3	6	4	10
PALCOR4	12	5	17

**Appendix 4.** Shrub cover in coyote brush shrub transects at Younger Lagoon Reserve.

<b>Transect</b>	<b>Native Shrub Cover (% transect intercepted)</b>
1	4.4
2	6.4
3	0
4	11.6
5	20
6	91.2
7	5
8	0
9	26.6

**Appendix 5.** Species list, functional group and origin of all species found at Younger Lagoon Reserve and reference sites.

Abbreviation	SPECIES	Functional	
		Group	ORIGIN
ACHMIL	<i>Achillea millefolium</i>	PF	N
AIRCAR	<i>Aira caryophyllea</i>	AG	E
ANAARV	<i>Anagallis arvensis</i>	AF	E
ARMMAR	<i>Armeria maritima</i>	PF	N
ASTCHI	<i>Aster chilensis</i>	PF	N
AVESP	<i>Avena sp</i>	AG	E
BACPIL	<i>Baccharis pilularis</i>	SHRUB	N
BRIMAX	<i>Briza maxima</i>	AG	E
BRIMIN	<i>Briza minor</i>	AG	E
BROCAR	<i>Bromus carinatus</i>	PG	N
BRODIA	<i>Bromus diandrus</i>	AG	E
BROHOR	<i>Bromus hordeaceus</i>	AG	E
BROTER	<i>Brodiaea terrestris</i>	GEO	N
CAMOVA	<i>Camissonia ovata</i>	BF	N
CARHR	<i>Carex harfordii</i>	PGRM	N
CARPYN	<i>Carduus pycnocephalus</i>	AF	E
CARSP1	<i>Carex sp1</i>	PGRM	N
CARSP2	<i>Carex sp2</i>	PGRM	N
CHLPOM	<i>Chlorogalum pomeridianum</i>	GEO	N
CIRBREV	<i>Cirsium brevistylum</i>	BF	N
CIRQUE	<i>Cirsium quercetorum</i>	PF	N
CIRVUL	<i>Cirsium vulgare</i>	BF	E
CONARV	<i>Convolvulus arvensis</i>	PF	E
CONMAC	<i>Conium maculata</i>	BF	E
CONSP1	<i>Conyza sp</i>	BF	E
CRYANG	<i>Cryptantha angustifolia</i>	AF	N
DANCAL	<i>Danthonia californica</i>	PG	N
DESCES	<i>Deschampsia cespitosa</i>	PG	N
DISSPIC	<i>Distichlis spicata</i>	PG	N
ELYGLA	<i>Elymus glaucus</i>	PG	N
EROBOT	<i>Erodium botrys</i>	AF	E
ERYARM	<i>Eryngium armatum</i>	PF	N
ESCCAL	<i>Eschscholzia californica</i>	AF	N
FILGAL	<i>Filago galica</i>	AF	E

GALSP1	<i>Galium sp1</i>	AF	U
GALSP2	<i>Galium sp2</i>	AF	U
GERDIS	<i>Geranium dissectum</i>	AF	E
GNASP1	<i>Gnaphalium</i>	PF	N
GRISP	<i>Grindelia sp.</i>	PF	N
HEMSP1	<i>Hemizonia sp.</i>	AF	N
HOLLAN	<i>Holcus lanatus</i>	PG	E
HORBRA	<i>Hordeum brachyantherum</i>	PG	N
HORLEP	<i>Hordeum murinum ssp leporinium</i>	AG	E
HORMAR	<i>Hordeum marinum</i>	AG	E
HYPRAD	<i>Hypochaeris radicata</i>	PF	E
JUNBUF	<i>Juncus bufonius</i>	AGRM	N
JUNEFF	<i>Juncus effusus</i>	PGRM	N
JUNOCC	<i>Juncus occidentalis</i>	PGRM	N
JUNPAT	<i>Juncus patens</i>	PGRM	N
JUNPHA	<i>Juncus phaeocephalus</i>	PGRM	N
JUNSP1	<i>Juncus sp1</i>	PGRM	N
JUNSP2	<i>Juncus sp2</i>	PGRM	N
LASSP1	<i>Lasthenia sp</i>	AF	N
LEYTRI	<i>Leymus triticoides</i>	PG	N
LINBIE	<i>Linum bienne</i>	AF	E
LOLMUL	<i>Lolium multiflorum</i>	AG	E
LOTCOR	<i>Lotus corniculatus</i>	PL	E
LOTFOR	<i>Lotus formosissimus</i>	PL	N
LUPNAN	<i>Lupinus nanus</i>	AL	N
LUPVAR	<i>Lupinus variicolor</i>	PL	N
LUZCOM	<i>Luzula comosa</i>	PGRM	N
MEDPOL	<i>Medicago polymorpha</i>	AL	E
MELOFF	<i>Melilotus officinalis</i>	BL	E
MIMAU	<i>Mimulus aurantiacus</i>	SHRUB	N
NASPUL	<i>Nassella pulchra</i>	PG	N
OXAPES	<i>Oxalis pes-caprae</i>	PF	E
PERSP1	<i>Perideridia sp.</i>	PF	N
PHASP1	<i>Phalaris sp.</i>	PG	E
PICECH	<i>Picris echoides</i>	BF	E
PINRAD	<i>Pinus radiata</i>	TREE	N
PLACOR	<i>Plantago coronopus</i>	BF	E
PLALAN	<i>Plantago lanceolata</i>	PF	E
POLPOG	<i>Polypogon monspeliensis</i>	AG	E
POLPUN	<i>Polygonum punctatum</i>	PF	E
RANCAL	<i>Ranunculus californica</i>	PF	N
RAPSAT	<i>Raphanus sativa</i>	BF	E
RUBURS	<i>Rubus ursinus</i>	SHRUB	N



RUMACE	<i>Rumex acetosella</i>	PF	E
RUMCRI	<i>Rumex crispus</i>	BF	E
SANSP1	<i>Sanicula sp.</i>	BF	U
SIDMAL	<i>Sidalcia malviflora</i>	PF	N
SILGAL	<i>Silene galica</i>	AF	E
SISBEL	<i>Sisyrinchium bellum</i>	PF	N
SONASP	<i>Sonchus asper</i>	BF	E
STABUL	<i>Stachys bullata</i>	AF	N
TOXDIV	<i>Toxicodendron diversilobum</i>	SHRUB	N
TRIANG	<i>Trifolium angustifolium</i>	AL	E
TRIDUB	<i>Trifolium dubium</i>	AL	E
TRIHYA	<i>Triteleia hyacinthina</i>	GEO	N
TRIIXI	<i>Triteleia ixioides</i>	GEO	N
TRIOLI	<i>Trifolium oliganthum</i>	AL	N
TRISUB	<i>Trifolium subterraneum</i>	AL	E
TRIVER	<i>Triphysaria versicolor</i>	AF	N
VICSAT	<i>Vicia sativa</i>	AL	E
VICVIL	<i>Vicia villosa</i>	AL	E
VULMYU	<i>Vulpia myuros</i>	AG	E

**Appendix 6.** For full data from Younger Lagoon Reserve and reference sites see file YLR – 2010 sampling – appendices.xlsx

## Appendix 4. Specific Resource Plan

## Supporting Information

see CLRDP 8.2.5

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*(this section used if project documentation is large format or extensive)*

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*(this section used if Technical Reports are extensive)*

# 1. Project Report

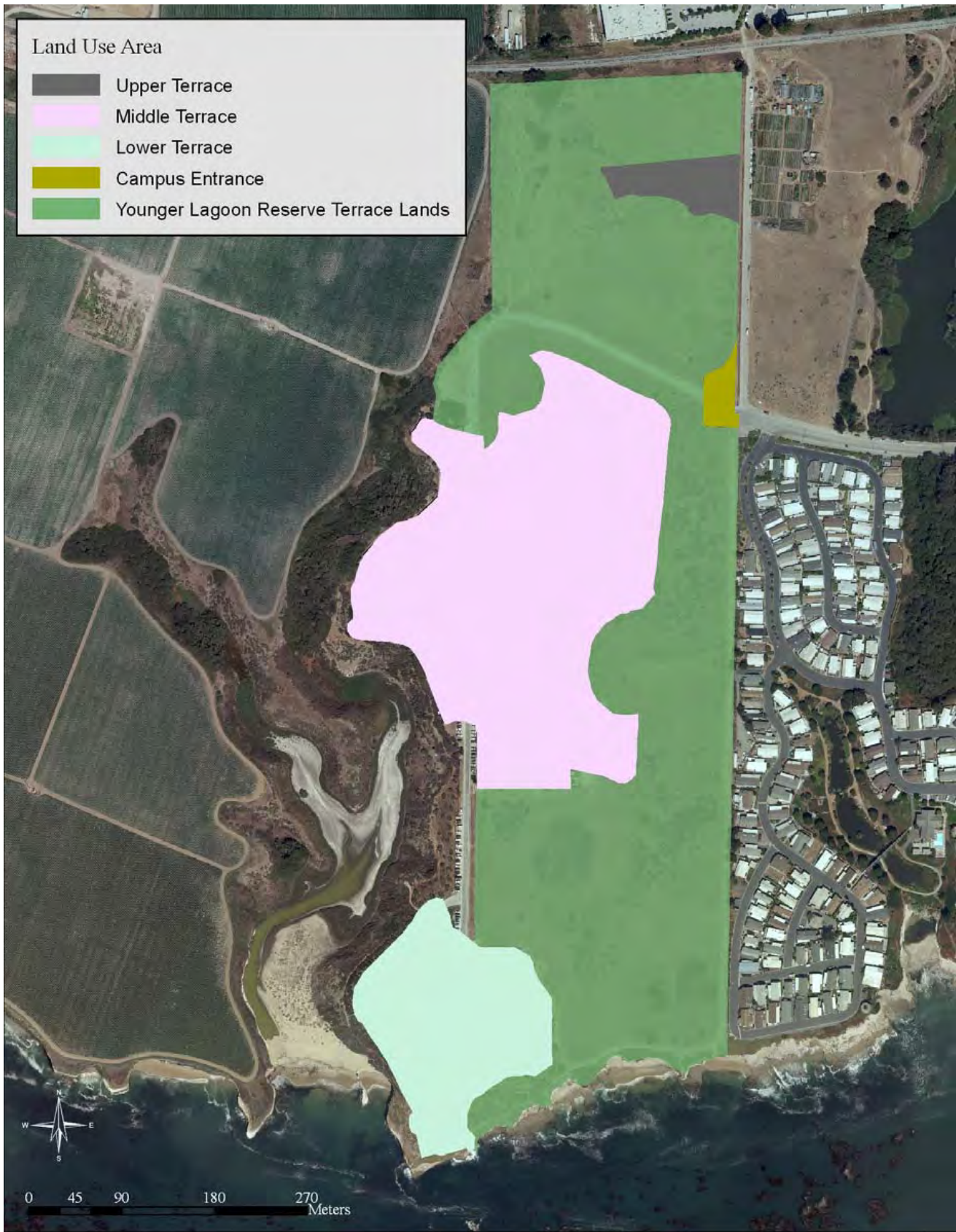
## **1a. NOID 10-2 Project Description**

The 2008 Coastal Long Range Development Plan (CLRDP) for the University of California, Santa Cruz's (UCSC's) Marine Science Campus (MSC) includes a Resource Management Plan (RMP) that sets goals and objectives for habitat restoration and enhancement in the areas of the Marine Science Campus that are protected from development. The RMP calls for preparation of a series of Specific Resource Plans (SRPs), to further describe the timing and conduct of specific activities through which RMP goals and objectives will be met, in successive phases, during the term of the CLRDP.

The SRP defines the RMP implementation activities for initial restoration and enhancement of habitats over about one-third of campus natural areas (i.e. areas outside of defined development zones on the Marine Science Campus) during the first seven years of the CLRDP program. Phase 1 is divided into two sub-phases. Phase 1A consists of removal of invasive non-native plants and hand planting to improve the habitat mosaic over an area of about 16 acres within the Younger Lagoon Reserve Terrace Lands (Figure 1, below). Phase 1B will propose minor hydrologic modifications to improve wetland functioning and enhance plant and wildlife habitat in wetlands W1 and W2. Phase 1A is proposed for immediate implementation. Phase 1B wetland work will be subject to Clean Water Act and other permitting, and related agency consultation regarding potential effects to California red-legged frogs.

### **Background: Relationship between the CLRDP RMP and SRP Phase 1**

Younger Lagoon Natural Reserve (YLR) was established in 1987, as one of the 36 reserves that make up the University of California Natural Reserve System of protected natural lands available for university-level instruction, research, and public outreach. The original reserve consisted of approximately 25 acres encompassing the lagoon itself and the upland habitat on the surrounding slopes. An additional 47 acres of natural areas outside of the development zones on the Marine Science Campus were incorporated into YLR in July 2008, bringing the size of the reserve to approximately 72 acres. These natural areas added to YLR are collectively referred to as the Terrace Lands. The CLRDP Resource Management Plan (RMP) outlines parameters for the restoration, enhancement, and management of biological and open space resources on the Terrace Lands. Conceptually, the RMP provides the initial framework for planned habitat improvements. The RMP will be implemented through development and execution of a series of Specific Resource Plans, developed under the guidance of a Scientific Advisory Committee (SAC). The RMP organizes restoration and enhancement efforts into two seven-year phases and one six-year phase. Each phase encompasses restoration and enhancement of the natural habitat on approximately one-third of reserve on the Terrace Lands. The SRPs, through which habitat restoration and enhancement are to be carried out, are to be designed to meet the goals and performance standards set forth in the RMP; however, each SRP may adapt these goals and performance standards to address the physical and ecological conditions existing at the time the program is implemented, and as appropriate to the then-current understandings of biological and ecological processes, and approaches to habitat re-vegetation, restoration, and enhancement. With approximately 47 acres outside of the development zone to be restored over the next 20 years, approximately 16 acres—or about one-third of the area overall—will be restored during each of the three SRP phases. SRP Phase 1 addresses the first seven-year phase of RMP implementation. In the concluding year of the first 7-year phase of restoration, a second SRP will be written to direct Phase 2 of the restoration effort (years 7-14) and, during year 14, the final SRP will be written for Phase 3 (years 14-21).



**Figure 1.** Campus Development Zones and YLR Terrace Lands.

## **Project Objectives**

The goal of restoration efforts on the Terrace Lands is to create and enhance a mosaic of coastal habitats. Such a mosaic provides substantial ecosystem services, including the preservation and enhancement of biodiversity and provision of habitat for special status species. These habitats include coastal bluff, seasonal wetlands, and forested wetlands. Additionally, because the project site is a UC Natural Reserve, restoration efforts focused on native flora and fauna will provide research opportunities to guide future restoration in similar habitats. Research and educational uses will offer unique opportunities for scientists, students, and the public to observe and participate in restoration projects; thus, functioning as outdoor classroom and living laboratory. The overarching objective of the proposed SRP Phase 1 is to meet the CLRDP RMP habitat restoration and enhancement objectives for one-third of the Terrace Lands. The SRP also includes the following specific objectives:

- 1) In coyote brush scrub-grassland areas, increase native plant species richness and percent cover and decrease non-native plant cover.
- 2) In non-native grassland areas, increase native grass species and decrease non-native plant cover.
- 3) In coastal bluff habitat, increase native plant species richness and percent cover and decrease non-native plant cover.
- 4) Within the central areas of wetlands W4 and W5 (delineated in the CLRDP RMP), increase native plant species richness and percent cover and decrease non-native plant cover.
- 5) In wetland buffers, increase native plant species richness and percent cover and decrease non-native plant cover.
- 6) Manage the hydrology of wetlands W1 and W2 to increase the cover of native wetland plant species, potentially enhance breeding habitat for amphibians, maintain raptor foraging habitat, improve the quality of water flowing to YLR, and create a continuous north-south area for wildlife movement to YLR.
- 7) Control priority-one weeds (non-native invasive species) throughout the Terrace Lands.

Phase 1A of the SRP focuses on those goals related to removal of non-native plants and plantings to improve native habitats, but would not include topographic or hydrological modifications to improve wetland functioning. These aspects of the Phase 1 plan would be addressed by implementation of Phase 1B, which would be subject to subsequent approvals.

## **Project Description**

SRP Phase 1A will focus on enhancement of five habitat areas within the Terrace Lands: coyote-brush scrub-grassland, grassland, coastal bluff, wetland willow, and wetland buffer areas (Figures 2 and 3); enhancement and protection of vegetation in other natural areas of the Terrace Lands will also take place as opportunities arise. Phase 1A also will include hand planting in central wetland habitat in wetlands W4 and W5 (Figure 3) as well as control and removal of Priority 1 weeds throughout the Terrace Lands. The following sections describe the proposed activities within each area that would take place during SRP Phase 1A and the envisioned SRP Phase 1B.

### ***SRP Phase 1A***

#### ***Coyote Brush Scrub-Grassland Areas***

During Phase 1A coyote brush scrub-grassland will be protected and enhanced, over the approximately 11 acres where coyote brush is already patchily distributed (Figure 2). Vegetation in

these areas currently is dominated by non-native grasses and coyote brush. The enhancement efforts will focus on filling in grassy interstitial spaces between existing coyote brush plants and patches in the middle and lower terrace with coyote brush and other shrub species. Native grasses will also be planted to create patches of native grassland within the Coyote Brush Scrub-Grassland areas. The SRP does not propose any changes in the topography and/or hydrology of these areas.

### *Grasslands*

Phase 1A would include restoration of native grassland throughout the Terrace Lands, but would focus primarily on restoration of native grasslands in wetland buffer areas. Native grasses would be planted in relatively dense patches throughout approximately 2 acres of wetland buffers around wetlands W4 and W5 as well as throughout other areas of the Lower Terrace. The intent is to increase coverage of native grass species and decrease non-native plant cover. It is anticipated that native shrubs also will scatter throughout these areas through natural recruitment. SRP Phase 1 does not propose any changes in topography and/or hydrology in these areas.

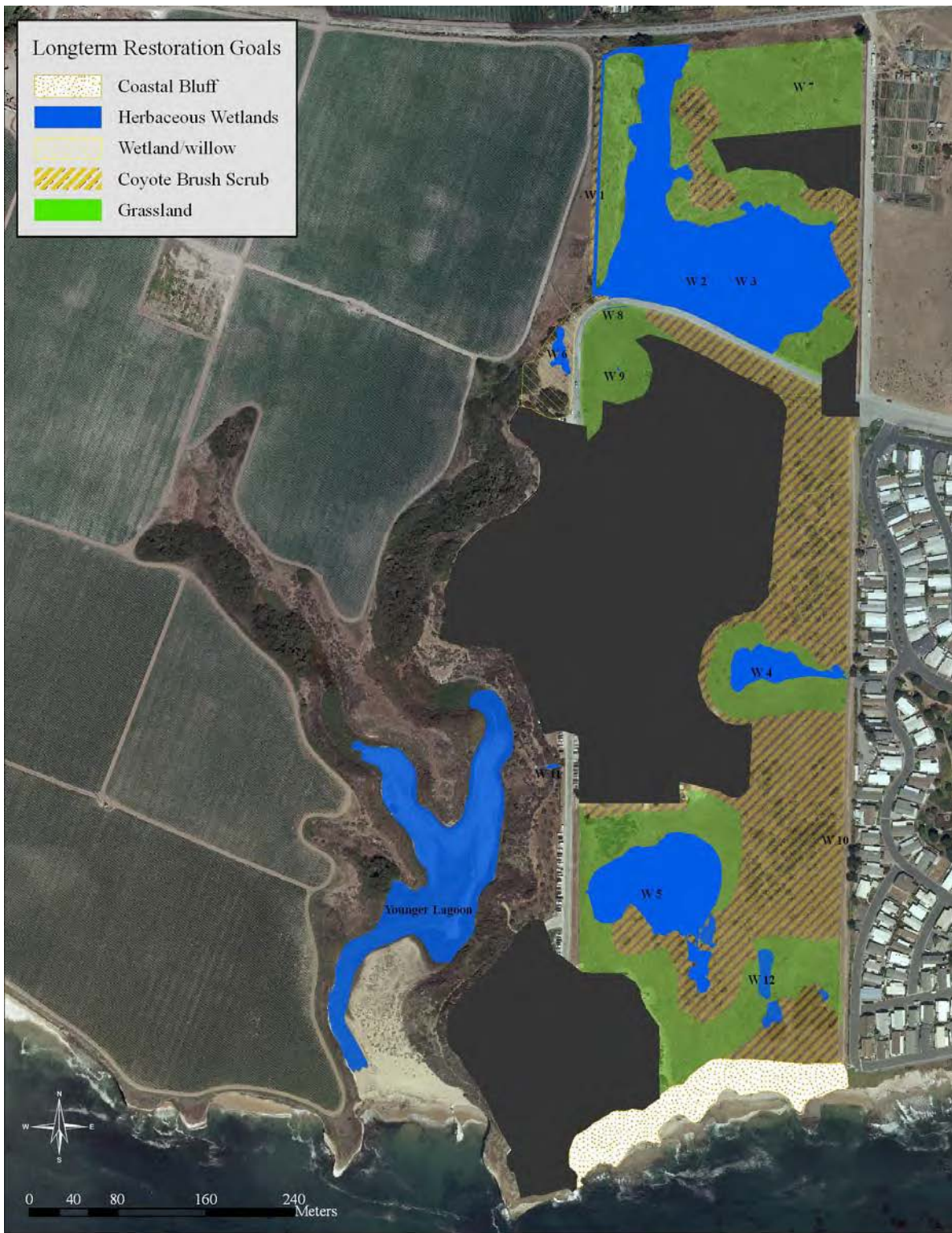
### *Coastal Bluff Expansion*

Although ongoing weed abatement activities have reduced invasive species along the coastal bluff area, vegetation within this region of the Terrace Lands is dominated by ice plant and non-native grasses. The coastal bluff scrub area currently covers approximately 1.5 acres. SRP Phase 1A restoration within coastal bluff habitat would focus on increasing native plant species richness and percent cover and decreasing non-native plant cover within the coastal bluff scrub, and increasing the width of this area, from bluff edge, to approximately 100 feet inland. SRP Phase 1A would not alter topography and/or hydrology in these areas. It is anticipated that improvements to an existing overlook area on the coastal bluff--a separate project that would implement a CLRDP requirement—would be constructed early in SRP Phase 1.

### *Wetland Willow*

The proposed wetland willow restoration area is an approximately 1-acre area at the top of the eastern arm of Younger Lagoon (Figures 2 and 3) that encompasses Wetland W6 and its buffer. This area is currently dominated by non-native grasses and willow. Under the proposed SRP Phase 1A, native willow, grasses, and shrubs would be hand planted in these areas.





**Figure 2. Phase 1A Primary Restoration Areas**



**Figure 3. Younger Lagoon Reserve Wetlands and Wetland Buffers**

### *Wetland Buffers*

Wetland buffers (Figure 3) represent prescribed distances from wetland edges (100 ft for all wetlands with the exception of W5, which has a 150 ft buffer), within which development activity would not occur. During SRP Phase 1A, primary restoration efforts in wetland buffers would focus on approximately 1 acre of buffer area in buffers W4 and W5; however, other buffer areas also may be planted. The wetland buffer areas are currently dominated primarily by non-native grasses, coyote brush, Douglas' baccharis, and willow. Soil conditions within and among wetland buffer areas differ greatly and thus significantly influence the potential plant species mix, which would vary from wetland to wetland. Restoration efforts in wetland buffers would focus on increasing native plant species richness and percent cover and decreasing non-native plant cover, adhering to interim and long-term goals of the RMP for restoration of ruderal, coyote brush scrub-grassland, and native grassland. In order to achieve the goal of "insulating" wetland habitat from physical and visual noise and intrusion by people, shrubs will be planted near the outer edge of the wetland buffer areas where appropriate soil conditions exist. No changes in topography and/or hydrology in the wetland buffers are proposed.

### *Priority One Weed Removal*

During SRP Phase 1A, all Priority 1 weeds (Table 1) would be controlled as they are detected throughout the Terrace Lands. The proposed SRP Phase 1 assigns Priority 1 weed status to exotic (non-native) plants that are large in stature, slow-spreading, and capable of invading and out-competing native plants in established plant communities. On the MSC these include Jubata grass, Monterey cypress, cape ivy, panic veldgrass, fennel, French broom, Harding grass, Monterey pine, and Himalayan blackberry. Discrete patches and scattered individuals of Priority 1 weeds are located throughout YLR Terrace Lands and MSC. Medium- and low-priority weeds will be controlled on an as needed basis until active restoration projects are taking place at a specific site.

Removal techniques for Priority 1 weeds may include hand pulling/ mechanical control, winching, clipping / weed whacking, flaming, solarization by laying down black agricultural plastic, burning, grazing, mowing, and herbicide application. Mature Monterey cypress and Monterey pine would be controlled by cutting the above-ground material from the root. Seedlings would be controlled by hand pulling and/or digging. When hand removal is employed, soil may be raked after removal of above-ground material to expose and remove any remaining roots or stolons. All herbicide application would follow California Department of Pesticide Regulation (CaDPR) regulations and would be done by a CaDPR qualified applicator. Herbicides would be chosen based on the target weed and surrounding habitat (e.g. species-specific targeted applications). Only registered aquatic herbicides would be used in wetland areas. Due to their potential to re-invade, all Priority 1 weeds with viable propagules would either be solarized and composted on site or bagged after removal and disposed of offsite. Some Priority 1 weed control activities would be ongoing throughout the year. Other activities would be restricted to the winter and spring months. Exact timing would be dependent on soil moisture conditions and seed-set.

**Table 1. Known Non-Native Weeds on YLR Terrace Lands and Adjacent Lands**

<i>Common Name</i>	<i>Scientific Name</i>	<i>Priority Rating* for Removal</i>
Blackwood acacia	<i>Acacia melanoxylon</i>	W
Everblooming acacia	<i>Acacia retinodes</i>	W

**Table 1. Known Non-Native Weeds on YLR Terrace Lands and Adjacent Lands**

<i>Common Name</i>	<i>Scientific Name</i>	<i>Priority Rating* for Removal</i>
Crofton weed	<i>Ageratina adenophora</i>	W
European beachgrass	<i>Ammophila arenaria</i>	W
Giant reed	<i>Arundo donax</i>	W
Mediterranean Linseed	<i>Bellardia trixago</i>	W
Portuguese Broom	<i>Cytisus multiflorus</i>	W
Scotch broom	<i>Cytisus scoparius</i>	W
Purple awned wallaby grass	<i>Danthonia pilosa</i>	W
Pepperweed	<i>Lepidium latifolium</i>	W
Yellow parentucellia	<i>Parentucellia viscosa</i>	W
Fountain grass	<i>Pennisetum setaceum</i>	W
Spanish broom	<i>Spartium junceum</i>	W
Ice plant	<i>Carpobrotus edulis</i>	1
Jubata grass	<i>Cortaderia jubata</i>	1
Monterey cypress	<i>Cupressus macrocarpa</i>	1
Cape ivy	<i>Delairea odorata</i>	1
Panic veldgrass	<i>Ehrharta erecta</i>	1
Fennel	<i>Foeniculum vulgare</i>	1
French broom	<i>Genista monspessulana</i>	1
Harding grass	<i>Phalaris aquatica</i>	1
Monterey pine	<i>Pinus radiata</i>	1
Himalayan blackberry	<i>Rubus discolor</i>	1
Wild oat	<i>Avena barbata</i>	2
Oat	<i>Avena fatua</i>	2
Common mustard	<i>Brassica rapa</i>	2
Rescue grass	<i>Bromus catharticus</i>	2
Ripgut brome	<i>Bromus diandrus</i>	2
Soft chess	<i>Bromus hordeaceus</i>	2
Italian thistle	<i>Carduus pycnocephalus</i>	2
Bull thistle	<i>Cirsium vulgare</i>	2
Bermuda grass	<i>Cynodon dactylon</i>	2
Poison hemlock	<i>Conium maculatum</i>	2
Black mustard	<i>Hirschfeldia incana</i>	2
Velvet grass	<i>Holcus lanatus</i>	2
Farmer's foxtail	<i>Hordeum murinum</i> ssp. <i>leporinum</i>	2
Prickly lettuce	<i>Lactuca serriola</i>	2

**Table 1. Known Non-Native Weeds on YLR Terrace Lands and Adjacent Lands**

<i>Common Name</i>	<i>Scientific Name</i>	<i>Priority Rating* for Removal</i>
Wild lettuce	<i>Lactuca virosa</i>	2
Italian ryegrass	<i>Lolium multiflorum</i>	2
Perennial ryegrass	<i>Lolium perenne</i>	2
Mallow	<i>Malva parviflora</i>	2
Sourgrass	<i>Oxalis pes-caprae</i>	2
Bristly ox-tongue	<i>Picris echioides</i>	2
Rabbitsfoot grass	<i>Polypogon monspeliensis</i>	2
Wild radish	<i>Raphanus sativus</i>	2
Curly dock	<i>Rumex crispus</i>	2
Prickly sow thistle	<i>Sonchus asper</i>	2
Sow thistle	<i>Sonchus oleraceus</i>	2
Scarlet pimpernel	<i>Anagallis arvensis</i>	3
Pineapple weed	<i>Chamomilla suaveolens</i>	3
Lambs quarters	<i>Chenopodium album</i>	3
Nettle-leaved goosefoot	<i>Chenopodium murale</i>	3
Brass buttons	<i>Cotula coronopifolia</i>	3
Filaree	<i>Erodium moschatum</i>	3
Cut-leaved geranium	<i>Geranium dissectum</i>	3
Rough cat's ear	<i>Hypochaeris radicata</i>	3
Loosestrife	<i>Lythrum hyssopifolium</i>	3
Bur clover	<i>Medicago polymorpha</i>	3
Cut-leaved plantain	<i>Plantago coronopus</i>	3
English plantain	<i>Plantago lanceolata</i>	3
Annual bluegrass	<i>Poa annua</i>	3
Common knotweed	<i>Polygonum arenastrum</i>	3
Sheep sorrel	<i>Rumex acetosella</i>	3
Common groundsel	<i>Senecio vulgaris</i>	3
Chickweed	<i>Stellaria media</i>	3
Rattail fescue	<i>Vulpia myuros</i>	3

Notes: \*Priority rating:

- W. Watch List. These weeds are currently undetected at YLR Terrace Lands but are known to exist on nearby lands. Reserve staff will actively patrol for these weeds and eliminate them as soon as they are detected as part of YLR's Early Detection Rapid Response (EDRR) program (outlined in SRP 3).
1. High priority. These weeds are capable of invading and out-competing native plants in established plant communities. They are typically large stature, slow spreading perennial or biennials. Effective removal techniques for these weeds are generally well documented, and reserve staff will actively work to eliminate these weeds from YLR Terrace Lands. Once eliminated, on-going monitoring for reemergence of these weeds will take place in conjunction with patrols for Watch List weeds.

2. Medium priority. These weeds are mostly biennial or annual and are ubiquitous on YLR Terrace Lands. They are typically smaller in stature than Priority 1 weeds and more difficult to control. Weed control efforts for Priority 2 weeds will take place in conjunction with active restoration projects (e.g. planting), but P2 weeds are not expected to be eliminated from YLR Terrace Lands.
3. Low priority. These weeds are mostly annuals and are ubiquitous on YLR Terrace Lands. They are typically smaller in stature than Priority 1 weeds and more difficult to control. While many can effectively compete with native plants once they are established, they typically do not aggressively push out native plants. Most are commonly associated with native and non-native grasses and forbs in grasslands. Incidental weed control efforts for Priority 3 weeds may take place in conjunction with active restoration projects (e.g. planting), but P3 weeds are not expected to be eliminated from YLR Terrace Lands.

Source: Modified from John Gilcrest and Associates and Environmental Hydrology 1998.

### *Planting*

Native plantings will be used throughout the SRP Phase 1 area, during Phase 1, to replace non-natives that are removed, improve plant cover as appropriate, and enhance native habitats. The proposed planting palette is made up exclusively of native taxa that are appropriate to the habitat and region. Seed and/or vegetative propagules would be obtained from local natural habitats so as to protect the genetic makeup of natural populations and increase the probability of successful establishment. Horticultural varieties will not be used.

Planting density will be approximately 12 to 36 inches (30 to 90 cm) on center, depending on species. Smaller stature plants will be grouped and spaced closer together, while larger stature plants would be spaced further apart. In general, plants will be placed in non-linear arrangements to mimic plant distribution patterns observed in nature. All planting will be done by hand and ground disturbance would be limited to individual holes for the plants. Supplies will be brought to each area using a pickup truck, gas powered mule, or by hand. Motor vehicle use will be limited primarily on the existing perimeter trail and to days when the soil is dry. Planting will begin after the first winter rains.

Seeds will be collected from local sources and grown by UCSC staff and students at the UCSC Arboretum, UCSC Teaching Greenhouses, YLR, or by local restoration contractors.

### *Erosion control*

The proposed removal of ice plant, a Priority 1 plant, along the bluff edge will expose bare soil areas temporarily, while new plantings are established. If needed, biodegradable silt fencing will be installed along the bluff edge after ice plant removal, and the new plants will be mulched to control erosion while vegetation is re-established. Because the Terrace Lands are essentially flat, and the restoration efforts will entail minimal ground disturbance, erosion is not likely to be a concern elsewhere in the area. However, Reserve staff will visually inspect all areas for bare ground following planting or weeding efforts and after storm events, and will install erosion control materials such as wood-chip mulch, jute netting, or other similar materials, as needed to prevent erosion.

### *Irrigation*

Ideally, plant installation will commence after the first winter rain and end well before the rains stop, ensuring that plants are naturally watered in and established before the summer dry period. However, if observations indicate that supplemental irrigation is needed, plants will be watered using one or all of the following methods: application using a water truck, hose, by hand, and/or overhead sprinkling. Water will be obtained from existing MSC infrastructure. Supplemental irrigation is likely to be needed only in the summer and fall months in the first year after planting. Because the soil generally is dry during those months, the potential for disturbance, damage, and erosion as the result of water vehicle traffic is low. If vehicle (water truck) application is used, vehicles will be restricted to the perimeter of the terrace, along the paved road and a fire break maintained by the campus. If needed,

temporary drip hoses and sprinklers will be installed above ground by hand and run off of existing water lines. All irrigation materials will be removed as soon as the vegetation is established.

#### *Interpretive and Protective Signage*

Signage will be placed throughout the Terrace Lands during Phase 1 to interpret restoration projects and research to the public. Signs or minimal low fencing also could be installed along active restoration areas adjacent to public trails to protect new plantings. All signage and fencing will be designed to comply with CLRDP design standards (CLRDP, Chapter 6) to avoid visual impacts while also providing the maximal public access consistent with restoration.

#### *Research Activities*

SRP Phase 1 also will include manipulative experiments focused on evaluating various restoration strategies and techniques (as described in SRP Phase 1, p 8). The objective of these experiments will be to identify the most effective strategies for habitat restoration that meets the goals of the RMP.

#### *Remediation (Plant Maintenance and Replacement)*

It is anticipated that initial plant mortality will likely be in the 10% to 40% range due to wildlife browsing, desiccation, and/or accidental trampling (by volunteers during planting and monitoring). Plants will be installed at relatively high densities to provide an allowance for plant mortality. If mortality is lower than anticipated, plants will be thinned as necessary to ensure successful growth and reproduction and future planting densities will be adjusted. If a particular planting effort fails, plants will be replanted that season, or the following year if failure occurs after the planting season.

#### *Monitoring Program*

The proposed SRP Phase 1 includes a monitoring program to evaluate whether success criteria for native plant cover and richness are being met. Hydrological monitoring may include monitoring of water levels in each major wetland, mapping the area with water at the ground surface, collecting soil samples from the wetlands, and collecting rainfall data. In addition, spring season vegetation monitoring will be conducted in coyote brush shrub-grassland, grassland, coastal bluff, willow riparian and ruderal areas in years 1, 4 and 7; and ten permanent photo points around the project area will be photomonitored annually. Results from the monitoring efforts will be included in reports that will be submitted by December 31<sup>st</sup> of each year to UC Santa Cruz, the California Coastal Commission, and the SAC. A final monitoring report will be submitted to the California Coastal Commission at the end of the final monitoring period of Phase 1. If the final report indicates that the project has been unsuccessful in achieving habitat restoration and enhancement in the subject area, in part or in whole, based on the approved success criteria, then the final report shall identify remediation measures to be implemented to compensate for those portions of the original plan that did not meet the approved success criteria.

#### **SRP Phase 1B**

As noted above, Phase 1B of the SRP is described here to the extent it has been developed to date. Implementation details will be subject to agency consultation and permitting and likely will vary, at least in some details, from the conceptual outline provided here. The implementation of SRP Phase 1B will be independent of the implementation of Phase 1A, although results of both will be monitored and reported at the end of SRP Phase 1. Due to the uncertainty related to the Phase 1B elements and implementation criteria it will be too speculative to evaluate the environmental effects of Phase 1B implementation at this time.

#### *Topographic Modification to Reconnect Wetlands 1 and 2*

Wetland W1 is essentially a drainage ditch, which was excavated sometime during the agricultural use of the plot to diminish the extent of natural seasonal inundation of active agricultural fields. The ditch is fed by a culvert under the railroad that defines the northern end of the Terrace Area of YLR at the upstream end of the ditch, and terminates at a culvert structure just north of the MSC entry road. Wetland W2, adjacent to the east of W1 (see Figure 3, above) and separated from W1 also is supplied by water entering the site through the railroad culvert, but is much more extensive than W1 and is not defined by artificial berms.

The primary focus of SRP Phase 1B will be work in the wetlands W1 and W2 to connect the wetlands hydrologically for hydrologic and habitat improvements as required by the RMP. The intent of the proposed alterations is to remediate historical modifications to site hydrologic function that served to drain wetlands on the site (e.g. the existing W1 drainage ditch), but leave intact and improve past modifications that may have increased the historical extent and duration of wetland inundation (e.g. the entry roadway berm at the south end of W1). It is envisioned that the initial modifications to wetlands W1 and W2 will consist of installation of a temporary, removable water control structure in the culvert at the south (downstream) end of W1 and, potentially, installation of earthen berm(s) near the upstream end of W1 to increase flows from W1 into W2 and potentially at other locations throughout W1.

It is anticipated that management of site hydrology will increase the cover of native wetland plant species, maintain raptor foraging habitat, improve water quality of inputs to YLR, create a continuous north-south corridor across the north end of the MSC for wildlife movement to YLR, and promote infiltration and subsurface storage of winter runoff. An increase in water pooled in W1 and W2 may also provide amphibian breeding habitat by creating small open water pools. Reserve staff will implement the diversions incrementally and monitor the effects of the modifications on hydrology and habitat, during SRP Phase 1B, before designing and installing any permanent diversion structures. If the measures described do not provide the anticipated benefits during Phase 1B, additional design and planning for enhancement of these wetlands will occur during SRP Phase 2.

#### *Central Areas of Wetlands 4 and 5*

Restoration within the central areas of wetlands 4 and 5 (Figure 3), with a total of 3 acres, will focus on increasing native plant species richness and percent cover and decreasing non-native plant cover. Activities in these areas will include weed control, enhancement of existing native vegetation with small-scale plantings, and collection of seeds and cuttings for propagation. No alternations to topography and/or hydrology in these wetlands are proposed.



## **1b. CLRDP Consistency Determination**

As stated in Policy 1.1 (Development Consistency), “Development shall be deemed consistent with the CLRDP if it is consistent with the provisions of Chapters 5, 6, 7, 8, 9, and Appendices A and B.”

The following is a list of all the Policies, Implementation Measures and Figures found in Chapter 5. Those that apply directly to this NOID are highlighted in black and followed with a comment regarding the project’s consistency. In addition, sections of Chapters 6, 7, 8, 9, and Appendices A and B that also apply to this NOID are referenced with comments.

### **CHAPTER 5 Long Range Land Use Development Plan**

#### **5.1 Application of the Long Range Land Use Development Plan**

##### **Policy 1.1 Development Consistency**

The University finds the project contemplated under NOID 09-1 to be consistent with the CLRDP.

##### **IM 1.1.1 Figures of Chapter 5.**

The project does not involve physical development, but is “development” as defined in Section 8.1.1 and the Coastal Act as a “the removal or harvesting of major vegetation other than for agricultural purposes.” Only the resource protection policies and implementation measures of Chapter 5, and Appendix B apply, and the project is consistent with these elements of the CLRDP..

~~IM 1.1.2 Lease Agreements.~~

~~IM 1.1.3 Federal In-holding and CLRDP.~~

##### **Policy 1.2 University Commitments**

The project implements a portion of the Resource Management Plan, one of the commitments identified in Chapter 9. It does not trigger any of the other commitments identified in Chapter 9.

#### **5.2. Land Use**

~~Figure 5.1 Building Program~~

~~Figure 5.2 Land Use Diagram~~

~~Figure 5.3 Locational Restrictions for Building Program~~

~~Stable Urban / Rural Boundary~~

##### **Policy 2.1 Maintaining a Stable Urban / Rural Boundary**

~~IM 2.1.1 Over sizing of Utility Lines Prohibited.~~

~~IM 2.1.2 Utility Prohibition Zone.~~

##### **Policy 2.2 Strengthening the Urban / Rural Boundary through the Protection of Adjacent Agricultural Resources**

~~IM 2.2.1 Setback of Development and Uses from Adjacent Agricultural Use.~~

##### **Policy 2.3 Designing for the Urban Edge**

~~IM 2.3.1 Cluster Development.~~

~~IM 2.3.2 Impervious Coverage.~~

~~IM 2.3.3 Windbreak/Screening Trees~~

~~IM 2.3.4 Buildout Planning.~~

~~IM 2.3.5 Interim Weed Abatement Measures for Undeveloped Land Within Development Zones.~~

##### **Short-term and Caretaker Accommodations**

##### **Policy 2.4 Short-term and Caretaker Accommodations**

~~IM 2.4.1 Short-Term Accommodation Use Restrictions.~~

~~IM 2.4.2 Caretaker Accommodations.~~

~~IM 2.4.3 Use Conversion.~~

##### **Campus Land Uses Limited to Marine / Coastal Research and Education, Resource Protection, and Public Access**

##### **Policy 2.5 Ensuring Appropriate Land Uses on the Marine Science Campus**

#### **5.3 Natural Resource Protection**

##### **Policy 3.1 Protection of the Marine Environment**

~~IM 3.1.1 Seawater System.~~

~~IM 3.1.2 Discharge of Drainage/Storm water.~~

##### **Policy 3.2 Protection and Restoration of Habitat Areas**

IM 3.2.1 Restoration of Wetlands on the Marine Science Campus.

The project will initiate the restoration work in compliance with IM 3.2.1.

IM 3.2.2 Management of Terrace Wetlands.

The project includes removal of non-native and invasive plants and planting native species in Wetlands W4 and W5, in compliance with IM 3.2.2.

IM 3.2.3 Protection and Enhancement of Wildlife Movement.

This project is likely to increase protection and enhance wildlife movement by increasing cover of native plant species.

**IM 3.2.4 Management of Special Status Species Habitat.**

The project includes enhancement of wetland and grassland/scrub-grassland habitats in compliance with IM 3.2.4.

~~IM 3.2.5 Protect Habitat Areas From Human Intrusion.~~

**IM 3.2.6 Natural Area Management.**

The purpose of the project is to restore, enhance and manage natural areas on the campus as high-quality open space and natural habitat area in compliance with IM 3.2.6.

~~IM 3.2.7 Management of Water Quality and Drainage Features.~~

**IM 3.2.8 Maintenance and Monitoring of Terrace Habitats.**

The project includes a monitoring program to evaluate whether success criteria for native plant cover and richness are being met.

~~IM 3.2.9 Wetland Buffers.~~

**IM 3.2.10 Natural Areas Habitat Management.**

The project partially implements Phase 1 restoration in compliance with IM 3.2.10. The Phase 1A SRP was developed in compliance with this measure and is consistent with the Resource Management Plan.

**IM 3.2.11 CRLF Protection.**

In compliance with IM 3.2.11., the project will implement CLRDP EIR Mitigation 4.4-1 to ensure that restoration activities in Phase 1B do not harm of CRLF.

**IM 3.2.12 USFWS Consultation Required**

Prior to Phase 1B activities, a preconstruction survey for CRLF will be performed by a qualified biologist, approved by the USFWS, and if CRLF are observed, USFWS shall be consulted to determine appropriate actions to avoid impact.

~~IM 3.2.13 Rodenticides.~~

**IM 3.2.14 Non-Invasive Native Plant Species Required.**

Seed and/or vegetative propagules will be obtained from local natural habitats so as to protect the genetic makeup of natural populations and enhance likelihood of plant survivorship, in compliance with IM 3.2.14.

**Policy 3.3 Use and Protection of Coastal Waters and Wetlands**

~~IM 3.3.1 Pre-development Evaluation of Wetland Conditions.~~

~~IM 3.3.2 Update CLRDP With Respect to Wetlands.~~

**Policy 3.4 Protection of Environmentally Sensitive Areas (ESHAs)**

~~IM 3.4.1 Additional Measures to Protect Habitat Areas.~~

~~IM 3.4.2 Noise Intrusion into Terrace ESHA.~~

~~IM 3.4.3 Noise Intrusion into YLR.~~

~~IM 3.4.4 Pre-development Evaluation of ESHA Conditions.~~

~~IM 3.4.5 Update CLRDP With Respect to ESHA.~~

**Younger Lagoon Reserve**

**Policy 3.5 Special Protection for Younger Lagoon Reserve**

**IM 3.5.1 Protection and Enhancement of YLR Habitats.**

The original 25-acre Younger Lagoon Reserve will continue to be protected and enhanced through ongoing weed management, restoration activities and by controlling human access.

~~IM 3.5.2 Protection of Special Status Species in YLR.~~

~~IM 3.5.3 Protection of YLR Resources.~~

~~IM 3.5.4 Development of Monitoring and Maintenance Program.~~

~~IM 3.5.5 Siting of Windbreak/Screening Trees.~~

**IM 3.5.6 YLR Manager Consultation.**

The Administrative Director of the UCSC Natural Reserves and the Field Manager of the Younger Lagoon Natural Reserve have reviewed the scope of the SRP Phase 1A Project (NOID 10-2) and concur the Project would not result in impacts to the Reserve.

---

Gage Dayton, Administrative Director, UCSC Natural Reserves

Date

~~IM 3.5.7 Movement Not Visible From YLR. (known post-CLRDP approval as YLNR)~~

~~IM 3.5.8 Protective Measures for YLR in Middle Terrace.~~

**Policy 3.6 Public Access to and within YLR**

~~IM 3.6.1 Provision of Controlled Access within YLR.~~

~~IM 3.6.2 Visual Access to YLR.~~

~~IM 3.6.3 Public Beach Access within YLR.~~

**Coastal Bluffs and Blufftops**

**Policy 3.7 Protection of Coastal Bluff and Bluff top Areas**

~~IM 3.7.1 Bluff Setbacks.~~

**IM 3.7.2 Coastal Bluff and Bluff top Area Protection and Enhancement Measures.**

The project includes removal of ice plant and planting of native plant species along the bluff edge in compliance with IM 3.7.2.

~~IM 3.7.3 Protecting Existing Development from Coastal Erosion.~~

#### **Agricultural Resources**

#### **Policy 3.8 Protection of Adjacent Agricultural Resources**

~~IM 3.8.1 Cooperation.~~

~~IM 3.8.2 Agreement to Indemnify and Hold Harmless.~~

#### **Cultural Resources**

#### **Policy 3.9 Conservation of Cultural Resources**

~~IM 3.9.1 Construction Monitoring.~~

#### **Hazardous Materials Management**

#### **Policy 3.10 Hazardous Materials Management**

~~IM 3.10.1 Hazardous Materials Management.~~

~~IM 3.10.2 Protective Measures for Laydown Yard.~~

#### **Air Quality and Energy Consumption**

#### **Policy 3.11 Energy Efficiency in New Construction**

~~IM 3.11.1 Energy Efficiency in New Construction.~~

~~IM 3.11.2 Energy Efficiency in Use.~~

#### **Policy 3.12 Air Quality and Energy Conservation through Land Use and Transportation Controls**

~~IM 3.12.1 Air Quality and Energy Conservation through On-Campus Short-Term Accommodations.~~

~~IM 3.12.2 Air Quality and Energy Conservation through Controlling Travel Mode Split.~~

~~IM 3.12.3 Air Quality and Energy Conservation through Parking Control.~~

~~IM 3.12.4 Air Quality and Energy Conservation through Alternative Transportation.~~

~~IM 3.12.5 Air Quality and Energy Conservation through Transportation Demand Management.~~

#### **Natural Resource Protection Analysis**

#### **Policy 3.13 Natural Resource Protection Analysis Required**

#### **Policy 3.14 Permanent Protection**

~~IM 3.14.1 Natural Areas Protection.~~

In 2008, all natural areas outside of the development zones were incorporated into the University of California Natural Reserve System as an integral part of Younger Lagoon Reserve (incorporation documents are included with this NOID under Section 2 – University Approval Documentation).

### **5.4. Scenic and Visual Qualities**

~~Figure 5.4 Development Subareas~~

#### **Policy 4.1 Protection of Scenic Views**

~~IM 4.1.1 Location of Development.~~

#### **Policy 4.2 Protection of Scenic Quality**

~~IM 4.2.1 Design Standards and Illustrative Campus Build-out Site Plan.~~

~~IM 4.2.2 Alteration of Natural Landforms.~~

~~IM 4.2.3 Building and Other Structure Heights.~~

~~IM 4.2.4 Laboratory Buildings.~~

~~IM 4.2.5 Maximum Building Gross Square Footage.~~

~~IM 4.2.6 Maximum Additional Gross Square Footage in Lower Terrace.~~

~~IM 4.2.7 Construction Materials.~~

~~IM 4.2.8 Building Setbacks.~~

~~IM 4.2.9 Building Length Limitations.~~

~~IM 4.2.10 Placement of Utility Lines Underground.~~

~~IM 4.2.11 Windbreak/Screening Trees.~~

~~IM 4.2.12 Development in Northernmost Portion of Middle Terrace.~~

~~IM 4.2.13 Development Along Edge of Lower Terrace.~~

~~IM 4.2.14 Building Development West of McAllister Way in Lower Terrace.~~

~~IM 4.2.15 Building Development West of McAllister Way in Middle Terrace.~~

~~IM 4.2.16 Building Development Outside of Subareas Prohibited.~~

#### **Policy 4.3 Visual Intrusion and Lighting**

~~IM 4.3.1 Visual Intrusion into YLR.~~

~~IM 4.3.2 Visual Intrusion into Terrace ESHA and Other Areas Outside of Development Zones.~~

~~IM 4.3.3 All Lighting.~~

~~IM 4.3.4 Building Lighting.~~

~~IM 4.3.5 Street and Trail Lighting.~~

~~IM 4.3.6 Parking Lot and Maintenance Yard Lighting.~~

~~IM 4.3.7 Sign Lighting.~~

~~IM 4.3.8 Lighting Plan Required.~~

### **5.5. Circulation and Parking**

Figure 5.5 Circulation and Parking Diagram

### **Auto Circulation**

#### **Policy 5.1 Vehicular Access**

IM 5.1.1 New Circulation System.

IM 5.1.2 Improve Shaffer Road / Delaware Avenue Intersection

IM 5.1.3 Shaffer Road Improvements.

IM 5.1.4 Access for Wildlife Across Shaffer Road (Upper Wildlife Corridor).

IM 5.1.5 Access for Wildlife Across Shaffer Road (Lower Wildlife Corridor).

IM 5.1.6 Use of Former Access Road.

IM 5.1.7 Emergency Access.

#### **Travel Mode Split**

#### **Policy 5.2 Travel Mode Split**

IM 5.2.1 Encourage Alternatives to Single-Occupant Vehicle.

IM 5.2.2 Alternatives to the Single-Occupant Vehicle.

### **Parking**

#### **Policy 5.3 Parking for Campus Use and Public Coastal Access**

IM 5.3.1 All Campus Users Off-Hour Parking.

IM 5.3.2 Public Coastal Access Parking.

IM 5.3.3 Campus Entrance Public Coastal Access Parking.

IM 5.3.4 Middle Terrace Public Coastal Access Parking.

IM 5.3.5 Lower Terrace Dual Use Parking (Public Coastal Access Parking and Discovery Center Parking).

IM 5.3.6 Lower Terrace Public Coastal Access Parking.

IM 5.3.7 Parking Demand Satisfied On-Campus.

IM 5.3.8 Free and/or Low Cost Public Coastal Access Parking.

#### **Parking Supply**

#### **Policy 5.4 Parking Supply**

IM 5.4.1 Development of New Parking

IM 5.4.2 Lease Agreements

IM 5.4.3 Distribution and Intensity of Parking

### **Parking Management**

#### **Policy 5.5 Parking Management**

IM 5.5.1 Permits Required.

IM 5.5.2 Public Coastal Access Parking.

IM 5.5.3 Carpools and Vanpools.

IM 5.5.4 Parking Management Strategy for Special and/or Temporary Events.

IM 5.5.5 Entrance Kiosk.

IM 5.5.6 Parking Limitation Seaward of Whale Skeleton.

IM 5.5.7 Parking Enforcement.

### **Pedestrian and Bicycle Facilities**

#### **Policy 5.6 Promotion of Bicycle Use and Walking**

IM 5.6.1 Sheltered and Secured Bike Parking.

IM 5.6.2 Bike Parking Outside Buildings.

IM 5.6.3 Personal Lockers and Showers.

IM 5.6.4 Coordinated Marketing with City of Santa Cruz.

IM 5.6.5 Crosswalk Design.

IM 5.6.6 Siting Buildings for Ease of Access.

### **Transit**

#### **Policy 5.7 Promotion of Transit Use**

IM 5.7.1 Extension of Santa Cruz Municipal Transit District Transit Services.

IM 5.7.2 Expansion of Shuttle Services.

IM 5.7.3 Physical Infrastructure for Transit.

### **Transportation Demand Management (TDM) Coordination**

#### **Policy 5.8 TDM Coordination**

IM 5.8.1 Carpool and Vanpool Services.

IM 5.8.2 TDM Coordination.

IM 5.8.3 Transportation Information.

### **Traffic Impacts on City Streets**

#### **Policy 5.9 Impacts Offset**

#### **Circulation and Parking Plan**

#### **Policy 5.10 Circulation and Parking Plan Required**

### **5.6. Public Access and Recreation**

Figure 5.6 Coastal Access and Recreation Diagram

#### **Policy 6.1 Public Access to the Marine Science Campus**

IM 6.1.1 Free Public Access for Visitors.

IM 6.1.2 Public Access Parking.

- ~~IM 6.1.3 Public Access Trails.~~
- ~~IM 6.1.4 Public Access Overlooks.~~
- ~~IM 6.1.5 Docent Led Tours and Education Programs for the Public.~~
- ~~IM 6.1.6 Educational Programs for Pre-College Students.~~
- ~~IM 6.1.7 Interpretive Information.~~

#### **Policy 6.2 Management of Public Areas**

- ~~IM 6.2.1 Public Use Hours for the Marine Science Campus.~~
- ~~IM 6.2.2 Public Trail Continuity.~~
- ~~IM 6.2.3 Access to Resource Protection Areas.~~
- ~~IM 6.2.4 Access to Resource Protection Buffer Areas.~~
- ~~IM 6.2.5 Access to Coastal Bluffs.~~
- ~~IM 6.2.6 Access to Laboratories and Research Areas.~~
- ~~IM 6.2.7 Carotaker Residence and Lab Security.~~
- ~~IM 6.2.8 Bicycles on the Marine Science Campus.~~
- ~~IM 6.2.9 Domestic Pets.~~
- ~~IM 6.2.10 Public Access Signage.~~
- ~~IM 6.2.11 Off Campus Trail Connectivity.~~
- ~~IM 6.2.12 Maintenance of Existing Public Access.~~
- ~~IM 6.2.13 Public Access to Younger Lagoon Beach.~~

#### **Policy 6.3 Public Access and Recreation Plan Required**

### **5.7. Hydrology and Water Quality**

Figure 5.7 Utilities Diagram

#### **Policy 7.1 Productivity and Quality of Coastal Waters**

- ~~IM 7.1.1 Management of Storm water and Other Runoff.~~
- ~~IM 7.1.2 Water Quality Standards.~~
- ~~IM 7.1.3 Pre and Post Development Flows.~~
- ~~IM 7.1.4 Pre-Development Drainage Patterns Defined.~~
- ~~IM 7.1.5 Pre-Development Drainage Peak Flow Rates Defined.~~
- ~~IM 7.1.6 Groundwater Recharge.~~
- ~~IM 7.1.7 Seawater System (Seawater Containment)~~
- ~~IM 7.1.8 Irrigation and Use of Chemicals for Landscaping.~~
- ~~IM 7.1.9 Wastewater.~~
- ~~IM 7.1.10 Elements of the Storm water Treatment Train.~~
- ~~IM 7.1.11 Runoff Containment for Laydown Yard and Food Service Washdown Areas.~~
- ~~IM 7.1.12 Location of Treatment Train Components.~~
- ~~IM 7.1.13 Permeable Hardscape.~~
- ~~IM 7.1.14 Ocean Discharge.~~
- ~~IM 7.1.15 Drainage System Interpretive Signs.~~
- ~~IM 7.1.16 Design of Vegetated Storm water Basins.~~
- ~~IM 7.1.17 Designation of Treatment Train.~~

#### **Policy 7.2 Long-Term Maintenance and Monitoring**

- ~~IM 7.2.1 Drainage System Monitoring and Maintenance.~~
- ~~IM 7.2.2 Storm water System Natural Features Maintenance.~~
- ~~IM 7.2.3 Drainage System Sampling.~~
- ~~IM 7.2.4 Long Term Maintenance of Storm water System.~~

#### **Policy 7.3 Drainage Discharge Points**

- ~~IM 7.3.1 Discharge to Younger Lagoon Reserve.~~
- ~~IM 7.3.2 Discharge Siting and Design.~~

#### **Policy 7.4 Drainage Plan Required**

### **5.8 Utilities**

#### **Policy 8.1 Provision of Public Works Facilities**

- ~~IM 8.1.1 Sizing of Utilities.~~
- ~~IM 8.1.2 Seawater System.~~

#### **Policy 8.2 Protection of Biological Productivity and Quality of Coastal Waters When Providing Public Works Facilities**

- ~~IM 8.2.1 Installation of New Utility Lines and Related Facilities.~~
- ~~IM 8.2.2 Seawater System.~~
- ~~IM 8.2.3 Evaluation of Western Utility Corridor.~~

#### **Policy 8.3 Water Conservation Required**

#### **Policy 8.4 Impacts to City Water and Sewer Systems Offset**

#### **Policy 8.5 Utility Plan Required**

## **CHAPTER 6 Design Guidelines**

- 6.1 ~~Building Design~~
- 6.2 ~~Campus Street Design~~
- 6.3 ~~Parking Design~~
- 6.5 ~~Landscape Design~~
- 6.6 ~~Lighting Design~~
- 6.7 ~~Signage Design~~
- 6.8 ~~Fence / Barrier Design~~

## **CHAPTER 7 Illustrative Campus Buildout Site Plan and Preliminary Designs**

This project will not construct any new buildings, roads or pathways. Low fencing may be installed as to protect new plantings, and will be consistent with the fencing/barrier design guidelines in Section 6.8 of the CLRDP.

## **CHAPTER 8 Development Procedures**

This NOID and the public notification process are submitted in conformance with the requirements of the CLRDP.

## **CHAPTER 9 Capital Improvement Program**

The proposed resource management activities are consistent with the Chapter 9 requirements.

## **APPENDIX A Resource Management Plan**

The proposed project is consistent with the RMP and Younger Lagoon Natural Reserve policies.

## **APPENDIX B Drainage Concept Plan**

The proposed project would create no impervious surface and thus would not affect storm water runoff.

### **1c. Environmental Compliance Documentation**

See Section 3

### **1d. Technical Reports**

See Section 5

### **1e. Consultation Documentation with other Agencies**

Not required for this NOID.

### **1f. Implementing Mechanisms**

See Section 3 – Environmental Compliance Documentation. There are no other implementing mechanisms for the proposed project.

### **1g. Correspondence Received**

No correspondence has been received on the proposed project.

### **1h. Project Manager**

Elizabeth Howard, Field Manager, Younger Lagoon Reserve

## **2. University Approval Documentation**

See attached:

Approval Letter

Chancellor Approval Item

Younger Lagoon Reserve Resolution and Agreement

Campus Provost/Executive Vice Chancellor letter to Dean of Physical and Biological Sciences

## **3. Environmental Compliance Documentation**

See attached: CLRDP EIR Addendum #2

CLRDP EIR: <http://ppc.ucsc.edu/cp/projects/11407>

## **4. Plans, Specifications, etc.**

*(this section used if project documentation is large format or extensive)*

**Not Used**

## **5. Technical Reports**

See attached: Specific Resource Plan Phase 1 – June 1, 2010



PHYSICAL PLANNING AND CONSTRUCTION

SANTA CRUZ, CALIFORNIA 95064

July 15, 2010

VICE CHANCELLOR THOMAS VANI  
Business and Administrative Services

Re: Project Approval: Specific Resource Plan, Phase 1A, UCSC Marine Science Campus

Dear Tom:

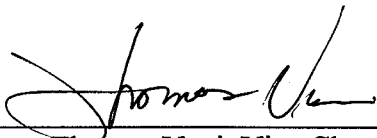
Enclosed for Chancellor Blumenthal's consideration and approval are the following documents, all of which have been prepared in consultation with the Office of the President and the Office of General Counsel:

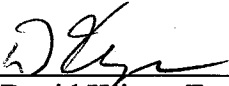
- Item for Action for Chancellor Approval
- Action Item Attachment #1 – CEQA Findings for the Specific Resource Plan Phase 1A Project
- CLRDP EIR (CEQA Findings Exhibit #1)
- CLRDP EIR Addendum #2 (CEQA Findings Exhibit #2)
- Specific Resource Plan, Phase 1 (CEQA Findings Exhibit #3)

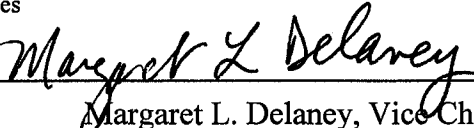
I recommend approval of this project, which implements a required element of our Coastal Long Range Development Plan. Physical Planning and Construction staff and I are available to answer any questions that you or Chancellor Blumenthal have. Please return the signed documents to PP&C for appropriate distribution and filing.

Sincerely,

John Barnes, AIA  
Interim Campus Architect  
Physical Planning & Construction

Concurrence:  7.19.10  
 Thomas Vani, Vice Chancellor date

Concurrence:  7/21/10  
 David Kliger, Executive Vice Chancellor date

enclosures  
 cc: Project files  
 S Morgan  
 Concurrence:  7/19/10  
 Margaret L. Delaney, Vice Chancellor date



July 9, 2010

*Drafted by:*  
*Reviewed by:*

S. Morgan  
K. Drumm  
M. O'Keefe

## **ITEM FOR ACTION**

### **FOR CHANCELLOR APPROVAL**

#### **APPROVAL OF SPECIFIC RESOURCE PLAN, PHASE 1A, MARINE SCIENCE CAMPUS, UC SANTA CRUZ**

The Interim Campus Architect, UC Santa Cruz Physical Planning and Construction, recommends that, upon review and consideration of the environmental consequences of the proposed Specific Resource Plan, Phase 1A Project as reflected in the attached Environmental Impact Report (EIR) and Addendum #2 for the adopted CLRDP, and in accordance with University Delegation of Authority, the Chancellor of the Santa Cruz campus:

- (1) Consider the CLRDP EIR (SCH #2001112014) and Addendum #2 (Exhibits #1 and #2 to the attached Findings)
- (2) Adopt the Findings set forth in Attachment #1 hereto.
- (2) Approve the Specific Resource Plan Phase 1A Project, as described in Addendum #2 and the Findings.

#### **Background**

The Board of Regents of the University of California (The Regents), acting as the Lead Agency, approved the Coastal Long Range Development Plan ("CLRDP") following certification of an EIR (SCH # 2001112014), which included analysis of the CLRDP Resource Management Plan (RMP), in conjunction with its approval of the UC Santa Cruz Marine Science Campus CLRDP, on September 21, 2004. Subsequent to certification of the CLRDP Final EIR, the University prepared Addendum #1 to the Final EIR, which described certain proposed changes to the CLRDP. Following consideration of the Final EIR and Addendum #1, the proposed revisions to the CLRDP were approved by the University on November 29, 2006.

The CLRDP includes Implementation Measure 3.2.10, which requires that the CLRDP be carried out through development and implementation of a series of Specific Resources Plans, consistent with the habitat restoration goals and objectives of the CLRDP RMP. In compliance with Implementation Measure 3.2.10, the UCSC staff and a Scientific Advisory Committee have prepared the first of these Specific Resource Plans, Specific Resource Plan ("SRP") Phase 1 (July 1, 2010), which describes how proposed vegetation management and wetland restoration activities consistent with the RMP would be implemented. For purposes of environmental review, SRP Phase 1 has been divided into two sub-phases. SRP Phase 1A, which is the subject of CLRDP EIR Addendum #2, describes specific activities and mechanisms through which SRP Phase 1 vegetation management for habitat restoration the CLRDP RMP would be implemented during the next seven years, over the first third of natural lands at the Marine Science Campus. SRP Phase 1B proposed plantings within jurisdictional wetland areas and modifications

to wetlands that would be subject to federal and state permitting. SRP Phase 1B methods and footprints may be refined through consultation with state and federal agencies, and will be the subject of a separate, subsequent environmental analysis and approval.

### The Proposed Project

The SRP Phase 1A Project consists of vegetation management for habitat restoration on 16 acres of the marine terrace lands ("Terrace Lands") at the Marine Science Campus within the Younger Lagoon Natural Reserve. The project area is part of the 47 acres on the Marine Science Campus that were designated for permanent preservation from future development under the CLRDP land use plan. These 47 acres were incorporated into the Younger Lagoon Natural Reserve in July 2008. The SRP Phase 1A Project, consistent with and implementing the goals set forth in the previously-approved RMP, would focus on enhancement of coyote-brush scrub-grassland, grassland, and coastal bluff scrub expansion habitat areas within the Terrace Lands. Phase 1A also would include control and removal of non-native invasive weeds throughout the Terrace Lands. Habitat enhancement and protection of vegetation in other natural areas of the Terrace Lands, outside of delineated wetlands, also could take place as opportunities arise. The proposed work, including excavation of planting holes, installation of new plantings, and removal of non-natives by cutting, pulling, plastic cover, and selective application of herbicides, would be carried out primarily by hand. Small motorized equipment, such as mowers, saws and sprayers, might be used selectively as needed. Materials could be transported to and from work sites using pickup trucks or other motorized vehicles, but this use would be confined to existing roads and paths, and would occur only when roads are dry.

The proposed SRP Phase 1A initiates implementation of the CLRDP RMP. The proposed implementation activities, their objectives, and their proposed locations are consistent with the activities envisioned under the RMP and analyzed in the CLRDP EIR.

### Environmental Impact Summary

Pursuant to State law and University procedures for implementation of the California Environmental Quality Act (CEQA), the environmental impacts of the RMP were analyzed in the certified Environmental Impact Report for the CLRDP. Addendum #2 to the CLRDP EIR further describes implementation of CLRDP Implementation Measure 3.2.10 and assesses whether the specific activities that would be implemented in the first phase of the RMP would result in new environmental impacts or increase the severity of environmental impacts identified in the CLRDP EIR and Addendum #1 thereto. Cumulative impacts and mitigation measures for all campus development proposed in the CLRDP, including the implementation of the RMP, are addressed in the CLRDP EIR and Addendum #1 thereto.

Based on the analysis of the significant environmental effects of the RMP as implemented through SRP Phase 1A, presented in the Draft CLRDP EIR (*Environmental Setting, Impacts, and Mitigation Measures*), CLRDP EIR Addendum #1, California Coastal Commission staff reports prepared for the December 2007 and April 2008 Coastal Commission hearings, and CLRDP EIR Addendum #2, the proposed SRP Phase 1A Project, which incorporates as part of the project mitigation measures identified in the CLRDP EIR, was determined not to result in any significant impacts as reflected in the attached Findings.

### Findings

The attached Findings discuss the project's environmental review process, the relation of the project to the UCSC Marine Science Campus CLRDP EIR, cumulative impacts and mitigation measures addressed in the environmental analysis, and conclusions regarding approval of this project in conformance with CEQA.

Approval of Specific Resource Plan, Phase 1A  
May 20, 2010

APPROVED



7/27/2010

Chancellor

Date

Attachment: 1, CEQA Findings for the Specific Resource Plan Phase 1A Project

Cc:  
Thomas Vani, Vice Chancellor, UCSC BAS  
John Barnes, Interim Campus Architect, UCSC PP&C  
Charlotte Strem, Interim Director UCOP, PDC

**A RESOLUTION OF THE UNIVERSITY OF CALIFORNIA, UNIVERSITYWIDE  
NATURAL RESERVE SYSTEM ADVISORY COMMITTEE ACCEPTING AND  
APPROVING THE INCORPORATION OF CERTAIN UC SANTA CRUZ CAMPUS  
LANDS INTO THE YOUNGER LAGOON RESERVE**

WHEREAS, the University of California (“UC”) Santa Cruz Campus (“UCSC”) Administration and the UC Santa Cruz Natural Reserve System (“UCSC NRS”) have proposed jointly to incorporate the campus-managed “Natural Areas” of the UCSC Marine Science Campus, as described in the UCSC Coastal Long Range Development Plan approved in December 2007 by the California Coastal Commission, into the Younger Lagoon Reserve, which is a unit of the UC Natural Reserve System; and

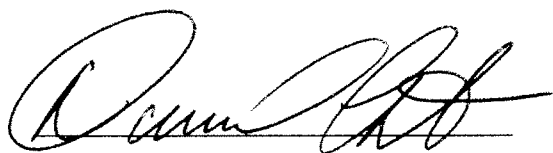
WHEREAS, the Universitywide NRS Advisory Committee (“Advisory Committee”) considered this proposal and expressed its support for the incorporation subject to the execution of a formal agreement between UCSC and UCSC NRS that addresses the points outlined in the summary section of the *“Evaluation of the Incorporation of Marine Science Campus Property in the UCSC Younger Lagoon Natural Reserve,”* which was presented by UCSC NRS Faculty Director Don Croll at the Advisory Committee’s May 24, 2007 meeting; and

WHEREAS, such an agreement has been executed between UCSC and the UCSC NRS, fulfilling the Committee’s condition, and is attached hereto.

NOW THEREFORE, BE IT RESOLVED, by the Advisory Committee, that this Committee accepts and approves the incorporation of the Natural Areas of the UCSC Marine Science Campus, as described in the UCSC Coastal Long Range Development Plan approved in December 2007 by the California Coastal Commission, into the Younger Lagoon Reserve.




IT IS FURTHER RESOLVED, and the Advisory Committee hereby directs UCSC to prepare and submit to the California Coastal Commission an amendment to the approved UCSC Coastal Long Range Development Plan to reflect the revised configuration of Younger Lagoon Reserve to include the incorporated Natural Areas, as required by Implementation Measure 3.14.1 of the approved Coastal Long Range Development Plan.

UNANIMOUSLY PASSED, APPROVED, AND ADOPTED by the Universitywide NRS Advisory Committee, this 2<sup>4th</sup> day of July, 2008.

A handwritten signature in black ink, appearing to read 'Daniel Costa', written over a horizontal line.

Daniel Costa  
Chairman  
Universitywide NRS Advisory Committee

**Legend**

-  Current Younger Lagoon Reserve
-  Natural Areas to be incorporated into Reserve
-  Mixed Use Areas



# AGREEMENT

July 15, 2008

Relating to the UCSC Marine Science Campus Natural Areas and the  
Younger Lagoon Reserve  
2008

## I. PURPOSE

The purpose of this agreement (Agreement) is to memorialize the commitments by and between the UCSC administration (Campus) and the UCSC Natural Reserves (UCSC NRS) to ensure that implementation of all provisions of the Marine Science Campus Coastal Long Range Development Plan (CLRDP) and the requirements of its CEQA documents that apply to the Natural Areas of the Marine Science Campus (as defined in the CLRDP) and the Younger Lagoon Reserve (YLR) (i) meets the requirements of approval imposed by the California Coastal Commission (Commission); and (ii) effectuates the protection, restoration and management of these affected lands in perpetuity. This Agreement, which specifies the obligations of each party regarding this subject matter, is intended to be binding by and between the parties.

## II. BACKGROUND

The CLRDP, approved in December 2007 by the Commission, requires, among other things, that the University designate portions of the Marine Science Campus terrace lands as permanently protected natural areas (Natural Areas). These Natural Areas are defined as all areas outside of those designated as Research and Education Mixed Use in the CLRDP (see attached CLRDP *Figure 5.2 Land Use Diagram*), which are to be protected, restored, enhanced, and maintained as high-quality open space and natural habitat areas. The CLRDP requires the University to incorporate the Natural Areas permanently into the University of California Natural Reserve System (UCNRS)\* as an integral part of its Younger Lagoon Reserve (YLR), and to protect, restore and manage these lands in accordance with the Resource Management Plan (RMP; see Appendix A to the CLRDP) and other CLRDP provisions. The CLRDP also imposes additional requirements on the management of YLR.

## III. TERM

This Agreement will be effective upon the adoption of a Resolution by the NRS Advisory Committee that approves the incorporation of the Natural Areas into the Natural Reserve System as an addition to YLR subject to the terms and conditions provided hereunder, and will continue in effect in perpetuity. A copy of the Resolution is attached hereto as *Attachment A* and incorporated herein.

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\* The mission of the Natural Reserve System is "to contribute to the understanding and wise management of the Earth and its natural systems by supporting university-level teaching, research, and public service at protected natural areas throughout California." The University is a trustee agency under the California Environmental Quality Act with respect to the University's Natural Reserve System.

#### IV. CLRDP REQUIREMENTS

The CLRDP<sup>†</sup> imposes the following requirements on the University with respect to the Natural Areas and YLR:

- A. Implement a comprehensive permanent restoration, protection and management plan for Natural Areas newly incorporated into YLR pursuant to the RMP and other CLRDP provisions.
- B. Develop and implement a long-term monitoring program for enhancement, restoration, protection and limited public access to YLR.
- C. Implement a docent-led public access program to Younger Lagoon Beach via a Controlled Access Trail.
- D. Implement a public access program to Younger Lagoon Reserve via a system of overlooks.
- E. Implement a public access program to the Natural Areas via a system of defined public trails and overlooks.
- F. Maintain the existing hydrologic regime and control runoff on site.
- G. Submit annual reports to the Commission Executive Director on projects and other activities that demonstrate the efficacy of the enhancement, restoration, monitoring, management, and public access programs required by the CLRDP.

#### V. COMMITMENTS

The Campus and the UCSC Natural Reserves Advisory Committee agree that incorporation of the Natural Areas into YLR will benefit the UCSC environmental teaching and research programs, YLR, the Marine Science Campus overall, and supports the UCNRS mission.

Typically, UCNRS reserves do not have the resources to undertake an extensive restoration and management project like that required by the CLRDP. YLR staff presently does not have the capacity to undertake a project of this magnitude without adequate support for staffing, projects, management and monitoring. The budget projections included in this MOU are the result of diligent planning between the office of Physical Planning and Construction, Institute for Marine Sciences, Natural Reserve, Environmental Studies, and Ecology and Evolutionary Biology staff and faculty as well as outside consultants. Although we are confident in our estimates, adjustments may need to occur if objectives are not being met. Given the scale of the restoration and management obligations, the Campus is committed to identifying and providing the support necessary for the UCSC Natural Reserves to be successful and for the Campus to fully comply with the CLRDP.

---

<sup>†</sup> This Agreement is bound by all of the terms in the CLRDP, including all amendments thereto, that relate to the Natural Areas and YLR.

The Universitywide NRS Advisory Committee supports the incorporation of the Natural Areas into the UCNRS as an addition to YLR conditioned upon the Campus' commitments described hereunder. Upon the endorsement of this Agreement by the Universitywide NRS Advisory Committee, the Natural Areas will be incorporated into the UCNRS as an addition to YLR, and the Campus and the UCSC NRS agree to comply fully with their respective commitments below.

A. By the Campus

- The Campus will provide adequate and permanent funding to the YLR program, as described in detail below, to support the Resource Management Plan and other obligations under the CLRDP. These funds will ensure the University's full compliance with the Commission's requirements in the CLRDP with regard to the Natural Areas and Younger Lagoon Reserve that are described in Paragraph IV of this document. A 20-year budget forecast for implementation, management, and maintenance of the Resource Management Plan and other YLR obligations under the CLRDP which may be amended from time to time, is appended as *Attachment B*. The estimated budget for the first 7 years is summarized below.

**Estimated Budget**

	First 7 Years							Subtotal		
	08-09	09-10	10-11	11-12	12-13	13-14	14-15			
<b>Ongoing Costs Funded Permanently*:</b>										
Reserve Manager (1.00 FTE)	\$78,000	Merits and salary increases handled through divisional process.								
Reserve Director (.10 FTE)	\$10,000									
	<b>\$88,000</b>									
*Funding includes salary, benefits, and \$3,500/FTE for supplies.										
<b>Estimated One-Time Costs:</b>										
Phase I RMP - restore 1/3	\$84,200	\$168,400	\$168,400	\$168,400	\$84,200	\$84,200	\$84,200	\$842,000		
Implementation Plan	\$15,000								\$15,000	
SAC Support	\$20,000	\$20,000	\$20,000	\$10,000	\$10,000	\$10,000	\$10,000	\$100,000		
Monitoring & Upkeep of Terrace Lands	\$12,000	\$12,000	\$12,000	\$12,000	\$12,000	\$12,000	\$12,000	\$84,000		
Monitoring of Beach Access	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$17,500		
Trail Improvements		\$15,000								\$15,000
	<b>\$133,700</b>	<b>\$217,900</b>	<b>\$202,900</b>	<b>\$192,900</b>	<b>\$108,700</b>	<b>\$108,700</b>	<b>\$108,700</b>	<b>\$1,073,500</b>		
<span style="margin-right: 150px;">4 year Average = \$186,850/yr</span> <span>3 Year Average = \$108,700/yr</span>										

- The campus will provide permanent funding of \$88,000 for salaries, benefits, and S&E to support 1.00 FTE Reserve Manager and .10 FTE Reserve Director, effective July 1, 2008. Consistent with campus practice, merit funding for eligible staff increases after July 1, 2008 will be part of the block allocation provided to the Physical and Biological Sciences Division, based on campus funding formulas. Funding for other salary adjustments are a divisional responsibility, subject to the appropriate staff compensation guidelines.
- The estimated one-time costs for the first seven years (2008-09 to 2014-15) total just over \$1M. The campus will provide one-time funding of \$1,073,500 over the 7 year period for the activities summarized above. The estimated average annual funding for the first four years (2008-09 to 2011-12) is \$186,850/year, and drops to \$108,700/year for three years beginning in 2012-13. The budget for resource management plan should be updated and reviewed after the first 4 years. It is the



campus's expectation that any unused funds available during the initial implementation period will carry forward to help offset costs in the out-years, when additional costs related to maintenance and Phases II and III will be incurred. The cost estimate for Phase II (2015-2022) is \$885,000 to \$1,506,000. The estimate for Phase III (2022-2029) is \$965,500 to \$1,586,500. The estimates for Phase II and III should be updated and submitted for campus review prior to the completion of Phase I.

4. After the 20-year implementation of the Resource Management Plan, funding for maintenance, and monitoring as required to comply with the CLRDP will continue to be provided, as outlined in lines 1.8, and 1.9 in *Attachment B*. It is the campus's intention that the permanent funding provided for the Reserve Manager salary and 10% of the NRS Administrative Director salary will remain available to support the on-going protection, enhancement, restoration and management obligations under the CLRDP.
5. The Campus will provide additional funding to the UCSC NRS budget as necessary in the event that compliance with the RMP and/or other YLR-related CLRDP provisions requires additional or unforeseen costs. Such additional funding will be based on a proposed project or plan prepared by YLR staff, and approved in advance by the Executive Vice Chancellor, that complies with the Commission's requirements and is also within the scope of the CLRDP as it may be amended from time to time. All reasonable cost-containment efforts should be exercised to keep such projects within budget and within the original scope. External funding should be sought when ever possible to support the maintenance of YLR and the Natural Areas.
6. The Director of Campus Planning will oversee all communication with the Commission and the Notice of Impending Development process. Following CLRDP certification by the Commission, YLR staff will coordinate all YLR projects outlined in the CLRDP, including those in the Natural Areas, with the UCSC planning office prior to initiation.
7. The Campus will consult UCSC Reserve staff to consider and address, to the extent feasible, the direct and indirect impacts of development activities to YLR from the development zones of the Marine Science Campus.

B. By the UCSC NRS

1. YLR staff will undertake the long-term management of the Natural Areas and YLR including, but not limited to, the restoration and on-going monitoring thereof, in accordance with the CLRDP and the mission and policies of the UCNRS.
2. YLR staff will work closely with the Scientific Advisory Committee and follow its guidance on the development and implementation of the RMP as required in the CLRDP, with specific guidance regarding prescriptions. RMP provisions may include the implementation of manipulative research and/or management practices.

3. YLR staff will oversee and implement the RMP and other CLRDP provisions relating to the Natural Areas and YLR, in coordination with Physical Planning and Construction, Physical Plant and other affected Campus units.
4. YLR staff will manage the public access and outreach components of the CLRDP within YLR and the Natural Areas in coordination with Physical Planning and Construction and other affected Campus units.
5. YLR staff and other Campus units will cooperate and coordinate the initial implementation and ongoing operation and maintenance of the following required infrastructure and services: vehicle circulation, provision of public access, underground utilities, lighting, storm water detention, screening, and other "development" located outside the areas designated for development but within the Natural Areas (see attached CLRDP *Figure 5.6 Coastal Access and Recreation Diagram*).
6. YLR staff will provide the campus with an annual report on the projects undertaken and the status of the implementation budget for the RMP and other CLRDP provisions relating to the Natural Areas and YLR to provide the Campus with forecasts of foreseeable costs.

VI. AMENDMENT

This Agreement may not be changed or modified except in writing, signed by the parties hereto, and endorsed by the Universitywide NRS Advisory Committee.

UCSC ADMINISTRATION

By: David Kye Date: 7/15/08

Its: Campus Provost and Executive Vice Chancellor






UCSC NATURAL RESERVES

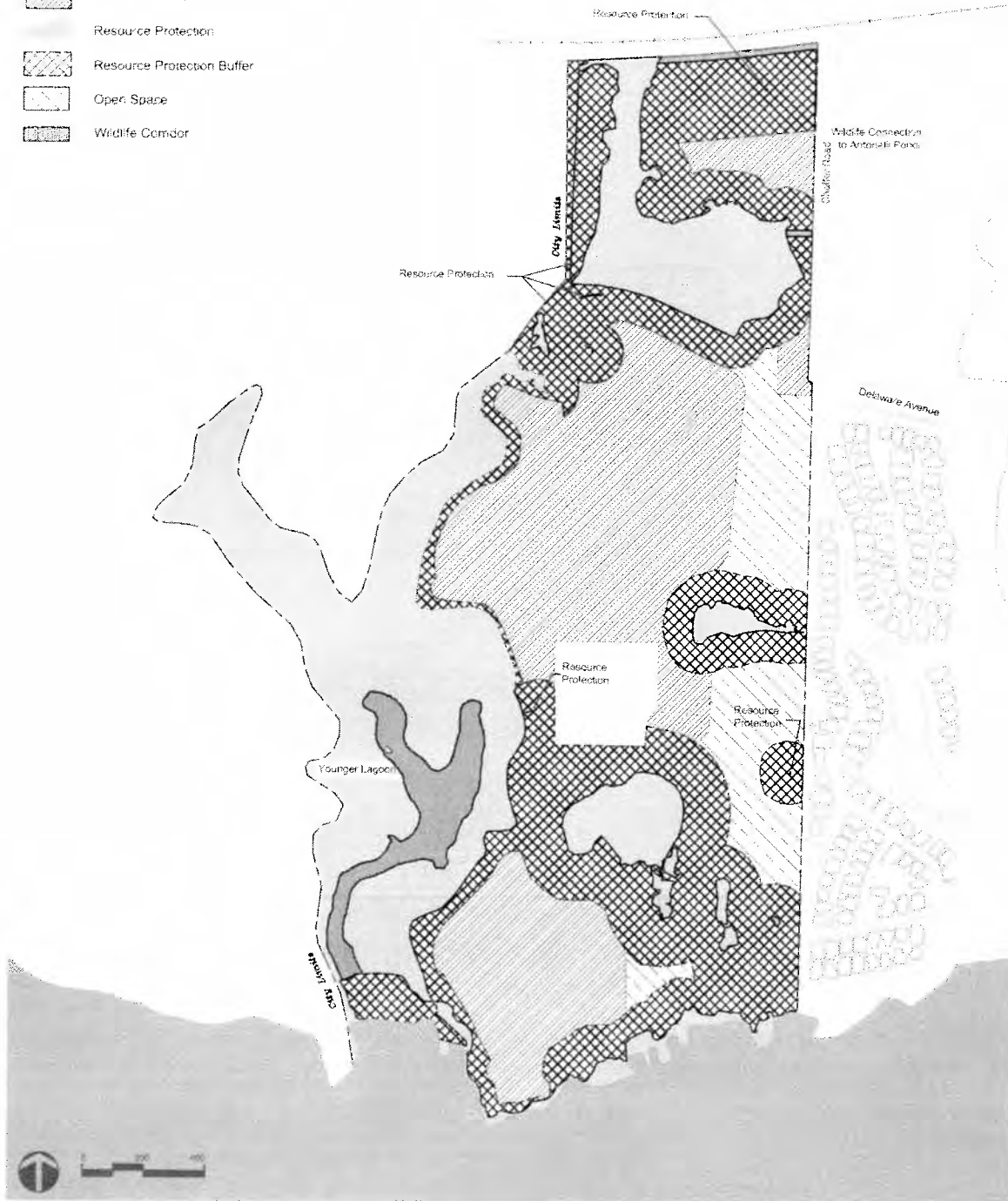
By: Jay Duff Date: 7/15/2008

Its: Administrative Director, UCSC Natural Reserves

Fig. 5.2 Land Use Diagram

Legend

-  Research and Education Mixed Use
-  Resource Protection
-  Resource Protection Buffer
-  Open Space
-  Wildlife Corridor

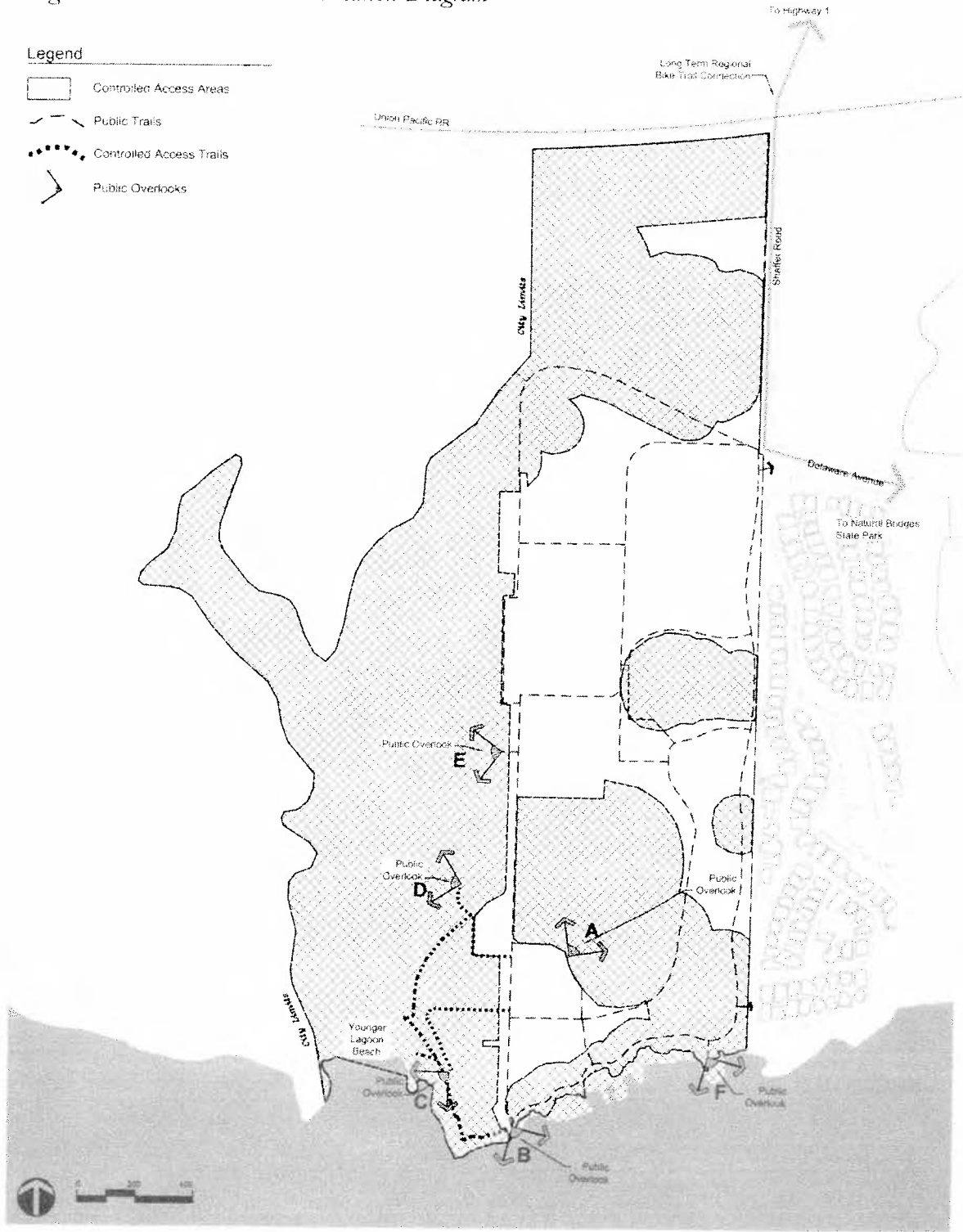


**Attachment A: UC Natural Reserve System Advisory Committee Resolution**

*(to be provided)*



Fig. 5.6 Coastal Access and Recreation Diagram



July 10, 2008

Dean Thorsett  
Physical and Biological Sciences

Dear Steve:

Re: UCSC Marine Science Campus Natural Areas and the Younger Lagoon Reserve

I write to confirm the funding details for the Resource Management Plan at Younger Lagoon and the Natural Areas at the Marine Science Campus to ensure compliance with the terms imposed by the California Coastal Commission as part of its approval of the Coastal Long Range Development Plan (CLRDP). The terms of this agreement are pending final action by the system wide Natural Reserve System (NRS) accepting Younger Lagoon as part of the system wide reserve.

This is an exciting opportunity for the campus. It has been years in the making and represents the hard work of many individuals. It provides many benefits, including:

- The ability of the University to develop the Marine Sciences Campus
- Expanded undergraduate research opportunities associated with the restoration of the designated areas

The attached agreement outlines the details of how funding will be provided for the first seven years. This first phase is broken into two segments to allow time to assess progress and funding needs. After a few years' experience with the Resource Management Plan, subsequent agreements will be developed for the out years of the implementation period. By allocating oversight responsibility and resources to the division, we hope to leverage the existing administrative infrastructure in Physical & Biological Sciences to provide budget oversight and project management that ensures the campus fulfills the terms of the agreement without expanding the scope.

It is my understanding that your staff will be working with the Planning and Budget Office to develop an annual report that tracks expenditures. While I am committing \$88,000 in permanent funding for 1.10 staff FTE at the reserve, and one-time funding totaling \$1,073,600 over the first 7 year period to implement the first phase of the Resource Management Plan, this is not intended to be automatic. I greatly appreciate that the division will take appropriate actions to ensure there are incentives to keep costs in check and not approve increases in scope that have not been specifically vetted and approved. We should keep the door open for potential grants and fundraising opportunities that could, in the future, help defray some of the costs. An endowment to support the ongoing maintenance of the Lagoon and Natural Areas would be of great benefit to the Reserve.

Please keep me apprised of progress on the formation of the Scientific Advisory Committee (SAC). To the extent that UCSC faculty are involved, this should be considered as part of their service to the University and I would not, except under extraordinary circumstances, expect to provide compensation. The estimated budget for SAC that was included in the Resource Implementation

Plan is intended to offset any costs for external or non-UCSC advisors.

In addition to the budget developed for the Resource Management Plan at the Marine Science Campus, which is specifically addressed in this letter and the attached agreement, the CLRDP Implementation identifies a number of other projects, including public access improvements, parking, road and circulation improvements, and infrastructure. The funding expectations for those projects will be addressed separately.

I appreciate the work of your staff in support of the CLRDP and the Resource Management Plan in the Natural Areas and Younger Lagoon Reserve. Once we have final agreement with the NRS, Assistant Director Free Moini in the Planning and Budget Office will coordinate the transfer of funding identified in this letter.

Sincerely,



David S. Kliger  
Campus Provost and  
Executive Vice Chancellor

Enclosure

cc: Director Barnes  
Associate Professor Croll  
Director Dayton  
Assistant Vice Chancellor Eckert  
Director Griggs  
Assistant Dean Kenyon  
Vice Chancellor Michaels  
Assistant Director Moini



**University of California Santa Cruz**  
**Marine Science Campus**  
**Specific Resource Plan Phase 1A**  
**Addendum #2 to the Coastal Long Range Development Plan**  
**Environmental Impact Report**

Prepared By:

Office of Physical Planning & Construction  
University of California Santa Cruz  
1156 High Street, Barn G  
Santa Cruz, CA 95064

July 2010

Contact: Sally Morgan, Senior Environmental Planner  
(831) 459-2170

**Addendum #2 and Supporting Environmental Assessment to the Coastal Long-Range  
Development Plan EIR**

**Specific Resource Plan, Phase 1A (Vegetation Management for Habitat Enhancement and  
Restoration), Younger Lagoon Reserve Terrace Lands**

**I. PROJECT INFORMATION**

1. Project title:

Specific Resource Plan, Phase 1A (Vegetation Management for Habitat Enhancement and Restoration), Younger Lagoon Reserve Terrace Lands, UCSC Marine Science Campus

2. Lead agency name and address:

The Regents of the University of California  
1111 Franklin Street  
Oakland, CA

3. Contact person and phone number:

Sally Morgan, 831-459-1254  
University of California Santa Cruz  
1156 High Street  
Santa Cruz, CA 95064

4. Project location:

UC Santa Cruz Marine Science Campus, Santa Cruz, California

5. Project sponsor's name and address:

(See #3)

6. Custodian of the administrative record for this project (if different from response to item 3 above.):

UC Santa Cruz Physical Planning and Construction

7. Identification of previous EIRs relied upon for tiering purposes (including all applicable LRDP and project EIRs) and address where a copy is available for inspection.)

1) UCSC Marine Science Campus CLRDP EIR, September 2004, SCH #2001112014.

2) Addendum # 1 to the CLRDP EIR, November 2006.

Both documents are available at the office of UC Santa Cruz Physical Planning and Construction, Barn G, UC Santa Cruz main campus, 1156 High Street, Santa Cruz, CA 95064

**II. PURPOSE OF THIS ADDENDUM**

The 2004 Coastal Long Range Development Plan (CLRDP) for the University of California, Santa Cruz's (UCSC's) Marine Sciences Campus includes a Resource Management Plan (RMP) that sets goals and objectives for habitat restoration and enhancement in the areas of the Marine Science Campus that are protected from development. The RMP—which was approved previously as part of the CLRDP by both the UC Regents and by the California Coastal Commissions—prescribes

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the types and locations of habitat restoration and enhancement activities that will be carried out on these lands. The RMP also calls for preparation of a series of Specific Resource Plans, to further describe the timing and conduct of specific activities through which RMP goals and objectives will be met, in successive phases, during the term of the CLRDP. The RMP was described and analyzed in the 2004 CLRDP EIR, a 2006 Addendum #1 to that EIR, and in the Coastal Commission's November 2007 and March 2008 staff reports and findings (hereinafter, referred to collectively, as "the CLRDP EIR").

The SRP, Phase 1, dated June 1, 2010, defines the implementation activities through which the previously-approved RMP will be carried out, for initial restoration and enhancement of habitats over about one-third of campus natural areas (i.e. areas outside of defined development zones on the Marine Science Campus) during the first seven years of the CLRDP program. SRP Phase 1 expands upon the adopted Resource Management Plan previously analyzed in the CLRDP, in that it defines the locations at which restoration and habitat enhancement work would be carried out and the specific methods that would be used to remove weeds and establish new plantings. However, SRP Phase 1 does not include any elements that were not contemplated in the RMP as previously analyzed.

Phase 1 is divided into two sub-phases for purposes of environmental analysis. Phase 1A would consist of removal of invasive non-native plants and hand planting to improve the habitat mosaic over an area of about 16 acres of the campus natural areas. Phase 1B would propose minor hydrologic modifications to improve wetland functioning and enhance plant and wildlife habitat in wetlands W1 and W2. Phase 1A is proposed for immediate implementation. Phase 1B wetland work would be subject to Clean Water Act and other permitting, and related agency consultation regarding potential effects to California red-legged frogs. The extent of Phase 1B wetland work and exactly how it would be carried out cannot be determined prior to this consultation. For this reason, SRP Phase 1B will be considered in a separate CEQA document, which will be prepared during the course of and with input from agency consultation.

This Addendum #2 to the CLRDP FEIR describes and analyzes the potential environmental effects of the specific activities that would implement Phase 1A of the SRP, involving habitat restoration under and consistent with the RMP. Analysis provided in this addendum augments the analysis of the RMP that was included in the CLRDP EIR, CLRDP EIR Addendum #1, and the November 2007 and March 2008 Coastal Commission staff reports and findings made as part of the Commission's CEQA certified regulatory program, all of which were previously approved and accepted by The Regents or, through delegated authority, by the Executive Vice President of the Board of Regents.

This addendum was prepared in accordance with CEQA to inform the University's consideration and action on Phase 1A of the proposed Specific Resource Plan. The purpose of this addendum is to provide additional detail on RMP implementation, and to evaluate whether the presence of changed circumstances or new information since The Board of Regents of the University of California (The Regents) adopted the 2004 CLRDP and certified the 2004 CLRDP FEIR in September 2004, triggers the need for the preparation of a subsequent EIR as described under "Project Approvals and Permits", below.

CLRDP RMP Implementation Measure 3.2.10 specifies that the University must file a Notice of Impending Development (NOID) with the California Coastal Commission for SRP Phase 1 habitat restoration and enhancement work within one year of CLRDP certification, which occurred in

January 2009. This addendum provides CEQA compliance for Phase 1A of the SRP and the anticipated filing of the required NOID. It is anticipated that a separate NOID will be filed for Phase 1B when project plans for this phase of work are finalized through regulatory agency consultation and following the preparation of additional CEQA documentation.

### **III. PROJECT LOCATION AND DESCRIPTION**

#### **Project Location**

The location of the proposed SRP Phase 1A project is UCSC's Marine Science Campus, specifically, 16 acres of the Terrace Lands within the Younger Lagoon Reserve (Figure 1, below). The relationship between the campus development areas, the Younger Lagoon Reserve and the Terrace Lands is detailed below.

#### **Background: Relationship between the CLRDP RMP and SRP Phase 1**

The proposed project is the implementation of Phase 1A of a Specific Resource Plan (SRP) for the restoration of natural habitat within Younger Lagoon Reserve (YLR) on the UCSC Marine Sciences Campus (MSC). YLR was established in 1987, as one of the 36 reserves that make up the University of California Natural Reserve System of protected natural lands available for university-level instruction, research, and public outreach. The proposed restoration is the first phase of implementation of a Resource Management Plan, one element of UCSC's Coastal Long Range Development Plan (CLRDP) for the MSC. Under the CLRDP, all "natural areas" outside of the Campus Development Zone on the MSC are to be incorporated into YLR, restored, and preserved in perpetuity. The approximately 47 acres of natural areas outside of the development zone on the Marine Science Campus were incorporated into YLR in July 2008, bringing the size of the reserve to approximately 72 acres. These natural areas added to YLR are collectively referred to as the Terrace Lands. The CLRDP Resource Management Plan (RMP) outlines parameters for the restoration, enhancement, and management of biological and open space resources on the Terrace Lands. Conceptually, the RMP provides the initial framework for planned habitat improvements. The RMP will be implemented through development and execution of a series of Specific Resource Plans, developed under the guidance of a Scientific Advisory Committee (SAC). The RMP organizes restoration and enhancement efforts into two seven-year phases and one six-year phase. Each phase encompasses restoration and enhancement of the natural habitat on approximately one-third of campus natural areas on the Terrace Lands. The SRPs through which habitat restoration and enhancement are to be carried out are to be designed to meet the goals and performance standards set forth in the RMP; however, each SRPs may adapt these goals and performance standards to address the physical and ecological conditions existing at the time the program is implemented, and as appropriate to the then-current understandings of biological and ecological processes, and approaches to habitat re-vegetation, restoration, and enhancement. With approximately 47 acres outside of the development zone to be restored over the next 20 years, approximately 16 acres—or about one-third of the area overall—will be restored during each of the three SRP phases. SRP Phase 1 (June 1, 2010) addresses the first seven-year phase of RMP implementation. In the concluding year of the first 7-year phase of restoration, a second SRP will



**Figure 1.** Campus Development Zones and YLR Terrace Lands.

be written to direct Phase 2 of the restoration effort (years 7-14) and, during year 14, the final SRP will be written for restoration Phase 3 (years 14-21).

The project description below outlines all the envisioned elements of SRP Phase 1, and provides detailed description of SRP Phase 1A, which is the subject of this addendum. SRP Phase 1A activities would be carried out independent of the approval of SRP Phase 1B. SRP Phase 1B, which proposes hydrologic modifications to wetlands W1 and W2, will be further defined through agency consultations and will be subject of further CEQA analysis and subsequent approval, when the potential impacts of wetlands alterations can be analyzed at an appropriate level of specificity. This Addendum #2 addresses the potential environmental effects of vegetation management for habitat restoration and enhancement under both phases of the SRP. Phase 1A is analyzed in detail herein; Phase 1B is analyzed to the extent known at this time.

### **Project Objectives**

The goal of restoration efforts on the Terrace Lands is to create and enhance a mosaic of coastal habitats. Such a mosaic provides substantial ecosystem services, including the preservation of biodiversity, provision of habitat for special status species, and buffering of stormwater runoff. These habitats include coastal bluff, coastal prairie, seasonal wetlands, forested wetlands and grasslands. Additionally, because the project site is a UC Natural Reserve, restoration efforts focused on native flora and fauna will provide research opportunities to guide future restoration in similar habitats and offer unique opportunities for researchers, students, and the public to participate in and observe restoration, and to use the reserve as an outdoor classroom and living laboratory. The overarching objective of the proposed SRP Phase 1 is to meet the CLRDP RMP habitat restoration and enhancement success criteria for one-third of the Terrace Lands. The SRP also includes the following specific objectives:

- 1) In coyote brush scrub-grassland areas, increase native plant species richness and percent cover and decrease non-native plant cover.
- 2) In non-native grassland areas, increase native grass species and decrease non-native plant cover.
- 3) In coastal bluff habitat, increase native plant species richness and percent cover and decrease non-native plant cover.
- 4) Within the central areas of wetlands W4 and W5 (delineated in the CLRDP RMP), increase native plant species richness and percent cover and decrease non-native plant cover.
- 5) In wetland buffers, increase native plant species richness and percent cover and decrease non-native plant cover.
- 6) Manage the hydrology of wetlands W1 and W2 to increase the cover of native wetland plant species, potentially enhance breeding habitat for amphibians, maintain raptor foraging habitat, improve the quality of water flowing to YLR, and create a continuous north-south area for wildlife movement to YLR.
- 7) Control priority-one weeds (non-native invasives) throughout the Terrace Lands.

Phase 1A of the SRP focuses on those goals related to removal of non-native plants and plantings to improve native habitats, but would not include topographic or hydrological modifications to improve wetland functioning. These aspects of the Phase 1 plan would be addressed by implementation of Phase 1B, which would be subject to subsequent approvals.

### **Project Description**

SRP Phase 1A would focus on enhancement of six habitat areas within the Terrace Lands: coyote-brush scrub-grassland, grassland, and coastal bluff scrub expansion (Figure 2). Phase 1A also would include hand planting in central wetland habitat in wetlands W4 and W5 (Figure 3), consistent and implementing the goals set forth in the previously-approved RMP. Phase 1A also addresses control and removal of Priority 1 weeds throughout the Terrace Lands. About 16 acres of the Terrace Lands would be subject to restoration during Phase 1; enhancement and protection of vegetation in other natural areas of the Terrace Lands will also take place as opportunities arise. The following sections describe the proposed activities within each area that would take place during SRP Phase 1A and the envisioned SRP Phase 1B.

### **SRP Phase 1A**

#### *Coyote Brush Scrub-Grassland Areas*

During Phase 1A coyote brush scrub-grassland will be protected and enhanced, over the approximately 11 acres where coyote brush is already patchily distributed (Figure 2). Vegetation in these areas currently is dominated by non-native grasses and coyote brush. The enhancement efforts will focus on filling in grassy interstitial spaces between existing coyote brush plants and patches in the middle and lower terrace with coyote brush and other shrub species. Native grasses will also be planted to create patches of native grassland within the Coyote Brush Scrub-Grassland areas. The SRP does not propose any changes in the topography and/or hydrology of these areas.

#### *Grasslands*

Phase 1A would include restoration of native grassland throughout the Terrace Lands, but would focus primarily on restoration of native grasslands in wetland buffer areas. Native grasses would be planted in relatively dense patches throughout approximately 2 acres of wetland buffers around wetlands W4 and W5. The intent is to increase coverage of native grass species and decrease non-native plant cover. It is anticipated that native shrubs also will scatter throughout these areas through natural recruitment. SRP Phase 1 does not propose any changes in topography and/or hydrology in these areas.

#### *Coastal Bluff Expansion*

Vegetation within the coastal bluff area currently is dominated by ice plant and non-native grasses. The coastal bluff scrub area currently covers approximately 1.5 acre. SRP Phase 1A restoration within coastal bluff habitat would focus on increasing native plant species richness and percent cover and decreasing non-native plant cover within the coastal bluff scrub, and increasing the width of this area, from bluff edge, to 100 feet. SRP Phase 1A would not alter topography and/or hydrology in these areas. It is anticipated that improvements to an existing overlook on the coastal bluff--a separate project that would implement a CLRDP requirement—would be constructed early in SRP Phase 1.

#### *Wetland Willow*

The proposed wetland willow restoration area is an approximately 1-acre area at the top of the eastern arm of Younger Lagoon (Figures 2 and 3) that encompasses Wetland W6 and its buffer. This area is currently dominated by non-native grasses and willow. Under the proposed SRP Phase 1A, native willow, grasses, and shrubs would be hand planted in these areas, above the ordinary

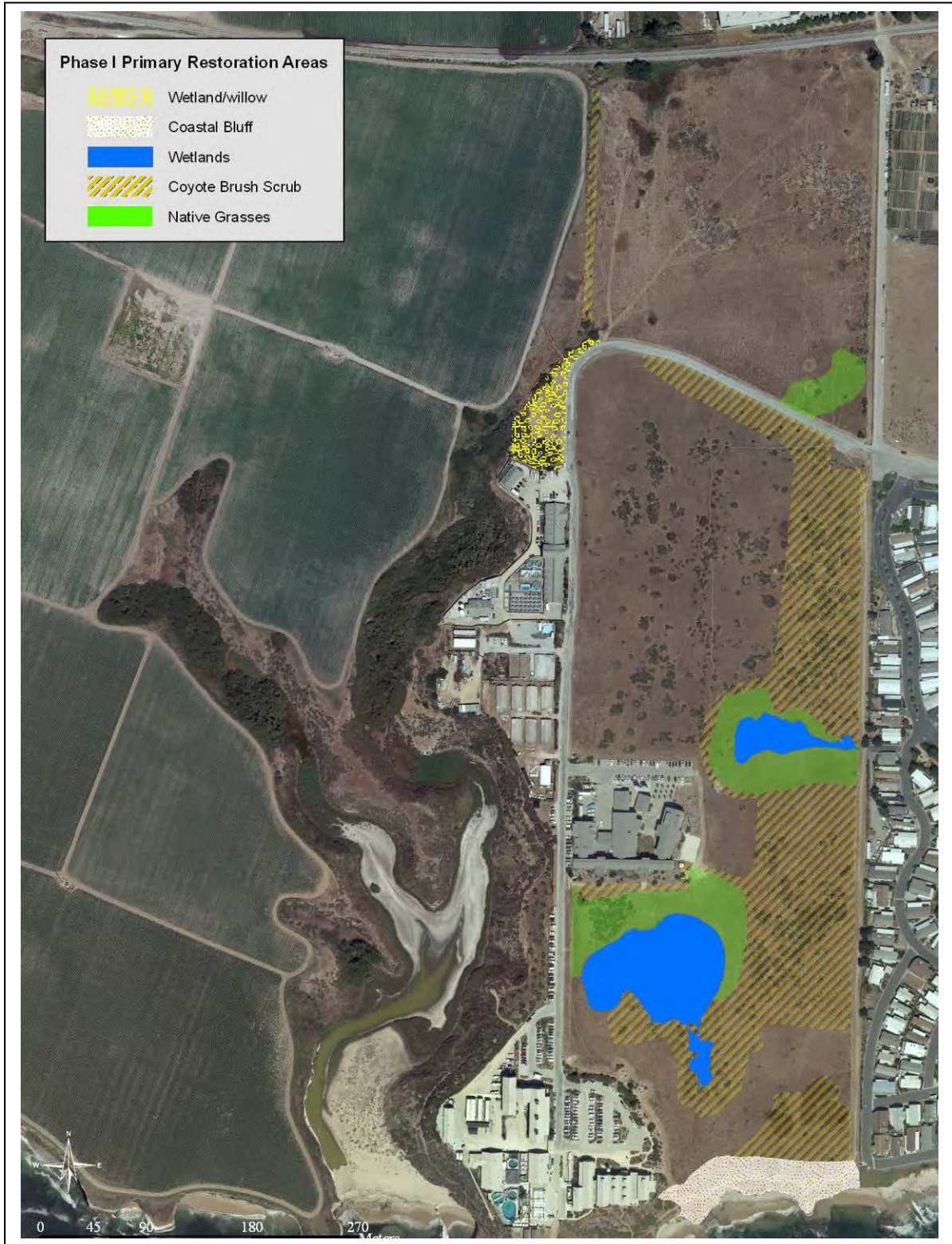


Figure 2. Phase 1A Primary Restoration Areas





**Figure 3. Younger Lagoon Reserve Wetlands and Wetland Buffers**

high water mark of the drainage channel (which has been determined to be Waters of the United States).

### *Wetland Buffers*

Wetland buffers (Figure 3) represent prescribed distances from wetland edges (100 ft for all wetlands with the exception of W5, which has a 150 ft buffer), within which development activity would not occur. During SRP Phase 1A, primary restoration efforts in wetland buffers would focus on approximately 1 acre of buffer area- in buffers W4 and W5; however, other buffer areas also would be planted. The wetland buffer areas are currently vegetated primarily in non-native grasses, coyote brush, Douglas' baccharis, and willow. Soil conditions within and among wetland buffer areas differ greatly and thus significantly influence the potential plant species mix, which would vary from wetland to wetland. Restoration efforts in wetland buffers would focus on increasing native plant species richness and percent cover and decreasing non-native plant cover, adhering to interim and long-term goals of the RMP for restoration of ruderal, coyote brush scrub-grassland, and native grassland. In order to achieve the goal of "insulating" wetland habitat from physical and visual noise and intrusion by people, shrubs would be planted near the outer edge of the wetland buffer areas. No changes in topography and/or hydrology in the wetland buffers are proposed.

### *"Living Fence" Buffer along Younger Ranch Boundary*

Presently, the agricultural land to the west of Wetland W1 is not being farmed and thus serves to augment the defined buffer for Wetland W1. It is possible that the unfarmed lands on the adjacent parcel may be put back into production in the future, which effectively would diminish the extent of the undeveloped buffer to the west of W1. SRP Phase 1A would include replanting of the narrow area between the western margin of W1 and the eastern margin of the adjacent Younger Ranch with native shrubs. This would provide a "living fence" between the wetland area and the agricultural land to the west, which would maintain an effective buffer for this wetland even in the event of agricultural development to the west. This SRP Phase 1 element is in addition to the low fence that would be constructed on the property line in conjunction with the first development project under the CLRDP, to implement CLRDP General Mitigation Measure 4.2-1.

### *Priority One Weed Removal*

During SRP Phase 1A, all Priority 1 weeds (Table 1) would be controlled as they are detected, throughout the Terrace Lands. The proposed SRP Phase 1 assigns Priority 1 weed status to exotic (non-native) plants that are large in stature, slow-spreading, and capable of invading and out-competing native plants in established plant communities. On the MSC these include Jubata grass, Monterey cypress, cape ivy, panic veldgrass, fennel, French broom, Harding grass, Monterey pine, and Himalayan blackberry. Discrete patches and scattered individuals of Priority 1 weeds are located throughout YLR Terrace Lands and MSC. Medium- and low-priority weeds will not be controlled until active restoration projects are taking place at a specific site.

Removal techniques for Priority 1 weeds may include hand pulling/ mechanical control, winching, clipping / weed whacking, flaming, solarization by laying down black agricultural plastic, burning, grazing, and herbicide application. Mature Monterey cypress and Monterey pine would be controlled by cutting the above-ground material from the root. Seedlings would be controlled by hand pulling and/or digging. When hand removal is employed, soil may be raked after removal of above-ground material to expose and remove any remaining roots or stolons. All herbicide application would follow California Department of Pesticide Regulation (CaDPR) regulations and

would be done by a CaDPR qualified applicator. Herbicides would be chosen based on the target weed and surrounding habitat (e.g. species-specific targeted applications). Only registered aquatic herbicides would be used in wetland areas. All applications would be done by hand. Due to their potential to re-invade, all Priority 1 weeds with viable propagules would either be solarized and composted on site or bagged after removal and disposed of offsite. Some Priority 1 weed control activities would be ongoing throughout the year. Other activities would be restricted to the winter and spring months. Exact timing would be dependent on soil moisture conditions and seed-set.

**Table 1. Known Non-Native Weeds on YLR Terrace Lands and Adjacent Lands**

<i>Common Name</i>	<i>Scientific Name</i>	<i>Priority Rating* for Removal</i>
Blackwood acacia	<i>Acacia melanoxylon</i>	W
Everblooming acacia	<i>Acacia retinodes</i>	W
Crofton weed	<i>Ageratina adenophora</i>	W
European beachgrass	<i>Ammophila arenaria</i>	W
Giant reed	<i>Arundo donax</i>	W
Mediterranean Linseed	<i>Bellardia trixago</i>	W
Portuguese Broom	<i>Cytisus multiflorus</i>	W
Scotch broom	<i>Cytisus scoparius</i>	W
Purple awned wallaby grass	<i>Danthonia pilosa</i>	W
Pepperweed	<i>Lepidium latifolium</i>	W
Yellow parentucellia	<i>Parentucellia viscosa</i>	W
Fountain grass	<i>Pennisetum setaceum</i>	W
Spanish broom	<i>Spartium junceum</i>	W
Ice plant	<i>Carpobrotus edulis</i>	1
Jubata grass	<i>Cortaderia jubata</i>	1
Monterey cypress	<i>Cupressus macrocarpa</i>	1
Cape ivy	<i>Delairea odorata</i>	1
Panic veldgrass	<i>Ehrharta erecta</i>	1
Fennel	<i>Foeniculum vulgare</i>	1
French broom	<i>Genista monspessulana</i>	1
Harding grass	<i>Phalaris aquatica</i>	1
Monterey pine	<i>Pinus radiata</i>	1
Himalayan blackberry	<i>Rubus discolor</i>	1
Wild oat	<i>Avena barbata</i>	2
Oat	<i>Avena fatua</i>	2
Common mustard	<i>Brassica rapa</i>	2
Rescue grass	<i>Bromus catharticus</i>	2

**Table 1. Known Non-Native Weeds on YLR Terrace Lands and Adjacent Lands**

<i>Common Name</i>	<i>Scientific Name</i>	<i>Priority Rating* for Removal</i>
Ripgut brome	<i>Bromus diandrus</i>	2
Soft chess	<i>Bromus hordeaceus</i>	2
Italian thistle	<i>Carduus pycnocephalus</i>	2
Bull thistle	<i>Cirsium vulgare</i>	2
Bermuda grass	<i>Cynodon dactylon</i>	2
Poison hemlock	<i>Conium maculatum</i>	2
Black mustard	<i>Hirschfeldia incana</i>	2
Velvet grass	<i>Holcus lanatus</i>	2
Farmer's foxtail	<i>Hordeum murinum</i> ssp. <i>leporinum</i>	2
Prickly lettuce	<i>Lactuca serriola</i>	2
Wild lettuce	<i>Lactuca virosa</i>	2
Italian ryegrass	<i>Lolium multiflorum</i>	2
Perennial ryegrass	<i>Lolium perenne</i>	2
Mallow	<i>Malva parviflora</i>	2
Sourgrass	<i>Oxalis pes-caprae</i>	2
Bristly ox-tongue	<i>Picris echioides</i>	2
Rabbitsfoot grass	<i>Polypogon monspeliensis</i>	2
Wild radish	<i>Raphanus sativus</i>	2
Curly dock	<i>Rumex crispus</i>	2
Prickly sow thistle	<i>Sonchus asper</i>	2
Sow thistle	<i>Sonchus oleraceus</i>	2
Scarlet pimpernel	<i>Anagallis arvensis</i>	3
Pineapple weed	<i>Chamomilla suaveolens</i>	3
Lambs quarters	<i>Chenopodium album</i>	3
Nettle-leaved goosefoot	<i>Chenopodium murale</i>	3
Brass buttons	<i>Cotula coronopifolia</i>	3
Filaree	<i>Erodium moschatum</i>	3
Cut-leaved geranium	<i>Geranium dissectum</i>	3
Rough cat's ear	<i>Hypochaeris radicata</i>	3
Loosestrife	<i>Lythrum hyssopifolium</i>	3
Bur clover	<i>Medicago polymorpha</i>	3
Cut-leaved plantain	<i>Plantago coronopus</i>	3
English plantain	<i>Plantago lanceolata</i>	3

**Table 1. Known Non-Native Weeds on YLR Terrace Lands and Adjacent Lands**

<i>Common Name</i>	<i>Scientific Name</i>	<i>Priority Rating* for Removal</i>
Annual bluegrass	<i>Poa annua</i>	3
Common knotweed	<i>Polygonum arenastrum</i>	3
Sheep sorrel	<i>Rumex acetosella</i>	3
Common groundsel	<i>Senecio vulgaris</i>	3
Chickweed	<i>Stellaria media</i>	3
Rattail fescue	<i>Vulpia myuros</i>	3

Notes: \*Priority rating:

- W. Watch List. These weeds are currently undetected at YLR Terrace Lands but are known to exist on nearby lands. Reserve staff will actively patrol for these weeds and eliminate them as soon as they are detected as part of YLR's Early Detection Rapid Response (EDRR) program (outlined in SRP 3).
1. High priority. These weeds are capable of invading and out-competing native plants in established plant communities. They are typically large stature, slow spreading perennial or biennials. Effective removal techniques for these weeds are generally well documented, and reserve staff will actively work to eliminate these weeds from YLR Terrace Lands. Once eliminated, on-going monitoring for reemergence of these weeds will take place in conjunction with patrols for Watch List weeds.
  2. Medium priority. These weeds are mostly biennial or annual and are ubiquitous on YLR Terrace Lands. They are typically smaller in stature than Priority 1 weeds and more difficult to control. Weed control efforts for Priority 2 weeds will take place in conjunction with active restoration projects (e.g. planting), but P2 weeds are not expected to be eliminated from YLR Terrace Lands.
  3. Low priority. These weeds are mostly annuals and are ubiquitous on YLR Terrace Lands. They are typically smaller in stature than Priority 1 weeds and more difficult to control. While many can effectively compete with native plants once they are established, they typically do not aggressively push out native plants. Most are commonly associated with native and non-native grasses and forbs in grasslands. Incidental weed control efforts for Priority 3 weeds may take place in conjunction with active restoration projects (e.g. planting), but P3 weeds are not expected to be eliminated from YLR Terrace Lands.

Source: Modified from John Gilcrest and Associates and Environmental Hydrology 1998.

### *Planting*

Native plantings would be used throughout the SRP Phase 1 area, during Phase 1A, to replace non-natives that are removed, improve plant cover as appropriate, and enhance native habitats. The proposed planting palette is made up exclusively of native taxa that are appropriate to the habitat and region. Seed and/or vegetative propagules would be obtained from local natural habitats so as to protect the genetic makeup of natural populations. Horticultural varieties would not be used.

Planting density would be approximately 12 to 36 inches (30 to 90 cm) on center, depending on species. Smaller stature plants would be grouped and spaced closer together, while larger stature plants would be spaced further apart. In general, plants would be placed in non-linear arrangements to mimic plant distribution patterns observed in nature. All planting would be done by hand and ground disturbance would be limited to individual holes for the plants. Supplies would be brought to each area using a pickup truck or gas powered mule. Motor vehicle use would be limited primarily on the existing perimeter trail and to days when the soil is dry. Planting would begin after the first winter rains.

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Seeds would be collected from local sources and grown by UCSC staff and students at the UCSC Arboretum, UCSC Teaching Greenhouses, and YLR, or by local restoration contractors.

#### *Erosion control*

The proposed removal of ice plant, a Priority 1 plant, along the bluff edge would expose bare soil areas temporarily, while new plantings are established. Biodegradable silt fencing would be installed along the bluff edge after ice plant removal, and the new plants would be mulched to control erosion while vegetation is re-established. Because the Terrace Lands are essentially flat and the restoration efforts would entail minimal ground disturbance, erosion is not likely to be a concern elsewhere in the area. However, Reserve staff would visually inspect all areas for bare ground following planting or weeding efforts and after storm events, and would install erosion control materials such as wood-chip mulch, jute netting, or other similar materials, as needed to prevent erosion.

#### *Irrigation*

Ideally, plant installation would commence after the first winter rain and end well before the rains stop, ensuring that plants are naturally watered in and established before the summer dry period. However, if observations indicate that supplemental irrigation is needed, plants would be watered using one or all of the following methods: application using a water truck, drip hose, and/or overhead sprinkling. Water would be obtained from existing MSC infrastructure. Supplemental irrigation is likely to be needed only in the summer and fall months in the first year after planting. Because the soil generally is dry during those months, the potential for disturbance, damage, and erosion as the result of water vehicle traffic is low. If vehicle (water truck) application is used, vehicles would be restricted to the perimeter of the terrace, along the paved road and a fire break maintained by the campus. If needed, temporary drip hoses and sprinklers would be installed above ground by hand and run off of existing water lines. All irrigation materials would be removed as soon as the vegetation is established.

#### *Interpretive and Protective Signage*

Signage would be placed throughout the Terrace Lands during Phase 1, to interpret restoration projects and research to the public. Signs or minimal low fencing also could be installed along active restoration areas adjacent to public trails to protect new plantings. All signage and fencing would be designed to comply with CLRDP design standards (CLRDP, Chapter 6) to avoid visual impacts while also providing the maximal public access consistent with restoration.

#### *Research Activities*

SRP Phase 1 also may include manipulative experiments focused on evaluating various restoration strategies and techniques (as described in SRP Phase 1, p 8). The objective of these experiments will be to identify the most effective strategies for habitat restoration that meets the goals of the RMP.

#### *Remediation (Plant Maintenance and Replacement)*

It is anticipated that initial plant mortality would likely be in the 10% to 40% range due to wildlife browsing, desiccation, and/or accidental trampling (by volunteers during planting and monitoring). Plants would be installed at relatively high densities to provide an allowance for plant mortality. If mortality is lower than anticipated, plants would be thinned as necessary to ensure successful growth and reproduction and future planting densities would be adjusted. If a particular planting

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effort fails, plants would be replanted that season, or the following year if failure occurs after the planting season.

### *Monitoring Program*

The proposed SRP Phase 1 includes a monitoring program to evaluate whether success criteria for native plant cover and richness are being met. Hydrological monitoring would include monitoring of water levels in each major wetland, mapping the area with water at the ground surface, collecting soil samples from the wetlands, and collecting rainfall data. In addition, spring season vegetation monitoring would be conducted in coyote brush shrub-grassland, grassland, coastal bluff, willow riparian and ruderal areas in years 1, 4 and 7; and ten permanent photo points around the project area would be photomonitored annually. Results from the monitoring efforts will be included in reports that will be submitted by December 31<sup>st</sup> of each year to UC Santa Cruz, the California Coastal Commission, and the SAC. A final monitoring report will be submitted to the California Coastal Commission at the end of the final monitoring period of Phase 1. If the final report indicates that the project has been unsuccessful in achieving habitat restoration and enhancement in the subject area, in part or in whole, based on the approved success criteria, then the final report shall identify remediation measures to be implemented to compensate for those portions of the original plan that did not meet the approved success criteria.

### **SRP Phase 1B**

As noted above, Phase 1B of the SRP is described here to the extent it has been developed to date. Implementation details will be subject to agency consultation and permitting and likely will vary, at least in some details, from the conceptual outline provided here. The implementation of SRP Phase 1B would be independent of the implementation of Phase 1A, although results of both would be monitored and reported at the end of SRP Phase 1. Due to the uncertainty related to the Phase 1B elements and implementation criteria it would be too speculative to evaluate the environmental effects of Phase 1B implementation at this time.

### *Topographic Modification to Reconnect Wetlands 1 and 2*

Wetland W1 is essentially a drainage ditch, which was excavated sometime during the agricultural use of the plot to diminish the extent of natural seasonal inundation of active agricultural fields. The ditch is fed by a culvert under the railroad that defines the northern end of the MSC at the upstream end of the ditch, and terminates at a culvert structure just north of the MSC entry road. Wetland W2, adjacent to the east of W1 (see Figure 3, above) and separated from W1 for most of its length by a raised berm, also is supplied by water entering the site through the railroad culvert, but is much more extensive than W1 and is not defined by artificial berms.

The primary focus of SRP Phase 1B would be work in the wetlands W1 and W2 areas to connect the wetlands hydrologically, for hydrologic and habitat improvements as required by the RMP. The intent of the proposed alterations is to remediate historical modifications to site hydrologic function that served to drain wetlands on the site (e.g. the existing W1 drainage ditch), but leave intact and improve past modifications that may have increased the historical extent and duration of wetland inundation (e.g. the entry roadway berm at the south end of W1). It is envisioned that the initial modifications to wetlands W1 and W2 would consist of installation of a temporary, removable water control structure in the culvert at the south (downstream) end of W1 and, potentially, installation of an earthen berm near the upstream end of W1 to increase flows from W1 into W2.

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It is anticipated that management of site hydrology would increase the cover of native wetland plant species, maintain raptor foraging habitat, improve water quality of inputs to YLR, create a continuous north-south corridor across the north end of the MSC for wildlife movement to YLR, and promote infiltration and subsurface storage of winter runoff. An increase in water pooled in W1 and W2 may also provide amphibian breeding habitat by creating small open water pools. Reserve staff would implement the diversions incrementally and monitor the effects of the modifications on hydrology and habitat, during SRP Phase 1B, before designing and installing any permanent diversion structures. If the measures described do not provide the anticipated benefits during Phase 1B, additional design and planning for enhancement of these wetlands will occur during SRP Phase 2.

#### *Central Areas of Wetlands 4 and 5*

Restoration within the central areas of wetlands 4 and 5 (Figure 3), with a total of 3 acres, would focus on increasing native plant species richness and percent cover and decreasing non-native plant cover. Activities in these areas would include weed control, enhancement of existing native vegetation with small-scale plantings, and collection of seeds and cuttings for propagation. No alternations to topography and/or hydrology in these wetlands are proposed.

#### **Project Population**

One new half-time staff person would be hired to work primarily on the proposed restoration and habitat enhancement work proposed in the SRP. Between two and 18 student assistants and interns would work on the project for up to 15 hours each. One graduate student researcher would work on the project part-time for 10-20 weeks a year, with time divided between the main campus and the Marine Science Campus. Finally, a short-term, seasonal crew of up to 20 non-students would be hired periodically to work full time planting or weeding, for one to two weeks at a time.

#### **IV. PROJECT APPROVALS AND PERMITS**

As discussed above, the proposed SRP Phase 1 project consists of activities consistent with the RMP previously approved by the Regents as an element of the CLRDP. The project would implement the habitat restoration program described in the RMP, for the first third of Terrace Lands, during the first seven years of CLRDP implementation. The proposed SRP Phase 1A is subject to approval by the Chancellor of UCSC. In addition, the University must file a Notice of Impending Development (NOID) for the project with the California Coastal Commission, which will determine whether the proposed project is consistent with the previously-approved CLRDP.

Based on the analyses provided below, implementation of SRP Phase 1A, which incorporates as part of the project description relevant CLRDP EIR mitigation and implementation measures (listed in each resource section below), would not result in any new significant environmental impacts, increase the severity of any impacts previously identified in the CLRDP EIR, or cause any environmental effects not previously examined in the CLRDP EIR. Since no effects to any wetlands or special status species are anticipated from the proposed vegetation management work, it also is not anticipated that permits from other public agencies will be required.

#### **Consistency with the CLRDP**

The proposed SRP Phase 1A Project responds to the requirement of Implementation Measure 3.2.10, as set forth in the previously-approved CLRDP, to implement the CLRDP Resource Management Plan, and therefore appears to be consistent with the applicable policy objectives and goals of the CLRDP. The project would not result in an increase in campus or community population levels. The project consists of habitat restoration in all areas on the Marine Science



Campus that are outside of the CLRDP-designated development sub areas shown on final CLRDP Figure 5.4 (as approved by the President of the Board of Regents in December 2008 and by the California Coastal Commission in January 2009). As required by the previously-approved CLRDP, these areas have been incorporated into the Younger Lagoon Reserve (YLR). The proposed SRP Phase 1A activities are consistent with the CLRDP land use designations for these areas.

**Environmental Analysis of the CLRDP EIR.**

The proposed project implements a portion of the Resource Management Plan, which was described and analyzed in the CLRDP EIR as a component of the CLRDP. The Resource Management Plan is incorporated into the Draft CLRDP EIR (January 2004) by reference (page 4.4-53). CLRDP Implementation Measure 3.2.10 requires that the RMP be implemented through a series of Specific Resource Plans, which set forth the timing, specific locations and activities through which the habitat restoration plan set forth in the previously-approved RMP will be implemented. The proposed project, Specific Resource Plan Phase 1A, does not change the previously-approved Resource Management Plan as analyzed in the EIR, but specifies how the vegetation management aspects of the first phase of that plan would be implemented, the areas that would be restored during Phase 1, and the specific techniques that would be used for planting and weed removal,

As described in the CLRDP EIR, implementation of the Resource Management Plan would include the following measures to protect and restore habitat areas on the Marine Science Campus:

- Consolidation, expansion, and enhancement of wetlands in the northern part of the site;
- Protection and enhancement of seasonal wetlands;
- Establishment of a corridor for unimpaired movement of wildlife along the northern boundary of the site;
- Protection of special status species through protection and enhancement of wetland habitats and grassland/scrub-grassland habitats outside of development areas and through other management measures contained in the CLRDP;
- Management of natural areas;
- Development of long-term maintenance and monitoring programs for terrace habitats

Table 4.4-7, on pages 4.4-54 through 4.4.59 of the CLRDP EIR, summarizes applicable CLRDP policies and implementation measures relevant to biological resources, and the performance standards specified in the Resource Management Plan. These policies and implementation measures include those that would be carried out as part of the SRP Phase 1: developing long-term maintenance and monitoring programs for the terrace habitats, and other habitat enhancement measures in accordance with the management measures contained in the CLRDP (Implementation Measure 3.2.8); controlling weeds; promoting the abundance and diversity of native plant species through small-scale plantings (Implementation Measure 3.2.2); protection and enhancement of the non-native grassland, ruderal, coyote brush scrub-grassland, and coastal bluff areas through eliminating highly invasive weeds; controlling lower priority weeds, and promoting the abundance and diversity of native plant species through small-scale plantings (Implementation Measure 3.2.6). Phase 1B of the SRP would focus on integrating the hydrology of Wetlands W1 and W2 (Implementation Measure 3.2.1), and protection and enhancement of the seasonal wetlands by improving surface water flow; and also would include plantings in wetlands W4 and W5. Again, as

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detailed in the project description above, Phase 1A, which is the subject of the current analysis, focuses on vegetation management and would not include any topographic or hydrological modifications or work within wetlands.

The CLRDP EIR was certified by The Regents in September 2004. Subsequently, the University revised the CLRDP in response to direction from the staff of the California Coastal Commission and prepared Addendum #1 to the CLRDP EIR for Regental approval of these changes. Addendum #1 determined that the CLRDP modification since certification of the EIR would not result in new significant environmental effects or a substantial increase in the severity of previously identified significant effects. The University approved these revisions in November 2006.

The Coastal Commission subsequently requested a peer review of CLRDP wetland delineations and, based on this review, requested additional changes to wetland boundaries and buffers proposed in the CLRDP. Pursuant to Section 21080.5 of CEQA, the Secretary of Resources has certified the Coastal Commission's review and approval process as the functional equivalent of the environmental review under CEQA. Accordingly, the impacts of these suggested wetland and wetland buffer modifications to the CLRDP were analyzed in the Commission's November 21, 2007 staff report, which concluded that the suggested modifications to the CLRDP would not result in any significant impacts not previously identified in the CLRDP EIR or UCSC's CLRDP Addendum #1, or increase the severity of any previously identified impact. At a subsequent hearing in April 2008, the Commission adopted revised findings and suggested additional CLRDP modifications related to public access and to permanent protection of resource lands, which had been analyzed in a staff report in March 2008. With the inclusion of these suggested November 2007 and March 2008 modifications, the Commission determined in April 2008 that the CLRDP is consistent with the policies of the California Coastal Act and approved the CLRDP, conditional upon UCSC's acceptance of the revised conditions. The campus revised the CLRDP to reflect the Commission's requested November 2007 and March 2008 changes and published the revised CLRDP in December 2008. On December 29, 2008, having reviewed and considered the Commission's November 2007 and March 2008 staff report and April 2008 findings and approval, the Executive Vice President of the Board of Regents, through delegated authority, affirmed the Commission's 2008 findings and accepted the suggested modifications of the CLRDP as a condition of approval of the CLRDP. The California Coastal Commission then certified the December 2008 CLRDP in January 2009.

As discussed above, among the changes included in the approved December 2008 CLRDP, relative to the project analysis in the 2004 EIR and 2006 Addendum #1, were minor adjustments to the boundaries of wetlands and their associated buffers, and to CLRDP development area boundaries. These adjustments slightly altered the area and location of land that would be affected by implementation of the RMP that had been approved as an element of the earlier (2004) version of the CLRDP, but did not affect the overall location, implementation schedule or range of activities previously approved for the RMP. Another change in the certified (2008) CLRDP was inclusion of Implementation Measure (3.14.1), which required the University to diligently pursue the incorporation of open space and natural lands into the UC Natural Reserve System as a permanent addition to the Younger Lagoon UC Natural Reserve. This measure was implemented in July 2008 through incorporation of the 47 acres of lands identified in the CLRDP as "natural lands", located on an area referred to as the Terrace Lands of the Marine Science Campus into the YLR. The incorporation of the 47 acres into the YLR was required by the Commission to ensure the

protection of the lands in perpetuity and does not materially affect the land uses envisioned in the approved CLRDP, or any aspect of implementation of the RMP as previously approved.

## V. ENVIRONMENTAL DETERMINATION

The purpose of the following Environmental Assessment is to determine the appropriate form of environmental review for the proposed SRP Phase 1A Project implementing the RMP approved by the Commission as part of the January 2008 certification of the CLRDP, and to document that determination.

Projects subsequently proposed following certification of the CLRDP must be examined for consistency with the program as described in the CLRDP and with the environmental impact analysis contained in the CLRDP EIR, Addendum #1 and Commission Findings (December 2007 and April 2008). If it is determined that project implementation would result in new significant impacts or a significant increase in previously identified significant impacts, or if new information changes prior significance conclusion or new mitigation measures would be required, a subsequent environmental document is required. As Section 15168(c) of the California Environmental Quality Act (CEQA) Guidelines (Title 14, California Code of Regulations) states in relevant part:

*Subsequent activities in the program must be examined in the light of the program EIR to determine whether an additional environmental document must be prepared....(2) If the agency finds that pursuant to Section 15162, no new effects could occur or no new mitigation measures would be required, the agency can approve the activity as being within the scope of the project covered by the program EIR, and no new environmental document would be required....(4) Where the subsequent activities involve site specific operations, the agency should use a written checklist or similar device to document the evaluation of the site and the activity to determine whether the environmental effects of the operation were covered in the program EIR.*

When an EIR has been certified for a project, no additional environmental review is required except as provided for in Section 15162 of the California Environmental Quality Act (CEQA) Guidelines (Title 14, California Code of Regulations, Sections 15000 *et seq*), which sets forth the circumstances under which a project may warrant a Subsequent EIR or Negative Declaration:

- (1) Substantial changes are proposed in the project which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects;*
- (2) Substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EIR or Negative Declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects; or*
- (3) New information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was certified as complete or the Negative Declaration was adopted, shows any of the following:*

*(A) The project will have one or more significant effects not discussed in the previous EIR or negative declaration;*

*(B) Significant effects previously examined will be substantially more severe than shown in the previous EIR;*

*(C) Mitigation measures or alternatives previously found not to be feasible would in fact be feasible, and would substantially reduce one or more significant effects of the project, but the project proponents decline to adopt the mitigation measure or alternative; or*

*(D) Mitigation measures or alternatives which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment, but the project proponents decline to adopt the mitigation measure or alternative.*

Under Section 15163, a supplement to a certified EIR may be prepared when any of the conditions requiring preparation of a subsequent EIR are met, but only minor additions or changes would be necessary to make the previous EIR adequately apply to the project in the changed situation. Under Section 15164, in cases where only minor technical changes or additions are necessary to make the previous EIR adequately apply to the project and none of the conditions calling for a subsequent or supplemental EIR has occurred, an EIR addendum may be prepared. If none of the above conditions is present, no further environmental review is required.

This Addendum and the following assessment of Environmental Factors Potentially Affected find the Project to be consistent with the CLRDP, certified by the Coastal Commission in January 2009. The assessment below considers changes to the CEQA checklist since certification of the CLRDP EIR and also project refinements, and concludes that the Project would not cause any new significant environmental effects that was not considered in the CLRDP, Addendum #1 and December 2007 and April 2008 Commission findings, nor increase the severity of any impact previously found significant therein, and that no new information of substantial importance, which was not known at the time the CLRDP was certified, has become available. Accordingly, the University has determined that an Addendum to the CLRDP is the appropriate level of environmental review for the Project, and specifically describes the scope of the Project and its impacts in relation to the CLRDP, and provides an analysis under CEQA Guidelines 15162 in the following assessment of Environmental Factors Potentially Affected.

## **VI. ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED**

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> Aesthetics               | <input type="checkbox"/> Agriculture Resources         | <input type="checkbox"/> Air Quality             |
| <input type="checkbox"/> Biological Resources     | <input type="checkbox"/> Cultural Resources            | <input type="checkbox"/> Geology/Soils           |
| <input type="checkbox"/> Greenhouse Gas Emissions | <input type="checkbox"/> Hazards & Hazardous Materials | <input type="checkbox"/> Hydrology/Water Quality |
| <input type="checkbox"/> Land Use/Planning        | <input type="checkbox"/> Mineral Resources             | <input type="checkbox"/> Noise                   |

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Population/Housing

Transportation/Traffic

Public Services

Utilities/Service  
Systems

Recreation

Mandatory Findings of  
Significance

**VII. DETERMINATION: (To be completed by lead agency)**

On the basis of the initial evaluation that follows:

- I find that the proposed project could have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, and that these effects have not been adequately analyzed by an earlier EIR. A TIERED ENVIRONMENTAL IMPACT REPORT will be prepared.
  
- I find that although the proposed project could have a significant effect on the environment, because (1) all potentially significant effects have been addressed adequately in an earlier environmental document pursuant to applicable standards; and (2) all potentially significant effects have been avoided or mitigated to the extent feasible pursuant to that earlier environmental document, including mitigation measures that are incorporated into the proposed project; and (3) the project does not involve new information of substantial importance; and (4) no new mitigation measures or alternatives which are considerably different from those adopted as part of the CLRDP or which were previously considered infeasible, are now feasible that would reduce a new or previously identified significant impact. An ADDENDUM and/or FINDINGS will be prepared.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
For

### VIII. EVALUATION OF ENVIRONMENTAL IMPACTS

The University has defined the column headings in the Initial Study checklist as follows:

“**Additional Project-level Impact Analysis Required**” applies where the project may result in an environmental impact that was not considered in an earlier document, or not considered in sufficient detail, and/or substantial project changes, changed circumstances, or new information of substantial importance triggering CEQA Section 15162 has occurred since certification of the earlier document.

“**Project Impact Adequately Addressed in Earlier Environmental Document**” applies where the potential impacts of the proposed project were adequately addressed in an earlier environmental document and either no changes or no substantial changes to the project are proposed, and no new information of substantial importance has been identified.

#### Impact Questions and Responses

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
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#### 1. AESTHETICS – Would the project:

- |  |                          |                                     |
|--|--------------------------|-------------------------------------|
| a) Have a substantial adverse effect on a scenic vista?  | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Substantially degrade the existing visual character or quality of the site and its surroundings?  | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?                                    | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

#### Relevant Features of the Project

The proposed Phase 1A SRP Project consists of habitat restoration on approximately 16 acres of natural lands on the UC Santa Cruz Marine Science Campus. The restoration work would consist of the planting of native plants in coyote-brush scrub-grassland, grassland, coastal bluff scrub, central wetland, and wetland buffer habitat; and removal of non-native invasive weeds throughout the terrace lands. Interpretive signage consistent with CLRDP design standards would be scattered in publicly-accessible areas to explain the restoration work and related research. Additional signage or low fencing also could be installed, as needed to protect new plantings.

No CLRDP EIR mitigations or CLRDP implementation measures related to aesthetics were adopted as part of the Mitigation Monitoring Program for the CLRDP or are applicable to the proposed Phase 1A SRP Project.

**Previous Analysis**

a-d) The CLRDP EIR (Section 4.1) analyzes potential impacts of building development on scenic vistas, scenic resources, and the visual character and quality of the site and its surroundings. The CLRDP EIR does not identify any environmental impacts related to aesthetics that would result from Resource Management Plan restoration activities. No aesthetic impacts were identified.

**Effect of Changes to the Project on the Previous Environmental Analysis**

a-d) The proposed SRP would alter the composition of the vegetation on approximately 16 acres of the natural lands on the MSC but this would not alter the appearance of these lands in a manner that could affect scenic vistas, scenic resources, or the visual character and quality of the site and its surroundings. Although vegetal cover would be altered, the replacement of non- natives with a better-quality mosaic of native vegetation is consistent with the natural appearance of the site. The resulting subtle alterations in visual character would be aesthetically beneficial to the overall natural visual character of the site. Because any signage would be low and small in scale and would be consistent with approved CLRDP design standards for signage, signage would be visible only at close range and would not be visually intrusive. No adverse aesthetic impacts are anticipated.

As discussed above, the implementation of the RMP as proposed in SRP Phase 1A would not adversely affect the appearance or visibility of the natural lands on the Marine Science Campus and is consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the California Coastal Commission’s December 2007 and April 2008 Findings, and would not introduce any new potential aesthetic impacts, and no changed circumstance or new information is present that would alter the conclusions contained therein. No Project revisions or additional mitigation measures are required and the prior environmental analysis is sufficient and comprehensive to address aesthetic impacts of the Project.

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
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**1. AGRICULTURAL AND FOREST**

**RESOURCES** – In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the CA Dept. of Forestry and Fire



Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
<p><u>Protection regarding the state’s inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and the forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.</u>            Would the project:</p>		
<p>a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>c) <u>Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g), timberland (as defined in Public Resources Code 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?</u></p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<p>d) <u>Result in the loss of forest land or conversion of forest land to non-forest use?</u></p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<p>e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of habitat restoration on approximately 16 acres of natural lands on the UC Santa Cruz Marine Science Campus. The restoration work would consist of the planting of native plants in coyote-brush scrub-grassland, grassland, coastal bluff scrub, central wetland, and wetland buffer habitat; removal of non-native invasive weeds throughout the terrace lands, and planting of a screen of shrubs to define a spatial buffer and “living fence” between project site wetlands and adjacent agricultural land.

CLRDP EIR General Mitigation Measure 4.2-1 requires that a fence and screen of shrubs or trees be constructed along the boundary between the campus and the adjacent Younger Ranch agricultural fields in conjunction with the first development project on the campus, to ensure that

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campus development does not result in incursions by members of the public onto adjacent farm lands. This measure is not triggered by the proposed SRP Phase 1, which is not a development project. However, SRP Phase 1A includes planting of a vegetation screen along the Wetland W1 buffer adjacent to Younger Ranch, which is one element of this mitigation measure. This screen will augment the wetland buffer between the campus and potential agricultural activities at Younger Ranch.

### **Previous Analysis**

Items related to forest land and forest conversion were added to the CEQA checklist subsequent to the publication of the CLRDP EIR. These new items and item revisions are addressed in the section that follows.

a) Twenty-six acres of Elkhorn sandy loam #132 on the middle and upper terrace are considered prime soils if they are irrigated. Soils on the lower terrace are of lesser quality. Based on an analysis of the Marine Science Campus following the California Department of Conservation Land Evaluation and Site Assessment (LESA) Model, the CLRDP EIR determined that the agriculture on the Marine Science Campus would not be economically viable due to the high costs of providing water to the site for irrigation. Therefore, the CLRDP EIR concluded that development under the CLRDP, including the proposed SRP Phase 1, would not result in significant impacts on Farmland (CLRDP EIR: 4.2-12 and -13).

b) The Marine Science Campus and the adjacent Younger Ranch are not under Williamson Act contract; therefore, the CLRDP EIR concluded that development under the CLRDP, including implementation of the RMP, would have no impacts on Williamson Act lands (p 4.2-13).

c, d) The project site is not forest land and was not forest land historically. No impact would occur

e) The CLRDP EIR analyzed the potential that development under the CLRDP, including implementation of the RMP, could constrain use of certain pesticides on adjacent agricultural lands and generate complaints of nuisance, vandalism/theft, pilferage, and trespass/liability at the Younger Ranch, and that these pressures could increase costs of agricultural operations, impair productivity, and diminish the feasibility of continued agricultural production, possibly resulting in the eventual removal of adjacent land from agricultural use. The potential for this impact to occur was considered less than significant (p 4.2-14 to -15). Implementation of the Resource Management Plan would not contribute to these potential impacts.

### **Effect of Changes to the Project on the Previous Environmental Analysis**

a-c) The SRP Phase 1A project, which implements the RMP-required vegetation management measures, is not a development project. Nonetheless, the project includes construction of a shrub screen between the project site and Younger Ranch, which would partially implement CLRDP General Mitigation Measure 4.2-1.

None of the implementation or mitigation measures described above are relevant to the SRP Phase 1A. The finding that SRP Phase 1A would not impact agricultural resources is consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the Commission's December 2007 and April 2008 Findings, and would not introduce any new potential agricultural impacts, and no changed circumstance or new information is present that would alter the conclusions contained therein. No Project revisions or additional mitigation measures are required and the prior environmental analysis is sufficient and comprehensive to address agricultural impacts of the Project.

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
<p><b>2. AIR QUALITY</b> -- Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:</p>		
<p>a) Conflict with or obstruct implementation of the applicable air quality plan?</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>d) Expose sensitive receptors to substantial pollutant concentrations?</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>e) Create objectionable odors affecting a substantial number of people?</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of habitat restoration on approximately 16 acres of natural lands on the UC Santa Cruz Marine Science Campus. The restoration work would consist of the planting of native plants in coyote-brush scrub-grassland, grassland, coastal bluff scrub, central wetland, and wetland buffer habitat; removal of non-native invasive weeds throughout the terrace lands; and installation of interpretive signage and possibly signage and low fencing to protect new plantings.

The use of motor vehicles to convey materials for restoration work would generate small amounts of air pollutant emissions. The project would not develop any new stationary sources of air pollutant emissions or toxic air contaminants.

None of the mitigation measures or implementation measures identified in the CLRDP EIR is applicable to the proposed SRP Phase 1A project.

**Previous Analysis**

a-d) The CLRDP EIR analyzed the following air quality issues: potential construction emissions of respirable particulate matter (PM<sub>10</sub>), ozone precursors, and toxic air contaminants (TACs); operational emissions of criteria pollutants, carbon monoxide (CO), and TACs; objectionable odors; cumulative emissions of CO and TACs; and consistency with Air Quality Management Plan. Implementation of the RMP would make a minor contribution to the construction emissions of PM<sub>10</sub> and TACs associated with development under the CLRDP but would not contribute to the identified operational emissions of CLRDP development.

The Association for Monterey Bay Area Governments (AMBAG) found that the CLRDP was consistent with the 2000 Air Quality Management Plan for the Monterey Bay Area.<sup>1</sup> Therefore, emissions of VOCs, NOX, and SO<sub>2</sub> resulting from implementation of the CLRDP, including the RMP project, are considered to have a less-than-significant cumulative impact on regional air quality (CLRDP EIR 4.3-26).

***Construction PM<sub>10</sub> Emissions.*** Based on the size of the area that would be graded for construction of each project under the CLRDP, the EIR concluded that PM<sub>10</sub> emissions from construction of multiple projects at the same time could exceed the significance threshold established by the Monterey Bay Unified Air Pollution Control District. Implementation of CLRDP EIR Mitigation Measure 4.3-1 (which is not applicable to the SRP because of the nature and scale of the project) would reduce temporary and localized air quality impacts from construction activities under the CLRDP to a less than significant level (CLRDP EIR p 4.3-16).

***Construction TAC Emissions.*** The CLRDP EIR included a health risk assessment that analyzed the potential acute exposure and long-term carcinogenic risks from construction emissions of TACs in diesel particulates and in the form of soil contaminants carried in fugitive dust. The estimated maximum acute exposure levels of TACs from fugitive dust during construction activities under the CLRDP, including the RMP, are below the acceptable threshold levels for both acute exposure and carcinogenic risk. Therefore, implementation of the CLRDP, including the RMP would not cause or substantially contribute to significant (adverse) health impacts (carcinogenic and non-carcinogenic) from the emissions of TACs (CLRDP EIR p 4.3-18).

e) The CLRDP EIR determined that implementation of the CLRDP, including implementation of the RMP, would not result in objectionable odors (CLRDP EIR p 4.3-24).

**Effect of Changes to the Project on the Previous Environmental Analysis**

a-e) The SRP Phase 1A Project would not include grading, would not involve more than incidental use of motorized vehicles, and would not create any new sources of air pollutant emissions. The project would not contribute to the PM<sub>10</sub> or TAC emissions impacts identified in the CLRDP EIR.

The SRP Phase 1A would not result in a significant air quality impact as described in (a)-(e), is consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the Commission's December 2007 and April 2008 Findings, and would not introduce any new potential air quality impacts, and no changed circumstance or new information is present that would alter the conclusions contained therein. No Project revisions or additional mitigation measures are required and the prior environmental analysis is sufficient and comprehensive to address air quality impacts of the Project.

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<sup>1</sup> AMBAG, 2003

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
<b>3. BIOLOGICAL RESOURCES</b> -- Would the project:		
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Conflict with any applicable policies protecting biological resources?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other applicable habitat conservation plan?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of habitat restoration on approximately 16 acres of natural lands on the UC Santa Cruz Marine Science Campus. The restoration work would consist of the planting of native plants in coyote-brush scrub-grassland, grassland, coastal bluff scrub, central wetland, and wetland buffer habitat; removal of non-native invasive weeds throughout the terrace lands; and installation of interpretive signage and signage and low fencing as needed to protect new plantings.

The following adopted CLRDP EIR mitigations and CLRDP implementation measures included in the Mitigation Monitoring Program for the CLRDP are applicable to and included as part of the proposed Phase 1A SRP Project:

**CLRDP Policy 3.2 - Protection and Restoration of Habitat Areas:** The biological productivity and the quality of coastal waters, streams, and wetlands, appropriate to maintain the optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through among other means minimizing adverse effects of wastewater discharges, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging wastewater reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural watercourses. Campus natural areas (i.e., areas outside of defined development zones) shall be protected, restored, enhanced, and managed as high-quality open space and natural habitat areas.

**CLRDP EIR Project Specific Mitigation Measure 4.4-1** -- For all projects proposed in the upper terrace under the CLRDP, the University will implement the following:

A preconstruction survey for CRLF will be conducted of all areas proposed for grading and construction by a qualified biologist, approved by the USFWS. If CRLF are observed, grading activities shall be postponed and USFWS shall be consulted to determine appropriate actions to avoid impact. Consultation with the USFWS will result in either a determination of the need to obtain a permit or in the identification of measures to avoid take of the individual(s).

The biological monitor shall also conduct meetings with the contractor(s) and other key construction personnel to describe the importance of the species, the need to restrict work to designated areas, and to discuss procedures for avoiding harm or harassment of wildlife encountered during construction.

**CLRDP EIR Project Specific Mitigation Measure 4.4-2:** UCSC shall ensure that construction activities avoid disturbing nests of raptors (and other special-status birds). If ground-disturbing activities are scheduled to occur during the breeding season (February 1 through August 31), the following measures are required to avoid potential adverse effects on nesting special-status raptors and other birds:

A qualified wildlife biologist will conduct preconstruction surveys of all potential nesting habitat. For burrowing owls, such surveys will follow the most recent CDFG Burrowing Owl Survey Protocol and Mitigation Guidelines.<sup>2</sup>

If active raptor nests are found during preconstruction surveys, a no-disturbance buffer acceptable in size to CDFG will be created around active raptor nests and nests of any other special-status birds during the breeding season, and maintained until it is determined that all young have fledged. Raptor or other bird nests initiated during construction are presumed to be unaffected, and no buffer is necessary. However, the “take” of any individuals will be prohibited.

If preconstruction surveys indicate that nests are inactive or potential habitat is unoccupied during the construction/restoration period, no further mitigation is required. Trees and shrubs that have been determined to be unoccupied by special-status birds or that are located outside the no-disturbance buffer for active nests may be removed.

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<sup>2</sup> California Department of Fish and Game, *Staff Report on Burrowing Owl Mitigation*, The Resources Agency, October 17, 1995.

**Previous Analysis**

a-c) The CLRDP EIR determined that no state or federal special-status plant species or other special-status plant species occur on the Marine Science Campus, and no such species are presumed to be present due to the lack of suitable habitat. Therefore, the implementation of the proposed CLRDP, including the proposed SRP Phase 1A, would not have the potential to result in significant adverse impacts on any special-status plant species under CEQA (CLRDP EIR p 4.4-60).

The EIR determined that development under the CLRDP, including the proposed habitat restoration activities, would have a less-than-significant impact on California red-legged frog (CRLF), which is a federally listed threatened species (CLRDP EIR p 4.4-62). Juveniles and sub-adults of this species have been observed immediately adjacent to the site in a ditch along the railroad tracks to the north of the Marine Science Campus but there presently is no suitable breeding habitat for the species on the campus. Although the wetland areas on the upper terrace do have the potential to provide temporary hydration and foraging areas for CRLF during winter movements, the CLRDP EIR determined that the potential for dispersing individuals to be present in this area was low because of the distance from breeding sites and because the aquatic habitat on the site is ephemeral. However, because of the potential that CRLF may occur on the campus, CLRDP EIR Mitigation 4.4-1 was adopted to further reduce the potential of CLRDP activity to adversely affect the species.

The CLRDP delineates sensitive habitats and wetlands and permanently protects them from development, and therefore would not cause significant adverse effects on these habitats (CLRDP EIR p 4.4-68).

d) The EIR evaluated the potential that development on, and restoration of, annual grassland and coastal scrub on the middle and upper terrace development zones, could disturb nesting raptors through the direct effects of ground disturbance and the indirect effects of increased human activity and noise. The EIR determined that the probability of this impact is low and the degree of impact is considered less than significant because raptor nesting records are limited for the site, and there is abundant alternate and protected habitat in the region (CLRDP EIR p 4.4-64). The EIR identified CLRDP EIR Project Specific Mitigation Measure 4.4-2, applicable to all projects in the middle and upper terrace areas, to further reduce the less-than-significant impact. This previously adopted mitigation is applicable to the restoration activities that would be carried out under the proposed SRP Phase 1A, and is included as part of the project.

The EIR determined that development under the CLRDP would not result in significant impacts to wildlife corridors because these habitats are outside the proposed development zones and are protected by buffers and the Stormwater Concept Plan (CLRDP EIR p 4.4-69). The restoration activities proposed under SRP Phase 1A, which implement the approved RMP, fall within the implementation of CLRDP Policy 3.2, and would also enhance and protect sensitive plant communities on the Terrace Lands.

e) The EIR determined that development under the CLRDP would not interfere with the Younger Lagoon Reserve Management Plan, which is the only plan for conservation of biological resources that applies to the Marine Science Campus. The CLRDP was developed in consultation with the YLR manager and is consistent with the goals of the YLR Management Plan. SRP Phase 1A would initiate implementation of the CLRDP Resource Management Plan.

**Effect of Changes to the Project on the Previous Environmental Analysis**

Since the CLRDP EIR was certified, the natural areas of the terrace lands of the Marine Science Campus have been incorporated into the YLR, by agreement between the UC Santa Cruz Campus administration and the UC Santa Cruz Natural Reserve System (UCNRS), as an integral part of the YLR. This agreement specifies that the UCNRS will undertake protection, restoration and management of these natural lands in accordance with the CLRDP RMP. The agreement does not alter the nature or scope of the restoration activities as described in the EIR or anticipated during SRP Phase 1A.

Although SRP Phase 1A would not involve construction or grading, planting would require some ground disturbance, and contractors would be involved in portions of the work. CRLF surveys of the upper terrace were carried out in spring and summer 2009 and frogs were found in one area of Wetland W2. No planting work or other activity is proposed for this area in SRP Phase 1A, and consultation with USFWS therefore does not appear to be warranted. However, consistent with the CLRDP, CLRDP EIR Project Specific Mitigation Measure 4.4-1, which requires that contractors and other key personnel be informed of procedures to ensure that any frogs that might be encountered are identified and avoided, is included in the project. The project also includes CLRDP EIR Project Specific Mitigation Measure 4.4-2, to ensure that the project would not result in incidental disturbance of nesting raptors.

Because the project incorporates all applicable CLRDP mitigation measures, SRP Phase 1A would not increase the extent to which RMP restoration activities could result in disturbance to sensitive habitat, sensitive natural communities or wildlife corridors, is consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the Commission’s December 2007 and April 2008 Findings, and would not introduce any new potential biological resources impacts, and no changed circumstance or new information is present that would alter the conclusions contained therein. No Project revisions or additional mitigation measures are required and the prior environmental analysis is sufficient and comprehensive to address biological resource impacts of the Project.

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
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**4. CULTURAL RESOURCES -Would the project:**

- |  |                          |                                     |
|--|--------------------------|-------------------------------------|
| a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?    | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic                       | <input type="checkbox"/> | <input checked="" type="checkbox"/> |



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feature?

- d) Disturb any human remains, including those interred outside of formal cemeteries?

### **Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of habitat restoration on approximately 16 acres of natural lands on the UC Santa Cruz Marine Science Campus, primarily the planting of native plants in coyote-brush scrub-grassland, grassland, coastal bluff scrub, central wetland, and wetland buffer habitat; removal of non-native invasive weeds throughout the terrace lands; and placement of interpretive signage, and of low fencing and signage to protect new plantings in the vicinity of public access trails. Plantings would involve hand excavation of a discrete hole for each small plant, and would not involve grading, soil disturbance at depth, or mechanical excavation.

The following CLRDP EIR mitigations and CLRDP implementation measures included in the Mitigation Monitoring Program for the CLRDP are applicable to and are part of the proposed SRP Phase 1A Project:

**CLRDP EIR Mitigation 4.5-1:** If human remains are discovered during the construction of a development project under the CLRDP, the University and/or its employees shall notify the Santa Cruz County Coroner's Office immediately. Upon determination by the County Coroner that the remains are Native American, the Coroner shall contact the California Native American Heritage Commission, pursuant to subdivision (c) of Section 7050.5 of the Health and Safety Code, and the County Coordinator of Indian Affairs and appropriate Native American consultation shall be conducted, as outlined by PRC 5097.98. Implementation Measure 3.9.1, Construction Monitoring, as identified in the CLRDP, shall also apply. UCSC will be responsible for implementing this mitigation measure.

**Implementation Measure 3.9.1 -- Construction Monitoring.** Should archaeological and/or paleontological resources be encountered during any construction on the Marine Science Campus, all activity that could damage or destroy these resources shall be temporarily suspended until qualified archaeologist/paleontologists and Native American representatives have examined the site and mitigation measures have been developed that address and proportionately offset the impacts of the project on archaeological and/or paleontological resources. Development shall incorporate measures to address issues and impacts identified through any archaeologist/paleontologist and/ or Native American consultation.

### **Previous Analysis**

a-d) The CLRDP EIR determined that there are no known historic or archaeological resources on the Marine Sciences Campus and that the potential for encountering paleontological resources during construction is low. Notwithstanding, the CLRDP EIR Project Specific Mitigation Measure 4.5-1 and CLRDP Implementation Measure 3.9.1 were adopted as part of the CLRDP in connection with any ground-disturbing activities. These measures specify the steps to be taken in the event of unexpected discovery of archeological or paleontological resources or human remains. The CLRDP EIR concluded that the inclusion of these measures would reduce potentially significant impacts to undiscovered archaeological and paleontological resources and human remains to a less-than-significant level (CLRDP EIR p 4.5-8).

**Effect of Changes to the Project on the Previous Environmental Analysis**

a-d) The SRP Phase 1A could result in disturbance to previously undiscovered cultural resources. Although, due to the small scale of proposed planting excavation, the potential to encounter subsurface cultural resources is slight, the CLRDP EIR Project Specific Mitigation Measure 4.5-1 and CLRDP Implementation Measure 3.9.1 would be implemented in connection with any ground-disturbing activities associated with habitat restoration. These measures specify the steps to be taken in the event of unexpected discovery of archeological or paleontological resources or human remains. With implementation of these measures, which are included as part of the project, all cultural resources impacts of the proposed project would be less than significant.

Because the project incorporates all applicable CLRDP mitigation measures, described above, the SRP Phase 1A would not increase the extent to which the restoration activities could result in disturbance to cultural resources, is consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the Commission’s December 2007 and April 2008 Findings, and would not introduce any new potential cultural resources impacts, and no changed circumstance or new information is present that would alter the conclusions contained therein. No Project revisions or additional mitigation measures are required and the prior environmental analysis is sufficient and comprehensive to address cultural resource impacts of the Project.

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
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**5. GEOLOGY AND SOILS -- Would the project:**

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.



ii) Strong seismic ground shaking?



iii) Seismic-related ground failure, including liquefaction?



iv) Landslides?



b) Result in substantial soil erosion or the loss of topsoil?



c) Be located on a geologic unit or soil that is unstable, or

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?		
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of habitat restoration on approximately 16 acres of natural lands on the UC Santa Cruz Marine Science Campus. The restoration work would consist of the planting of native plants in coyote-brush scrub-grassland, grassland, coastal bluff scrub, central wetland, and wetland buffer habitat; removal of non-native invasive weeds throughout the terrace lands; and installation of interpretive signage and low fencing and signage to protect new plantings, as needed. No topographic or hydrologic modifications are proposed, and vegetation removal and planting would not involve grading.

**Previous Analysis**

a-e) The CLRDP EIR concluded that no significant impacts related to geology and soils would result from implementation of the CLRDP program, including the RMP. RMP implementation would not involve construction of any structures and thus has not potential for impacts related to seismic shaking and other geologic hazards. The CLRDP EIR determined that standard construction and engineering practices, which require winterizing construction sites and protecting exposed soil during heavy rainfall, would ensure that the implementation of the CLRDP, including the RMP, would not result in significant erosion impacts (CLRDP EIR p 4.6-23).

**Effect of Changes to the Project on the Previous Environmental Analysis**

a-e) The SRP Phase 1A Project includes the methods that would be used to remove weeds and to plant, in implementing the approved RMP. All weed removal and planting would be done by hand, and the use of motor vehicles would be limited to light trucks driven primarily on the existing perimeter trail and only when the soil is dry. These activities have minimal potential for ground disturbance that could result in erosion. Restoration work along the coastal bluff edge after the removal of ice plant (a Priority 1 weed that would be systematically removed) would include installation of biodegradable silt fencing. New plantings would be installed as soon as possible after ice plant removal and would be mulched to control erosion while vegetation is re-established. In flat areas of the terrace, materials such as wood-chip mulch or jute netting would be used as needed to prevent erosion of soils exposed by weeding or planting.

The project does not have the potential to result in new significant effects related to geology or soils, is consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the Commission’s December 2007 and April 2008 Findings, and would not introduce any new potential impacts with respect to geology or soils, and no changed circumstance or new information is present that would alter the conclusions contained therein. No Project revisions or additional mitigation measures are required and the prior environmental analysis is sufficient and comprehensive to address geology and soils impacts of the Project.

<u>Issues</u>	<u>Additional Project-level Impact Analysis Required</u>	<u>Project Impact Adequately Addressed in Earlier Environmental Document</u>
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**6. GREENHOUSE GAS EMISSIONS -- Would the project:**

- a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant effect on the environment?
- b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing emissions of greenhouse gases?

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of habitat restoration on approximately 16 acres of natural lands on the UC Santa Cruz Marine Science Campus. The restoration work will include removal of non-native invasive weeds throughout the terrace lands, and may include the selective use of pickup trucks or a gas-powered mule to transport materials to selected sites, and occasional use of hand-held gas-powered mechanical equipment (such as a chain saw). The proposed project does not include any development or population increase with a potential to result in future operational air emissions.

a, b) The CLRDP EIR was certified before the passage of Assembly Bill 32 (Global Warming Solutions Act of 2006) and therefore did not analyze greenhouse gas emissions or climate change.

It is generally the case that an individual project of any size is of insufficient magnitude by itself to influence climate change or result in a substantial contribution to the global GHG inventory. Thus, GHG impacts are recognized as exclusively cumulative impacts: there are no non-cumulative GHG emission impacts from a climate change perspective. Accordingly, discussion of the GHG emissions that would result from the proposed project and their impact on global climate are addressed in terms of the project’s contribution to a cumulative impact on global climate.

The greenhouse gas emissions of the proposed SRP Project would be limited to those resulting from the temporary, periodic use of vehicles by the staff carrying out the project to commute to and from the project site and to carry equipment to specific work sites. The small number of such trips that would be generated by the project were taken into account in the trip generation estimate for the CLRDP overall and are within the number of trips analyzed in the EIR in relation to

CLRDP implementation. The proposed project would not create any new permanent sources of greenhouse gases and therefore would not make a cumulatively considerable contribution to global climate change.

GHG emissions from the proposed activities would be minimal compared with those from any type of construction. The project would not add any new stationary sources of air emissions or other operation air emissions. The project site is served by public transportation and the Campus provides low-cost bus passes to employees. The project is consistent with the UC Policy on Sustainable Practices, and would not conflict with any applicable plan, policy or regulation adopted for the purpose of reducing emissions of greenhouse gases.

**Conclusions**

Because the project consists of replanting of existing vegetated areas, primarily by hand, as described above, it would not result in a significant greenhouse gas impact for the reasons given above. No Project revisions or additional mitigation measures are required.

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
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**7. HAZARDS AND HAZARDOUS MATERIALS –**

Would the project:

- |  |                          |                                     |
|--|--------------------------|-------------------------------------|
| a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?  | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?  | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?  | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?                 | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
the project area?		
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of habitat restoration on approximately 16 acres of natural lands on the UC Santa Cruz Marine Science Campus. The restoration work will include removal of non-native invasive weeds throughout the terrace lands, and may include the selective use of herbicides. Pickup trucks or a gas-powered mule could be used to transport materials to selected sites, but would be restricted to existing roads and trails and used only when the soil is dry.

The following CLRDP implementation measures included in the Mitigation Monitoring Program for the CLRDP are applicable to and included in the proposed SRP Phase 1A Project:

**Implementation Measure 3.10.1 – Use, Containment and Cleanup of Hazardous Materials.**

The University, through the Office of Environmental Health and Safety, will manage the use, and in the event of spillage, the containment and cleanup of, hazardous materials and petroleum on the UCSC Marine Science Campus in compliance with federal and state regulations related to the storage, disposal, and transportation of hazardous substances.

**Previous Analysis**

a-c) The CLRDP EIR concluded that, with the implementation measures above included in the project, the increase in hazardous materials use by UC entities under the CLRDP would not result in significant risks because UC Santa Cruz would continue to comply with all federal and state laws regulating the use, storage and disposal of petroleum products and other hazardous materials, such as pesticides (CLRDP EIR p 4.7-17). The CLRDP also determined that the project site is not within ¼ mile of a public or private elementary, middle, or high school and therefore, that there would be no impacts associated with hazardous emissions or the handling of hazardous or acutely hazardous materials, substances, or wastes within ¼ mile of a school as a result of the project (CLRDP EIR p 4.7-19).

d) Because the Marine Science Campus is not listed as a contaminated site, with the inclusion of the implementation measures listed above, no significant hazard to the public or the environment

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would result from construction activities under the CLRDP, including the proposed project (CLRDP EIR p 4.7-19).

e-f) The Marine Science Campus is not located within 2 miles of public airport or private airstrip. No impact with respect to risk from or to air overflight would occur (CLRDP EIR p 4.7-19) .

g-h) The CLRDP EIR also determined that development under the CLRDP would not interfere with the City of Santa Cruz Emergency Response Plan or any federal or state emergency response plans, and that the risk of wildland fire at the Marine Science Campus is low because of the nature of the development on the site and its coastal location. The impact would be less than significant and no mitigation is required (CLRDP EIR p 4.7-20).

**Effect of Changes to the Project on the Previous Environmental Analysis**

a-g) The SRP Phase 1 Project describes the specific techniques that could be used to remove Priority 1 weeds under the previously-approved RMP. These techniques could include application of herbicides. All herbicide application would follow California Department of Pesticide Regulation (CaDPR) regulations and would be done by a CaDPR qualified applicator. Herbicides would be chosen based on the target weed and surrounding habitat (e.g. species-specific targeted applications). Only registered aquatic herbicides would be used in wetland areas. Any herbicide application would be done by hand. The project would also implement CLRDP Implementation Measures 3.10.1 in the event of an accidental release of any hazardous material, including herbicide. These measures would ensure that the use of herbicides in restoration activities related to SRP Phase 1A would not create a significant risk to the public or the environment.

The project includes applicable Implementation Measures, described above, is consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the Commission’s December 2007 and April 2008 Findings, and would not introduce any new potential impacts with respect to hazards and hazardous materials, and no changed circumstance or new information is present that would alter the conclusions contained therein. No Project revisions or additional mitigation measures are required and the prior environmental analysis is sufficient and comprehensive to address hazards associated with the Project.

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
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**8. HYDROLOGY AND WATER QUALITY -- Would the project:**

- |   |                          |                                     |
|---|--------------------------|-------------------------------------|
| a) Violate any water quality standards or waste discharge requirements?   | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Otherwise substantially degrade water quality?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
j) Inundation by seiche, tsunami, or mudflow?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of habitat restoration including the planting of native plants; removal of non-native invasive weeds throughout the terrace lands, including on the ocean bluff edge, by hand and with local applications of herbicides. The proposed Phase 1A does not include any topographic or hydrological modifications, but would include minor excavation by hand and temporary exposure of previously vegetated soils.

The following CLRDP EIR mitigations and CLRDP implementation measures included in the Mitigation Monitoring Program for the CLRDP are applicable to and included in the proposed SRP Phase 1A Project:



**CLRDP Policy 7.1 -- Productivity and Quality of Coastal Waters.** The Marine Science Campus shall be developed and used in a manner that shall sustain and, where feasible, enhance and restore, the biological productivity and quality of coastal waters on and adjacent to the Campus through controlling, filtering, and treating runoff and other non-point sources of pollution, preventing depletion of groundwater supplies and substantial interference with surface water flow, encouraging wastewater reclamation, and maintaining natural vegetation buffer areas that protect riparian habitats.

**IM 7.1.8 – Irrigation and Use of Chemicals for Landscaping.** Any water used for landscape irrigation on the Marine Science Campus shall not be applied in a manner that would cause significant erosion. Any use of chemicals for fertilizer and/or weed and pest control shall be minimized to the degree feasible, including as required by the Drainage Concept Plan, and any chemicals unavoidably used shall not enter habitat areas or the ocean in concentrations sufficient to harm wildlife and/or to degrade habitat.

### **Previous Analysis**

a-j) The CLRDP EIR analyzed the potential impacts on hydrology and water quality that could result from development under the CLRDP, including changes to runoff quantities and patterns and new impervious surfaces such as rooftops and parking lots that accumulate sediments and other contaminants. The CLRDP EIR concluded that implementation of the CLRDP, including the RMP, would not result in adverse effects to water quality, due to the protections provided by the water quality policies and implementation measures included in the CLRDP (CLRDP EIR p 4.8-25). The project would not rely on groundwater supplies. The increase in impervious surfaces associated with implementation of the CLRDP would not substantially reduce groundwater recharge because, under CLRDP policies and implementation measures included in the project, the development of new impervious surfaces in any one area is limited and most runoff from development will be infiltrated in local catchments. The CLRDP therefore would not adversely affect groundwater at the site (CLRDP EIR p 4.8-27). The stormwater management and water quality measures provided in the CLRDP would reduce the potential for erosion, siltation and flooding to ensure that impacts related to additional stormwater flows are less than significant (CLRDP EIR p 4.8-30, -32). The stormwater concept plan included in the CLRDP requires calculation of the potential for increased peak flows during the 25-year storm event and of detention volume required to maintain discharge flows to existing rates and volumes, and mandates that stormwater facilities be designed to capture such flows. For these reasons, impacts associated with increased runoff would be less than significant (CLRDP EIR p 4.8-34). The project site is not in a 100-year flood zone. Development at the site would not place people or structures at risk for flooding. Due to the 40-foot elevation of the campus above ocean level, the risk of flooding by ocean tides or tsunami is negligible. The site is flat and would not be subject to mudflow (CLRDP EIR p 4.8-36, -37).

### **Effect of Changes to the Project on the Previous Environmental Analysis**

a-j) The SRP Phase 1A Project would involve restoration activities the use of herbicides as one of the methods that may be used to remove weeds. The use of herbicides was not directly discussed in the CLRDP EIR. However, Implementation Measure 7.1.8, which is part of the project the project, requires that the use of chemicals for weed or pest control be minimized to the degree feasible and that any such chemicals be used in a manner that prevents the chemical from entering habitat areas or the ocean in concentrations sufficient to harm wildlife and/or to degrade habitat or water quality. Any herbicide application would follow California Department of Pesticide Regulation

(CaDPR) regulations and would be done by a CaDPR qualified applicator. Herbicides would be chosen based on the target weed and surrounding habitat (e.g. species-specific targeted applications). Only registered aquatic herbicides would be used in wetland areas. All applications would be done by hand. These measures would ensure that the use of herbicides does not result in significant adverse effects on habitat or wildlife.

Removal of non-native plants would be carried out primarily by hand and would not entail grading or mechanical scraping. Plantings also would be carried out by hand, thus minimizing soil disturbance. Where weeds are removed or soil is disturbed by plantings, the project includes erosion-control measures, including installation of silt fencing along the coastal bluff after ice plant removal, and the use of other soil covers as needed while new plantings are being established. These project elements would ensure that the project would not result in erosion or siltation that could have adverse effects upon water quality.

Therefore, the project does not have the potential to result in new significant impacts related to hydrology or water quality, is consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the Commission’s December 2007 and April 2008 Findings, and would not introduce any new potential hydrology or water quality impacts, and no changed circumstance or new information is present that would alter the conclusions contained therein. No Project revisions or additional mitigation measures are required and the prior environmental analysis is sufficient and comprehensive to address aesthetic impacts of the Project.

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
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**9. LAND USE AND PLANNING -- Would the project:**

- |   |                          |                          |
|---|--------------------------|--------------------------|
| a) Physically divide an established community?  | <input type="checkbox"/> | <input type="checkbox"/> |
| b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the LRDP, general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect? | <input type="checkbox"/> | <input type="checkbox"/> |
| c) Conflict with any applicable habitat conservation plan or natural community conservation plan?   | <input type="checkbox"/> | <input type="checkbox"/> |
| d) Create other land use impacts?   | <input type="checkbox"/> | <input type="checkbox"/> |

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of habitat restoration entirely within the natural lands on the UC Santa Cruz Marine Science Campus, consistent with the requirements of the CLRDP. Some of the proposed work would be located near the border of the MSC with the adjacent

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Younger Ranch. The project would include planting of shrubs to create a “living fence” along the western margin of the campus in the area of the Wetland W1 buffer, which would serve both to further buffer the wetland from intrusion and would provide additional separation between the wetland and potential agricultural land uses on the adjacent Younger Ranch.

No relevant mitigation or implementation measures were identified in the CLRDP EIR or the CLRDP.

**Previous Analysis**

a-c) The University is exempt from local land use regulation; however, the CLRDP EIR includes a discussion of the consistency of the CLRDP with the City of Santa Cruz General Plan/Local Coastal Program (LCP). In addition, the CLRDP EIR analyzed potential conflicts with a Habitat Conservation Plan (HCP) or Natural Community Conservation Plan (NCCP), compatibility with neighboring land uses, and consistency with the California Coastal Act.

The CLRDP EIR concludes that the CLRDP, including the RMP, would be consistent with the City of Santa Cruz General Plan/LCP and the California Coastal Act, and that there is no HCP or NCCP that applies to the Marine Science Campus or vicinity. The agricultural buffers and limits on the sizing and placement of utility lines in the CLRDP would ensure that development under the CLRDP would be compatible with neighboring agricultural uses and would be consistent with City and County General Plan/LCP policies. Therefore, the CLRDP EIR determined that development under the CLRDP would not result in any significant project or cumulative impacts with respect to land use (CLRDP EIR p 4.9-10 through -14).

**Effect of Changes to the Project on the Previous Environmental Analysis**

a-c) SRP Phase 1 identifies the locations of restoration activities to be carried out under the RMP, and the development of specific methods that would be used for weed removal and planting. The activities covered in the SRP Phase 1A implement the first phase of the CLRDP RMP, a required element of the CLRDP. Proposed work areas are consistent with the applicable CLRDP land use designations, and would not change or result in changes to any existing land use. SRP Phase 1A would include installation of a vegetation screen between Wetland W1 and adjacent farm land, and thus would enhance the effectiveness of the existing spatial buffer between wetland habitat and potential agricultural land uses.

Therefore the project does not have the potential to result in new significant land use impacts, is consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the Commission’s December 2007 and April 2008 Findings, and would not introduce any new potential land use impacts, and no changed circumstance or new information is present that would alter the conclusions contained therein. No Project revisions or additional mitigation measures are required and the prior environmental analysis is sufficient and comprehensive to address land use impacts of the Project.

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
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**10. NOISE --** Would the project result in:

- a) Exposure of persons to or generation of noise levels in

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
excess of standards established in any applicable plan or noise ordinance, or applicable standards of other agencies?		
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project (including construction)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of habitat restoration on natural lands on the UC Santa Cruz Marine Science Campus that would consist of the hand planting of native plants in coyote-brush scrub-grassland, grassland, coastal bluff scrub, central wetland, and wetland buffer habitat; and removal of non-native invasive weeds throughout the terrace lands, also primarily by hand.

**Previous Analysis**

a-f) The CLRDP EIR analyzed whether operation of the Marine Science Campus under the CLRDP has the potential to result in excessive noise or expose persons to excessive noise from trains, traffic, and operation of campus facilities; the potential that implementation of the CLRDP could generate or expose persons to substantial ground-borne vibration from construction activity and from train activity; whether construction activities associated with the development of new buildings and facilities on the Marine Science Campus under the CLRDP would generate noise that could expose nearby receptors to elevated noise levels; and whether implementation of the project would expose people to airport noise. The EIR determined that all of these impacts either would be less than significant, or would be reduced to less-than-significant levels with mitigation that is included in the project (CLRDP EIR 4.11-27).

**Effect of Changes to the Project on the Previous Environmental Analysis**

a-f) The SRP Phase 1A Project would not affect the potential for the restoration activities described in the CLRDP RMP and analyzed in the CLRDP EIR to result in significant noise impacts. The restoration activities under the SRP Phase 1A would be carried out by small crews using hand-operated equipment, and light trucks, wheelbarrows or gas-powered mules to move equipment to each work area. This work would be sporadic and of small scale. Therefore, the SRP Phase 1A Project would not contribute to the noise impacts analyzed in the EIR.

Therefore the project is consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the Commission’s December 2007 and April 2008 Findings, and would not introduce any new potential noise impacts, and no changed circumstance or new information is present that would alter the conclusions contained therein. No Project revisions or additional mitigation measures are required and the prior environmental analysis is sufficient and comprehensive to address noise impacts of the Project.

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
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**11. POPULATION AND HOUSING -- Would the project:**

- |   |                          |                                     |
|---|--------------------------|-------------------------------------|
| a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?   | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?   | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of habitat restoration on designated natural lands on the UC Santa Cruz Marine Science Campus. The restoration work would address only natural areas and would not entail removal or construction of any structures or infrastructure. One new half-time employee would be hired to oversee this work, but the work would be carried out primarily by UCSC students and current employees, augmented periodically by teams of up to 20 short-term laborers hired for periods of one to two weeks at a time.

**Previous Analysis**

The CLRDP EIR analyzed the potential that development under the CLRDP could directly or indirectly induce substantial population growth, result in a concentration of population, or displace housing or substantial numbers of people. The EIR concluded that the project would not result in any significant impacts with respect to population or housing, and no mitigation was required (C:RDP EIR 4.12-22, -24).

**Effect of Changes to the Project on the Previous Environmental Analysis**

The SRP Phase 1A Project consists of the identification of the locations where restoration activities required by the RMP would be carried out, and the specific methods that would be used for weed removal and planting. The work would be carried out by persons already taken into account in the CLRDP EIR population analysis. The proposed project would be carried out by existing UC employees and UCSC students and would not result directly or indirectly in any increase in campus population. It is assumed that temporary short term laborers likely would be available in the local work force. The sporadic and short term nature of the work would not be likely to draw permanent workers to the area who would contribute to the demand for housing. Therefore, the project would not displace any housing or people, contribute to demand for new housing, or result in any significant population increase.

Therefore, consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the Commission’s December 2007 and April 2008 Findings, and would not introduce any new potential population impacts, and no changed circumstance or new information is present that would alter the conclusions contained therein. The prior environmental analysis is sufficient and comprehensive to address the potential population and housing impacts of the Project. No Project revisions or additional mitigation measures are required.

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
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**12. PUBLIC SERVICES**

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

- |   |                          |                                     |
|---|--------------------------|-------------------------------------|
| a) Fire protection?                     | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Police protection?                   | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Schools?                             | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d) Parks?                               | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| e) Other public facilities?             | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| f) Create other public service impacts? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of habitat restoration on natural lands on the UC Santa Cruz Marine Science Campus. One new half-time employee would be hired to oversee this work, but the work would be carried out primarily by UCSC students and current employees, augmented periodically by teams of up to 20 short-term laborers hired for periods of one to two weeks at a time. The project would not result in any measurable population increase, and therefore would not contribute to demand for public facilities; nor would it include the installation of any facilities that would require police or fire protection.

**Previous Analysis**

a-f) The CLRDP EIR analyzed whether development under the CLRDP EIR would generate demand for fire protection or police service or schools that would require the construction of facilities whose construction could have significant adverse environmental effects. The EIR determined that, the project would not result in any significant project-level or cumulative impacts in these areas (CLRDP EIR 4.13-7 and -9).

**Effect of Changes to the Project on the Previous Environmental Analysis**

The SRP Phase 1A Project would not result an increase in population greater than that analyzed in the EIR or the construction of new structures requiring fire protection and police services. Therefore, the Project does not have the potential to result in new significant impacts related to public services, is consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the Commission’s December 2007 and April 2008 Findings, and would not introduce any new potential public service impacts, and no changed circumstance or new information is present that would alter the conclusions contained therein. No Project revisions or additional mitigation measures are required and the prior environmental analysis is sufficient and comprehensive to address public services impacts of the Project.

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
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**13. RECREATION --**

- |  |                          |                                     |
|--|--------------------------|-------------------------------------|
| a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?                       | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of habitat restoration on natural lands on the UC Santa Cruz Marine Science Campus and installation of interpretive signage and of signs and low fences to protect new plantings as needed. The project would increase campus staffing by up to one half-time employee. Most of the remainder of the work would be carried out by students

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already enrolled at UCSC and existing staff. This labor force would be augmented occasionally by work crews of up to 20 persons working occasionally for a week or two at a time.

**Previous Analysis**

a-b) The CLRDP EIR analyzed the potential for construction of recreational facilities on the Marine Science Campus to result in environmental impacts, and the potential that development under the CLRDP would increase the use of existing neighborhood and regional parks or other recreational resources such that substantial physical deterioration of those facilities would occur or be accelerated. The EIR determined that policies and implementation measures included in the CLRDP would ensure that all of these impacts would be less than significant. CLRDP Policy 6.1 states that the University will provide maximum public access to the coastal resources of the Marine Science Campus, to the extent consistent with public safety, fragile coastal resources, implementation of the education and research missions of the campus, and security of sensitive facilities and research activities on the site. Implementation Measure (IM) 6.1.1 addresses how coastal access visitors will be accommodated at the site; IM 6.1.3 provides for development of and improvements to coastal overlooks; and IM 6.1.4 and IM 6.1.5 provide for docent-led tours of the site for members of the public and school children. CLRDP also includes Policy 6.2 states that all public access to the site will be managed to ensure the security of research facilities on the site, protect wildlife populations and other natural resources and provide for public safety. IM 6.2.1 described how access to resource protection areas will be managed; IM 6.2.6 controls the use of bicycles on the site; IM 6.2.7 prohibits domestic pets on the site; and IM 6.2.8 provides for public access interpretive and safety signage.

**Effect of Changes to the Project on the Previous Environmental Analysis**

a-b) The SRP Phase 1 Project would not result an increase in population greater than that analyzed in the EIR, or in the associated demand for recreational facilities. Furthermore, the project includes interpretive signage that would enhance the experience of recreational users of campus trails. Low fencing and signage installed to protect restoration plantings would not prevent recreational use of any existing trails and would in any case be temporary. Therefore, the implementation of the RMP through SRP Phase 1 does not have the potential to result in new significant impacts related to recreation or contribute to any previously-identified impacts. Accordingly, the project is consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the Commission’s December 2007 and April 2008 Findings, and would not introduce any new potential recreational impacts, and no changed circumstance or new information is present that would alter the conclusions contained therein. No Project revisions or additional mitigation measures are required and the prior environmental analysis is sufficient and comprehensive to address the impacts of the Project on recreation.

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
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**14. TRANSPORTATION/TRAFFIC -- Would the project:**

- a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the



circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycles paths, and mass transit?

b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

e) Result in inadequate emergency access?

f) Conflict with applicable policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of vegetation management for habitat restoration on approximately 16 acres of natural lands on the UC Santa Cruz Marine Science Campus. One new half-time staff person would be added to the campus staff in support of this project. Most of the work would be performed by existing UCSC students and staff, augmented with contract work crews of up to 20 persons who would be hired periodically to assist with intensive planting or weeding efforts for periods of one to two weeks.

**Previous Analysis**

The CLRDP EIR analyzed the potential impacts of vehicle trips generated by development under the CLRDP on intersection operations and on the environment on nearby residential street segments, parking demand, traffic hazards, emergency access, and alternative transportation. The analysis concluded that cumulative development of the then-envisioned near term projects, as well as cumulative development of the CLRDP program over the long term, would contribute to significant cumulative impacts at several intersections in the City of Santa Cruz (CLRDP EIR p 4.15-33 , -44, -67 and -75), and would increase the potential for pedestrian conflicts with vehicles and bicycles along the north side of Delaware Avenue where there is no sidewalk, a less-than-significant impact, even prior to mitigation (CLRDP EIR p 4.15-37). Through Mitigation Measures 4.15-1, 4.15-3, 4.15-4, 4.15-5 and 4.15-6, the University committed to contribute its fair share of

the cost of intersection improvements, which would reduce traffic delays and improve intersection levels of service. Under Mitigation Measures 4.15-2, UCSC committed to pay a fair share of the cost of construction of a pedestrian path along a section of Delaware Avenue near the campus entrance. Even with the implementation of mitigation measures, however, it was concluded that intersection impacts would remain significant and unavoidable because additional approval outside of the jurisdiction of the University would be needed for the improvements, and some identified improvements might not be feasible.

**Effect of Changes to the Project on the Previous Environmental Analysis**

The SRP Phase 1 Project would not result an increase in population or related traffic greater than that analyzed in the EIR. The small number of daily trips generated by the single new half-time staff person would be well within the range of current daily variability, and would not result in a detectable change in levels-of-service at any intersection, conflict with any other established measures of effectiveness for circulation system performance, or make a cumulatively considerable contribution to any of the traffic impacts previously identified, nor would they conflict with any established congestion management plan. Traffic associated with existing students and staff is fully taken into account in the prior analysis. Traffic generated periodically by contract work crews of up to 20 persons hired to carry out elements of the project would result in sporadic increases in average daily trips to campus, but these increases would be temporary and would last for only short periods of time, and therefore would not result in a significant impact. Furthermore, because development at the campus has proceeded at a slower rate than anticipated, growth in traffic anticipated by 2010 in the CLRDP EIR has not occurred; thus the near-term traffic impacts identified in the CLRDP EIR have not occurred as of 2010 and likely will be delayed for several years at least. The SRP project in can case would make only a small and temporary contribution to cumulative traffic conditions. In response to the amendments to the CEQA Guidelines adopted the Natural Resources Agency in December 2009, the University no longer includes the question of adequate parking capacity in its CEQA checklist.

Therefore, the SRP Phase 1 Project does not have the potential to result in new significant impacts related to transportation, nor would it make a cumulatively considerable contribution to any significant cumulative impact. The project is therefore consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the Commission’s December 2007 and April 2008 Findings, and would not introduce any new potential traffic impacts, and no changed circumstance or new information is present that would alter the conclusions contained therein. No Project revisions or additional mitigation measures are required and the prior environmental analysis is sufficient and comprehensive to address traffic impacts of the Project.

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
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**15. UTILITIES AND SERVICE SYSTEMS –**

Would the project:

- |   |                          |                                     |
|---|--------------------------|-------------------------------------|
| a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|   | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?		☒
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☒
e) Result in a determination by the wastewater treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☒
g) Comply with applicable federal, state, and local statutes and regulations related to solid waste?	☐	☒
h) Create other utility and service system impacts?	☐	☒

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of weed removal and new plantings for habitat restoration on approximately 16 acres of natural lands on the UC Santa Cruz Marine Science Campus. The proposed project may utilize water for temporary irrigation, if necessary to establish plantings in the restored areas. Project operations would not utilize electricity or natural gas or generate any wastewater or significant volumes of solid waste.

**Previous Analysis**

The CLRDP EIR estimated that water demand for the CLRDP would represent 0.45 percent of system demand for the SCWD service area at the time the EIR was prepared. This new demand would not require new or expanded water entitlements or construction of new or expanded water supply facilities. However, full development of the CLRDP in conjunction with other development within the service area would result in increased cumulative demand for water in a system that does not have adequate supplies. The City has inadequate supply of water during low rainfall years, and the studies conducted by the City indicate that existing water supply would fall short of

existing and projected demands during critical and/or long-term drought conditions. At the time the CLRDP EIR was prepared the City was considering the development of a desalination facility and/or wastewater reclamation system to address the deficit but had not prepared an EIR to assess the environmental impacts of the construction and operation of a new water supply facility. The CLRDP EIR concluded that the development of a new source of water could potentially result in one or more significant environmental impacts. Therefore the cumulative impact associated with water supply would be significant and the CLRDP would make a cumulatively considerable contribution to this cumulative impact. Mitigation Measure 4.16-1a through -1d, adopted for the project, require the use of low-flow water fixtures; provide for water use curtailment in the event of drought restrictions; require that non-UC entities operating on campus minimize water usage; and identify that the City of Santa Cruz can and should identify and develop new water supplies to serve anticipated cumulative growth. These measures would reduce the cumulative impact and UCSC's contribution to it. However, because it is not known whether the entire water supply deficit will be adequately addressed, and whether all environmental impacts associated with the City's water supply projects could be reduced to a less than significant level, the CLRDP EIR concludes that the impact would be significant and unavoidable (CLRDP EIR p 4.16-18).

#### **Effect of Changes to the Project on the Previous Environmental Analysis**

The SRP Phase 1 Project would not result an increase in water demand associated with population growth that would exceed that analyzed in the EIR. The use of water for temporary irrigation of restoration plantings was not taken into account in the CLRDP water demand analyzed in the EIR. This temporary use, however, is offset by the fact that development at the site has not occurred at the rate anticipated; further, any new development will include water use efficiencies that would offset the anticipated irrigation use. The Project would use irrigation, only if necessary. Such irrigation would likely be limited to the summer and fall in the first year after planting, and any irrigation lines would be removed once the vegetation is established.

Since the EIR was certified, the City of Santa Cruz has determined that its existing water supplies are adequate to meet projected demand in normal water years at least through the year 2025<sup>3</sup> However, under drought conditions these existing supplies are inadequate to meet existing demand. A settlement agreement reached in August 2008 between the University and the City of Santa Cruz, the County of Santa Cruz, two community associations, and 11 individuals to resolve litigation with respect to The Regents' approval of the 2005 LRDP established a process by which the University and the City would agree on the University's water allocations in the event of a system-wide water use drought curtailment. Following this process, representatives of the University and the City met to agree upon the method for the University's water allocations under the City's Water Shortage Contingency Plan, which the City adopted in March 2009. To implement the University's commitment under this agreement, the Campus could temporarily reduce or suspend any irrigation of restoration plantings that otherwise would have been undertaken as part of the implementation of SRP Phase 1A. Failure to irrigate or suspension of irrigation could result in the loss of some new plantings but these would be replaced as described in the proposed SRP. The project's minimal use of water for irrigation would not have the potential to result in a significant effect related to water supply.

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<sup>3</sup> Erler and Kalinowski, Inc., 2009. City of Santa Cruz Water Supply Assessment, Sphere of Influence Amendment. September 15.

The project would not utilize any other utilities or result in the extension of any existing utility lines, with the potential exception of temporary irrigation lines that might be extended from the existing water system as needed and removed once vegetation was established.

The Project does not have the potential to result in new significant impacts related to utilities, and is consistent with the certified CLRDP, the CLRDP EIR, Addendum #1 and the Commission’s December 2007 and April 2008 Findings, and would not introduce any new potential utility impacts, and no changed circumstance or new information is present that would alter the conclusions contained therein. No Project revisions or additional mitigation measures are required and the prior environmental analysis is sufficient and comprehensive to address utility impacts of the Project.

Issues	Additional Project-level Impact Analysis Required	Project Impact Adequately Addressed in Earlier Environmental Document
<b>16. MANDATORY FINDINGS OF SIGNIFICANCE</b>		
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Does the project have the potential to achieve short-term environmental goals to the disadvantage of long-term environmental goals?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Does the project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of past, present and probable future projects)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**Relevant Features of the Project**

The proposed SRP Phase 1A Project consists of habitat restoration on approximately 16 acres of natural lands on the UC Santa Cruz Marine Science Campus that would consist of the planting of

native plants in coyote-brush scrub-grassland, grassland, coastal bluff scrub, central wetland, and wetland buffer habitat, and removal of non-native invasive weeds throughout the terrace lands. The work would be carried out by hand and would not require the use of any utilities, but could result in water consumption for temporary irrigation for new native plantings. No hydrological or topographic modifications are proposed. Work would be carried out primarily by current campus employees and by students, but would entail hiring of one new half-time employee, and occasional employment of contract work crews of up to 20 persons for one to two week periods.

**Previous Analysis**

a) As discussed in the sections on *Biological Resources* and *Cultural Resources*, above, the CLRDP EIR determined that implementation of the CLRDP, including the restoration activities under the RMP, would not result in any significant adverse effects on sensitive plant or wildlife species, sensitive habitat, or prehistoric resources (CLRDP EIR Section 4.4 and 4.5).

b-d) The CLRDP EIR identified the following significant and unavoidable impacts of the CLRDP (CLRDP EIR Section 4.15 and 4.16):

<b>Number</b>	<b>Impact</b>
4.15-1	Impact associated with increased short-term traffic at Mission and Bay.
4.15-3	Impact associated with increased short and long-term traffic at Mission and Bay.
4.15-4	Impact associated with increased short and long-term traffic at Mission and Chestnut.
4.15-5	Impact associated with increase in total traffic at Mission and Bay.
4.15-6	Cumulative impact associated with decreased levels of service at six study intersections.
4.16-1	Cumulative impact associated with demand for a new water supply source.

The CLRDP EIR determined that all other environmental impacts of the CLRDP would be less than significant with mitigation (CLRDP EIR, Table 2-1).

**Effect of Changes to the Project on the Previous Environmental Analysis**

The SRP Phase 1A Project identifies locations where RMP restoration activities would be carried out, and the specific methods that would be used for weed removal and restoration planting.

a) As discussed in the sections on *Biological Resources* and *Cultural Resources*, above, the project refinements would not result in new significant impacts on special-status plants or wildlife, sensitive habitat, or prehistoric resources, or a substantial increase in the severity of previously identified significant effects on these resources (CLRDP EIR Sections 4.4 and 4.5).

b-d) The implementation of the RMP through SRP Phase 1 project would not result in an increase in vehicle trips or water demand greater than that analyzed in the CLRDP EIR. Furthermore, the Campus anticipates that only one of the five near-term projects analyzed at the project level in the CLRDP EIR (the Center for Ocean Health Phase II, now renamed the Center for Ocean Health Expansion) will be constructed or under construction by 2010 as anticipated in the EIR. As a result, the near-term contribution of CLRDP development to the significant impact of cumulative near-term CLRDP development (by 2010) upon traffic congestion and intersection LOS identified in the EIR would not be significant.

In addition, as described in *Utilities* (Section 14, above), the City of Santa Cruz currently projects that, in normal water years, the existing water supply will be adequate to serve existing and

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projected demand through at least 2025.<sup>4</sup> The City's water supplies are not adequate to serve existing demand in drought years. The University has committed that, in the event that the City declares a water shortage, the Campus will reduce its water demand in accordance with the City's Water Shortage Contingency Plan. The project would comply with any demand reduction program implemented by the University to satisfy this commitment by reducing or suspending irrigation of new plantings. Therefore, the SRP project would not contribute to the project or cumulative water supply impacts of the CLRDP.

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<sup>4</sup> Erler and Kalinowski, Inc., 2009. *City of Santa Cruz Water Supply Assessment, Sphere of Influence Amendment*. September 15.

**VIX. SUPPORTING INFORMATION SOURCES**

California Coastal Commission Findings on UCSC's CLRDP. December 2007

California Coastal Commission Findings on UCSC's CLRDP. April 2008.

California Coastal Commission Staff Report on UCSC's CLRDP. November 2007.

California Coastal Commission Staff Report on UCSC's CLRDP. March 2008.

Specific Resource Plan, Enhancement and Protection of Terrace Lands at Younger Lagoon Reserve. UCSC Staff and the Younger Lagoon Reserve Scientific Advisory Committee. June 1, 2010.

University of California Santa Cruz (UCSC) Final Coastal Long Range Development Plan (CLRDP), December 2008

UCSC Marine Science Campus CLRDP Draft Environmental Impact Report, January 2004

UCSC Marine Science Campus CLRDP Environmental Impact Report Addendum #1: Proposed Revisions to the CLRDP. November 2006

**X. INITIAL STUDY PREPARERS**

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<b>XI. Mitigation and Monitoring Program</b>				
<b>Measure #</b>	<b>Measure Text</b>	<b>Monitoring and Reporting Procedure</b>	<b>Monitoring and Reporting Responsibility</b>	<b>Timing</b>
<b>CLRDP Policy 3.2</b>	<b>Protection and Restoration of Habitat Areas:</b> The biological productivity and the quality of coastal waters, streams, and wetlands, appropriate to maintain the optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through among other means minimizing adverse effects of wastewater discharges, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging wastewater reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural watercourses. Campus natural areas (i.e., areas outside of defined development zones) shall be protected, restored, enhanced, and managed as high-quality open space and natural habitat areas.	Implemented through development of this SRP and, for SRP, through implementation of MM 4.4-1, 4.4-2 and 4.5-1, below; reporting as described in specific mitigation measures, below.	PP&C	Prior to and during construction
<b>CLRDP MM 4.4-1</b>	<b>CA Red-legged Frog:</b> For all projects proposed in the upper terrace under the CLRDP, the University will implement the following:  A preconstruction survey for CRLF will be conducted of all areas proposed for grading and construction by a qualified biologist, approved by the USFWS. If CRLF are observed, grading activities shall be postponed and USFWS shall be consulted to determine appropriate actions to avoid impact. Consultation with the USFWS will result in either a determination of the need to obtain a permit or in the identification of measures to avoid take of the individual(s).  The biological monitor shall also conduct meetings with the contractor(s) and other key construction personnel to describe the importance of the species, the need to restrict work to designated areas, and to discuss procedures for avoiding harm or harassment of wildlife encountered during construction.	Conduct survey. Document results.  If CRLF are observed, consult with USFWS.  Conduct meetings with contractor(s) and construction personnel. Include mitigation specifications in construction contract.	Prior to construction, of projects in upper terrace  Prior to construction, if CRLF are observed  Before beginning construction	PP&C
<b>CLRDP MM 4.4-2</b>	<b>Nesting Birds:</b> UCSC shall ensure that construction activities avoid disturbing nests of raptors (and other special-status birds). If ground-disturbing activities are scheduled to occur during the breeding season (February 1 through August 31), the following measures are required to avoid potential adverse effects on nesting special-status raptors and other birds:	Conduct survey. Document results.  Create no-disturbance buffer in consultation with qualified biologist.	Before beginning construction on each project  Before beginning construction, if	PP&C

<sup>5</sup> California Department of Fish and Game, *Staff Report on Burrowing Owl Mitigation*, The Resources Agency, October 17, 1995.

<b>XI. Mitigation and Monitoring Program</b>				
<b>Measure #</b>	<b>Measure Text</b>	<b>Monitoring and Reporting Procedure</b>	<b>Monitoring and Reporting Responsibility</b>	<b>Timing</b>
	<p>A qualified wildlife biologist will conduct preconstruction surveys of all potential nesting habitat. For burrowing owls, such surveys will follow the most recent CDFG Burrowing Owl Survey Protocol and Mitigation Guidelines.5</p> <p>If active raptor nests are found during preconstruction surveys, a no-disturbance buffer acceptable in size to CDFG will be created around active raptor nests and nests of any other special-status birds during the breeding season, and maintained until it is determined that all young have fledged. Raptor or other bird nests initiated during construction are presumed to be unaffected, and no buffer is necessary. However, the “take” of any individuals will be prohibited.</p> <p>If preconstruction surveys indicate that nests are inactive or potential habitat is unoccupied during the construction/restoration period, no further mitigation is required. Trees and shrubs that have been determined to be unoccupied by special-status birds or that are located outside the no-disturbance buffer for active nests may be removed.</p>	<p>Include mitigation specifications in construction contract.</p>	<p>active raptor nests are found</p>	
<b>CLRDP MM 4.5-1</b>	<p><b>Human Remains:</b> If human remains are discovered during the construction of a development project under the CLRDP, the University and/or its employees shall notify the Santa Cruz County Coroner’s Office immediately. Upon determination by the County Coroner that the remains are Native American, the Coroner shall contact the California Native American Heritage Commission, pursuant to subdivision (c) of Section 7050.5 of the Health and Safety Code, and the County Coordinator of Indian Affairs and appropriate Native American consultation shall be conducted, as outlined by PRC 5097.98. Implementation Measure 3.9.1, Construction Monitoring, as identified in the CLRDP, shall also apply. UCSC will be responsible for implementing this mitigation measure.</p>	<p>Include in construction contract the requirement that the University be notified if suspected human bone is discovered.</p> <p>Contact archaeologist and County Coroner in the event of discovery of suspected human bone. Contact California Native American Heritage Commission and conduct Native American consultation if Coroner determines the remains are Native American.</p>	<p>Before beginning construction</p> <p>During construction</p>	<p>PP&amp;C</p>

<b>XI. Mitigation and Monitoring Program</b>				
<b>Measure #</b>	<b>Measure Text</b>	<b>Monitoring and Reporting Procedure</b>	<b>Monitoring and Reporting Responsibility</b>	<b>Timing</b>
<b>CLRDP IM 3.9.1</b>	<b>Cultural Resources Construction Monitoring:</b> Should archaeological and/or paleontological resources be encountered during any construction on the Marine Science Campus, all activity that could damage or destroy these resources shall be temporarily suspended until qualified archaeologist/paleontologists and Native American representatives have examined the site and mitigation measures have been developed that address and proportionately offset the impacts of the project on archaeological and/or paleontological resources. Development shall incorporate measures to address issues and impacts identified through any archaeologist/ paleontologist and/ or Native American consultation.	<p>Include in construction contract the requirement that work be suspended if archaeological resources are disclosed.</p> <p>Contract with qualified archaeologist to develop appropriate mitigation measures.</p>	<p>Before beginning construction</p> <p>If archaeological resources are disclosed</p>	PP&C
<b>CLRDP IM 3.10.1</b>	<b>Use, Containment and Cleanup of Hazardous Materials.</b> The University, through the Office of Environmental Health and Safety, will manage the use, and in the event of spillage, the containment and cleanup of, hazardous materials and petroleum on the UCSC Marine Science Campus in compliance with federal and state regulations related to the storage, disposal, and transportation of hazardous substances.	For UC entities, continue to implement UCSC Environmental Health and Safety programs involving oversight of individual units' compliance efforts and advising on improvements in procedures related to storage, disposal, and transportation of hazardous substances.; document activity of relevant EH&S programs	Ongoing, frequency varies with the type and quantity of hazardous materials; document annually	UCSC EH&S
<b>CLRDP Policy 7.1</b>	<b>Productivity and Quality of Coastal Waters.</b> The Marine Science Campus shall be developed and used in a manner that shall sustain and, where feasible, enhance and restore, the biological productivity and quality of coastal waters on and adjacent to the Campus through controlling, filtering, and treating runoff and other non-point sources of pollution, preventing depletion of groundwater supplies and substantial interference with surface water flow, encouraging wastewater reclamation, and maintaining natural vegetation buffer areas that protect riparian habitats.	<p>Implement Resource Management Plan as described in this SRP</p> <p>Construction practices consistent with Stormwater Concept Plan</p>	Throughout construction	PP&C
<b>CLRDP IM 7.1.8</b>	<b>Irrigation and Use of Chemicals for Landscaping.</b> Any water used for landscape irrigation on the Marine Science Campus shall not be applied in a manner that would cause significant erosion. Any use of chemicals for fertilizer and/or weed and pest control shall be minimized to the degree feasible, including as required by the	Establish polices for irrigation and use of chemicals in landscaping to minimize erosion potential and runoff into habitat areas or the ocean.	Before occupancy of first project developed under the CLRDP	Physical PLant

<b>XI. Mitigation and Monitoring Program</b>				
<b>Measure #</b>	<b>Measure Text</b>	<b>Monitoring and Reporting Procedure</b>	<b>Monitoring and Reporting Responsibility</b>	<b>Timing</b>
	Drainage Concept Plan, and any chemicals unavoidably used shall not enter habitat areas or the ocean in concentrations sufficient to harm wildlife and/or to degrade habitat.			

# Specific Resource Plan

## Phase 1

### Enhancement and Protection of Terrace Lands at Younger Lagoon Reserve

June 1, 2010

This document was a collaborative effort among UCSC Staff and the Younger Lagoon Reserve Scientific Advisory Committee.

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## **INTRODUCTION**

On January 7, 2009 the California Coastal Commission (CCC) certified UCSC's Coastal Long Range Development Plan (CLRDP) for its Marine Sciences Campus (MSC). The CLRDP is a comprehensive physical development and land use plan that governs development, land use and resource protection at the MSC, including Younger Lagoon Reserve (YLR).

The CLRDP states that all "natural areas" outside of the Campus Development Zone on the MSC are to be incorporated into Younger Lagoon Reserve, restored, and preserved in perpetuity (CLRDP 2009). On July 24, 2008 the University of California Natural Reserve System (UCNRS) and UCSC Campus Administration signed an agreement incorporating the approximately 42 ac (17 ha) of natural areas (CLRDP 2009) into the University of California Natural Reserve System (UCNRS) as part of UCSC's Younger Lagoon Reserve (YLR now encompasses approximately 67 ac [27 ha]). In this document, these additional Natural Areas will be collectively referred to as the Terrace Lands. The agreement outlines the commitment by the NRS and campus to comply with restoration, management, and research on all YLR lands.

The Resource Management Plan (RMP) within the CLRDP provides a broad outline with general recommendations and specific guidelines for resource protection, enhancement, and management of all areas outside of the mixed-use research and education zones on the MSC site (areas that will remain undeveloped). A critical component of the CLRDP is the creation of a Specific Resource Plan (SRP) for each phase of restoration guided by a Scientific Advisory Committee (SAC). Thus, the intent of the RMP is for the SAC to use it as an initial framework for development of more detailed SRP for implementation. The subsequent SRP's may be adapted to address the current physical and ecological conditions, current understanding of biological and ecological processes, and current approaches to habitat re-vegetation, restoration, and enhancement. Although the SRP's are meant to be consistent with the performance standards set forth in the RMP, they may be adapted periodically based on findings from ongoing restoration work or input from the SAC. As such, the RMP goals and performance standards are not static requirements per se so much as initial guidelines that may be refined during the SAC process so long

as such refinement is consistent with current professional restoration, enhancement, and management goals and standards, and with achieving high quality open space and natural habitat in perpetuity and consistent with the CLRDP.

Although the SRP's provide specific methodology and criteria for restoration and enhancement of the Terrace Lands within YLR it is important to note that other education and research endeavors will occur throughout YLR. These education, research, and outreach projects are concurrent with UCNRS's mission to "*contribute to the understanding and wise management of the Earth and its natural systems by supporting university-level teaching, research, and public service at protected natural areas throughout California.*" Interpretive signs will be placed throughout the Terrace Lands and student and faculty users will conduct a wide range of projects ranging from observational studies of vertebrates to manipulative experiments focused on evaluating various restoration strategies and techniques to studies of wetland hydrology on coastal wetland species. These educational and research endeavors will help train students, inform the public, provide insight into the natural world, and help guide future restoration and management efforts at YLR and other similar habitats. In fact, undergraduate student investigators contributed greatly to this SPR both through background research and initial vegetation mapping efforts. Thus, restoration efforts outlined below in the SRP, combined with future uses consistent with the UCNRS mission, will provide a unique opportunity for researchers, students, and the public to participate in, and observe, restoration and to use the reserve as an outdoor classroom and living laboratory.

The following document provides the SRP for the Phase 1 of the restoration of the Terrace Lands within YLR. There are approximately 42 ac (17 ha) outside of the development zone that will be restored over the next 20 years; thus, approximately 14 ac (5.5 ha) will be restored during each of the three phases. At the conclusion of Year 7 another SRP will be written for Phase II (years 7-14), and after year 14 the final SRP will be written for Phase III (years 14-21).

Complete SRP guidelines are included as Appendix 1. Mitigation and monitoring program requirements under the California Environmental Quality Act (CEQA) are included as Appendix 2.

## **BASELINE ASSESSMENT (SRP 1)**

This SRP applies to Phase 1 restoration of the Younger Lagoon Reserve Terrace Lands, located on UCSC's Marine Science Campus. The MSC is located on the coast at the western edge of the City of Santa Cruz. It encompasses, among other things, the laboratory complex known as Joseph M. Long Marine Laboratory (LML), a flat, gently southward-sloping coastal terrace that ends at a bluff approximately 35 ft (10.5 m) above the waters of the Monterey Bay National Marine Sanctuary, and the University of California's Younger Lagoon Reserve. The site is located within the coastal zone of the City of Santa Cruz.

The MSC is bordered by a variety of land uses. Agricultural land lies to the west of the site along the western boundary of YLR. The northern boundary of the campus is formed by the Union Pacific Railroad tracks beyond which is an industrial area. Shaffer Road runs along the eastern boundary of the site north of Delaware Avenue. East of Shaffer Road is undeveloped land that is currently vacant except for a community garden. Antonelli Pond lies to the east of this area. South of Delaware Avenue the MSC is bounded on the east by the De Anza Mobile Home Park. The Pacific Ocean forms the site's southern boundary.

The approximate 96-acre (39 hectare) Marine Science Campus site brings together the Campus Development Zones (approximately 29 ac [12 ha]), including the original 15.70 acre (6.3 hectare) LML site, the original YLR (approximately 25 ac [10 ha]), and YLR Terrace Lands (approximately 42 ac [17 ha]). The upland terrace, which encompasses both the Campus Development Zone and the YLR Terrace Lands, stretches from the coastal bluff area northward to the Union Pacific Railroad tracks at the site's northern boundary. The majority of the site was used for agriculture and produced Brussels sprouts until 1987. Since 1987 the area has remained fallow. As described more fully below, the coastal bluff and terrace support a mix of native and non-native vegetation, most of which is characterized as non-native grassland and coyote brush scrub-grassland.

Seasonal freshwater wetlands are also present on the terrace. A narrow intertidal rock shelf exists at the base of the bluff.

YLR is part of the University of California Natural Reserve System managed for research and other educational activities. Younger Lagoon lies along the western edge of the site. The reserve includes the lagoon itself as well as portions of tributary drainages and adjacent upland habitats. YLR contains known and potential habitat for several special-status wildlife species. No special-status plant species are known to occur on the reserve.

Several areas in YLR meet the definition of environmentally sensitive habitat area (ESHA) under the California Coastal Act. An ESHA is defined as any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments. At the time of CLRDP certification portions of the original YLR qualified as ESHA, as did seasonal wetlands on the Terrace and the rocky intertidal zone.

The terrace and bluff are part of the lowest and southernmost of a series of marine terraces along the Santa Cruz coastline. The terrace is essentially flat, with a 1-2% slope to the south. Its elevation ranges from 51 ft (15.5 m) above sea level at the northern edge to 37 ft (11 m) above sea level at the bluff top; its southern boundary. The southwestern edge of the terrace, between the original LML and Younger Lagoon, is partially edged by an artificial berm approximately 10 to 12 ft (3 to 3.5 m) high and 40 to 50 ft (12 to 15 m) wide.

The site is subject to a Mediterranean climate with wet cool winters and dry warm summers with little rainfall. This pattern helps to account for the mostly seasonal nature of the site's wetlands. Summer fog is present on 30% to 40% of the days. Prevailing winds are from the northwest in the summer and winter storm winds are generally from the south. Total rainfall averages approximately 30 inches (76 cm) per year. The site is exposed and subject to relatively high wind velocities, coastal fog, and salt spray compared to more protected areas to the east.

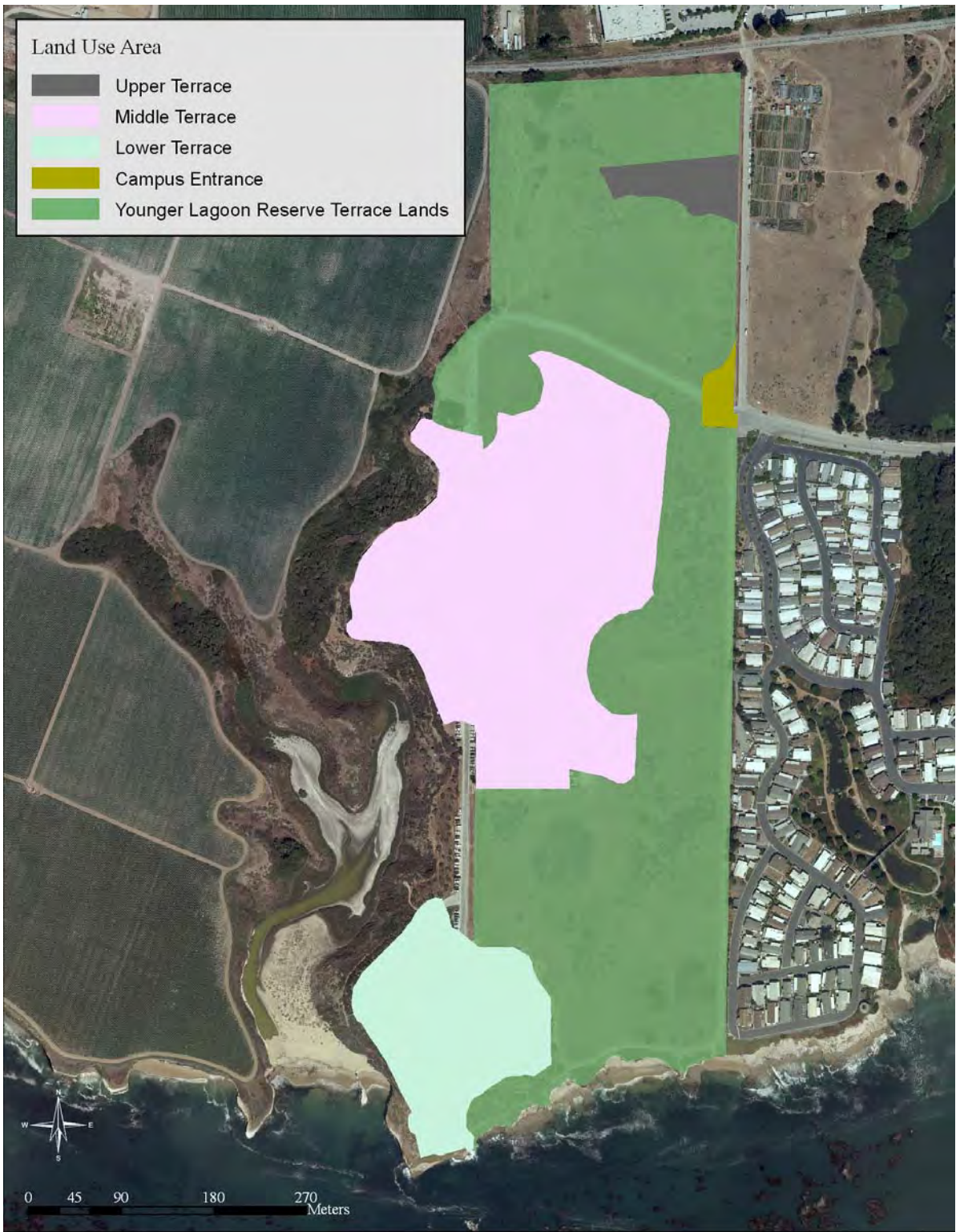
Soils on the terrace exhibit generally poor drainage, with portions of the site experiencing saturated soil conditions and temporary shallow inundation during the wet season (November through March). Soils fall into three soil series, Elkhorn Sandy Loam, 0-2% slope; Elkhorn Sandy Loam, 2-9% slope; and Watsonville Loam, thick surface, 0-2% slope (Soil Conservation Service 1980). These soils were formed from alluvial fans and marine deposits and tend to be deep with loamy textures and slow runoff. The 0-2% slope soils are categorized by the Natural Resource Conservation Service as hydric soils for Santa Cruz County (Natural Resource Conservation Service 1992). The soils are underlain by Santa Cruz Mudstone, with the water table generally 2 to 10 ft (0.6 to 3 m) below the surface depending on time of year (Philip Williams and Associates 1995).

Surface water primarily enters the property from a culvert at the railroad tracks near the northwest corner of the site, through on-site precipitation and by site runoff (Huffman-Broadway Group, Inc. 2004). The watershed above the Terrace Lands is significantly restricted by HWY 1 which diverts potential (and likely historical) runoff that would have ended up in Younger Lagoon over to Wilder Ranch State Park (West) or Antonelli Pond (East). Thus, the approximate size of the watershed that flows into the upper Terrace area is only approximately 50 ac (20 ha). Water leaves the site through evaporation and evapotranspiration, as well as drainage to Younger Lagoon, De Anza Mobile Home Park, and the ocean. Natural drainage patterns have been altered by LML and related Campus development as well as ditches and surface reconveyance from past farming activities. Subsurface seeps on the coastal bluff and YLR slopes also indicate that near surface perched groundwater exits on the site at these locations. Extensive burrowing activity by rodents is evident throughout the Terrace and may have loosened the upper portions of the soil profile and aerated the soils. This may be improving soil drainage characteristics and increasing vertical and horizontal water movement through the site (Huffman-Broadway Group, Inc. 2004).



### *Development zones*

The built environment is organized into four primary zones of development, one each in the lower (approximately 7 ac [3 ha]), middle (approximately 20 ac [8 ha]), and upper portions of the site (approximately 1.4 ac [0.6 ha]), and one at the Campus entrance (approximately 0.5 ac [0.2 ha]), referred to in the CLRDP as Lower Terrace, Middle Terrace, Upper Terrace, and Campus Entrance development zones (Figure 1). Each development zone is intended to include a mix of marine research and education uses, except for the Campus Entrance zone, which is intended for more general support facilities such as parking and an entrance kiosk (University of California Santa Cruz 2008).



**Figure 1.** Campus Development Zones and YLR Terrace Lands.

### ***Natural areas outside of the MSC Development Zones (YLR Terrace Lands)***

Below, the baseline conditions of YLR Terrace Lands is described.

#### ***Non-native grassland***

Non-native grassland is one of two dominant vegetation types, along with coyote brush scrub, (*Baccharis pilularis*) on the terrace and currently covers approximately 31 ac (12.5 ha) of the Terrace Lands. It became firmly established after farming ceased in 1987 and is now composed almost entirely of weedy non-native and mostly annual species. The dominant species include ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), six-weeks fescue (*Vulpia bromoides*), slender wild oat (*Avena barbata*), hare barley (*Hordeum murinum* ssp. *leporinum*), and Italian ryegrass (*Lolium multiflorum*). Herbs include wild radish (*Raphanus sativus*), cut-leaved geranium (*Geranium dissectum*), bristly ox-tongue (*Picris echioides*), and Bermuda-buttercup (*Oxalis pes-caprae*). The abundance of Bermuda-buttercup, which reproduces by vegetative bulblets, likely results from past cultivation and tilling activities.

#### ***Coyote-brush scrub***

Coyote-brush scrub is currently the second dominant vegetation community on the terrace and is sparsely distributed over approximately 7 ac (3 ha) on the Terrace Lands (Figure 2). It is characterized by patches of coyote brush of various sizes interspersed with open grassland areas. It is similar in composition to the non-native grassland and also includes scattered patches of Douglas' baccharis (*Baccharis douglasii*). Many coyote brush individuals are very tall, reaching 10 ft (3 m) or more. Bermuda-buttercup is generally abundant under the coyote brush.

### ***Ruderal***

Areas identified as ‘ruderal’ in the CLRDP are included in this SRP as either part of the non-native grassland or coyote-brush scrub categories. Restoration activities in “ruderal” areas will be the same as in the adjacent non-native grassland and coyote-brush scrub areas. The ruderal designation included an area that supports a linear (north-south) underground utility corridor (University of California Santa Cruz 2008). All vegetation was removed during construction and the area is now colonized by a dense cover of the weedy, non-native herb bur-clover (*Medicago polymorpha*). Other species include non-native weeds such as white-stemmed filaree (*Erodium moschatum*), Cretan lavatera (*Lavatera cretica*), Jubata grass (*Cortaderia jubata*), poison hemlock (*Conium maculatum*), and non-native annual grasses.

### ***Coastal bluffs***

Current coastal bluff vegetation can be classified into two groups: mixed and ice plant (*Carpobrotus edulis*). The coastal bluff area is exposed to salt spray and ocean winds and is represented as a narrow zone along the top of bluff at the Terrace’s southern end just south of LML (Figure 3). The perennial grass creeping wild rye (*Leymus triticoides*) is the most abundant native species; other natives include the herbaceous perennials lizard tail (*Eriophyllum staechadifolium*), coast buckwheat (*Eriogonum latifolium*), seaside daisy (*Erigeron glaucus*), yarrow (*Achillea millefolium*) and sea lettuce (*Dudleya caespitosa*). The history of these species on the Terrace is unclear; they may be indigenous to the site or may have established from native plant garden seed dispersal. The non-native wild radish, Bermuda-buttercup, Cretan lavatera, and ripgut brome are also abundant. Ice plant extends along much of the eastern boundary of site by the De Anza Mobile Home Park. Overall, this area dominated by ice plant and non-native grasses and is highly degraded.



**Figure 2.** Map of creeping wild rye, coyote brush, and arroyo willow on the Terrace Lands. Plants were digitized using a 2007 ortho-image as a background (small patches of *L. triticoides* in coastal bluff area not mapped).



**Figure 3.** Coastal bluff area.

## *Wetlands*

The CLRDP cites 12 wetlands (W) on the Terrace Lands (Figure 4; Huffman-Broadway Group, Inc. 2004). These wetlands support six vegetation types: seasonal ponds, freshwater marsh-coastal terrace, willow herb-Douglas' baccharis, moist meadow, willow riparian forest, and annual grassland (University of California Santa Cruz 2008, EcoSystems West 2002). In addition, some wetland indicator species (e.g. Italian ryegrass and Douglas' baccharis) are patchily distributed outside of the 12 delineated wetlands (Huffman-Broadway Group, Inc. 2004).

W1 is the drainage channel along the northwestern boundary of the property (approximately 0.14 ac [0.05 ha]). W2 is a flatter wetland swale in the northwestern portion of the property (it connects with W1 at its northern and southern ends). W3 is a large ponded area adjacent to the intersection of Delaware Avenue and Shaffer Road. W2 and W3 combined are approximately 4.57 ac (1.85 ha). W4 is a seasonal wetland swale in the eastern portion of the site (approximately 0.42 ac [0.17 ha]). W5 is a seasonal pond in the depression area immediately south of the NOAA building (approximately 2.21 ac [0.89 ha]). W6 is an isolated wetland complex just north of the California Department of Fish and Game (CDFG) building (approximately 0.09 ac [0.036 ha]). W8 is an isolated wetland immediately south of Delaware Avenue Extension (approximately 0.01 ac [0.004 ha]). W9 is an isolated wetland approximately 200 ft<sup>2</sup> (61 m<sup>2</sup>) south southeast of the road bend where Delaware Avenue Extension turns south to become McAllister Way (87 ft<sup>2</sup>, 8 m<sup>2</sup>). W10 is an isolated wetland south of the DeAnza drainage adjacent to the eastern property boundary (four ft<sup>2</sup>, 0.37 m<sup>2</sup>). W11 is a drainage channel that extends westward from McAllister Way (115 ft<sup>2</sup>, 10.6 m<sup>2</sup>). W12 is a complex of wetlands south and east of the W5 (approximately 0.21 ac [0.085 ha]). Other than wetland W7, all wetlands qualify as ESHAs and together total approximately 7.65 ac. Each of these is described in more detail below.



**Figure 4.** Wetlands.



In addition to finding wetlands that qualified as ESHA on the Marine Science Campus, the Huffman-Broadway Group (2004) found one area that qualified as wetland but that did not qualify as ESHA. This is designated as Wetland W7. Wetland W7 was determined to have no plant or animal life or habitat that was either rare or especially valuable because of its role in the ecosystem. Wetland W7 is approximately 43 ft<sup>2</sup> (4 m<sup>2</sup>) and is located in the northeast corner of the site approximately 150 ft (46 m) south of the northern property line.

### *Wetland Vegetation Types*

EcoSystems West (2002) described five wetland vegetation types on the Terrace Lands based on vegetation characteristics. These include seasonal pond, freshwater marsh-coastal terrace, herb community dominated by willow-herb and Douglas' baccharis, moist meadow, and central coast arroyo willow riparian forest. EcoSystems West (2002) characterized Italian ryegrass (*Lolium multiflorum*) as an upland vegetation type. However, at the time that the U.S. Fish and Wildlife Service (USFWS) issued its 1988 list of species that grow in wetlands, Italian ryegrass was considered synonymous with perennial ryegrass (*L. perenne*), a hydrophyte with a wetland designation of "FAC" (equally likely to occur in uplands or wetlands). Although the 1996 USFWS list does not include Italian ryegrass (the perennial ryegrass is now considered by many to be a separate species), in California it occurs in the same habitat conditions as its congener. On the Terrace Lands Italian ryegrass grows in locations that are continuously inundated for months as well as in areas with upland hydrology. As such, the species is considered a FAC species and a sixth wetland vegetation type (Grassland dominated by Italian ryegrass) is suggested to be included on the Terrace Lands (Huffman-Broadway Group, Inc. 2004). The following six wetland vegetation types exist on the Terrace Lands:

1. Seasonal ponds—Located within the grasslands south of the NOAA building in the southwestern portion of the terrace (Wetland W5). Patches of prairie bulrush (*Scirpus maritimus*) dominate the central pond, along with smaller dense patches of pale spike-rush (*Eleocharis macrostachya*). Scattered on the pond bed are

patches of the coastal salt marsh species such as pickleweed (*Salicornia virginica*) and non-native brass buttons (*Cotula coronopifolia*), swamp grass (*Crypsis schoenoides*), and biennial sagewort (*Artemisia biennis*). An annual native herb, water starwort (*Callitriche marginata*), is abundant along the pond margins where the vegetation is not otherwise sharply distinct from that of the adjacent non-native grassland. Douglas' baccharis and Italian ryegrass also grow in the transitional areas.

2. Freshwater marsh—Found in three areas throughout the Terrace. The first area is near the western boundary of the site just north of the sharp curve where Delaware Avenue Extension curves to the south near the southwest corner of Wetland W2. The marsh is in a small topographic depression, dominated by a dense patch of California tule (*Scirpus californicus*). Water smartweed (*Polygonum punctatum*) and willow-herb (*Epilobium* spp.) occur around the edges along with a small arroyo willow (*Salix lasiolepis*).

The second area of freshwater marsh-coastal terrace is just south of the railroad tracks in the northwestern corner of the property at the northwest end of Wetland W2 at its intersection with W1. Dominated by a large arroyo willow in the center, the marsh also supports a dense colony of broad-leaved cattail, (*Typha latifolia*), floating marsh-pennywort (*Hydrocotyle ranunculoides*), water smartweed, willow-herb, and prairie bulrush. Saltgrass (*Distichlis spicata*) occurs in dense patches along the marsh margins.

The third location of freshwater marsh-coastal terrace is in the small wetland complex in the northwestern area of the terrace north of the CDFG building. This marsh drains into the eastern arm of Younger Lagoon. Prairie bulrush and willow-herb grow along the margins of the marsh, which can have open water as late as May. Willow-herb, prairie bulrush, and tall cyperus (*Cyperus eragrostis*) are the dominant species in the drainage way.

3. Herb community—This type is dominated by willow-herb and Douglas' baccharis as well as non-native cut-leaved geranium and bristly ox-tongue. Although these

species occur elsewhere on the property, only a small area in the east-portion of W4 supports this specialized vegetation type.

4. Moist meadow habitat—Occurs at the northern end of the W6 wetland complex and to the north of the freshwater marsh-coastal terrace from which it is separated by an area of non-native grassland. The moist meadow intergrades with the non-grassland habitat, but is floristically distinct and its soil retains moisture until relatively late in the season. It is dominated by the non-native velvet grass (*Holcus lanatus*) which is a perennial that indicates at least seasonally moist conditions. The native Pacific silverweed (*Potentilla anserina* ssp. *pacifica*) is an abundant associate. Other species include willow-herb, cut-leaved geranium, wild radish (*Raphanus sativa*), prickly sow-thistle (*Sonchus asper*), and bristly ox-tongue.
5. Central coast arroyo willow riparian forest—Although abundant in Younger Lagoon, this habitat is found in only one location on the Terrace. Beyond the freshwater marsh-coastal terrace and moist meadow habitats, arroyo willow riparian forest also occurs near W6 and in one small patch at the southeast end of the freshwater marsh-coastal terrace. It is dominated by arroyo willow with no other arborescent species present and little understory.
6. Grassland dominated by Italian ryegrass—This habitat is a significant part of the vegetation in wetlands W2, W3, W4, W5, W8, W9, W10, and W12.

### *Description of wetlands*

Below are more detailed descriptions of specific characteristics of each wetland that occurs on the Terrace Lands.

#### *Wetland W1*

W1 and W2 both receive water from the culvert beneath the berm at the railroad tracks near the northwestern corner of the Terrace Lands. A small bermed area separates the wetland from adjacent agricultural lands to the west. Water flows in a north to south direction along the northwestern property boundary, then veers to the southwest before discharging to the eastern arm of Younger Lagoon. W1 was originally a drainage channel constructed to prevent inundation and allow agricultural cultivation in the northern portion of property. At present, it provides a major source of freshwater to Younger Lagoon. Sediment accumulation along portions of the channel has caused small ponds to form in some areas.

W1 is dominated by arroyo willow (*Salix lasiolepis*), willow-herb (*Epilobium ciliatum* ssp. *watsonii*), and the non-native curly dock (*Rumex crispus*). A non-native weeping willow (*Salix babylonica*) and the weedy invasive Jubata grass (*Cortaderia jubata*) also grow in W1. Poison hemlock (*Conium maculatum*) grows along its upper banks.

Wetland W1 and adjacent upland habitat provide an opportunity for wildlife to travel between Younger Lagoon and Antonelli Pond/Moore Creek (and along the railroad tracks to the west more generally).

#### *Wetland W2*

W2 shares a water source with W1 and also receives sheet flow from upland areas to the east. Historical aerial photographs show that W2 previously included a man-made drainage ditch feature but active management of the ditch apparently stopped in the early 1980s. The channel gradually filled in with sediment and W2 no longer contains a clearly defined bed and bank, making it difficult to define its lateral boundaries. As delineated in 2001, it diverges from its origin near the culvert into two narrow bands, one extending south to just north of Delaware Avenue Extension and the other extending west and east along the northern Campus boundary. The Delaware Avenue Extension road grade promotes flooding, ponding, and surface soil saturation during the wet season and through early spring. This results in some recharge of the shallow water table as well as settling of suspended solids and associated pollutants.

Wetland W2 supports both Italian ryegrass and two locations of freshwater marsh-coastal Terrace habitat (one in the southwest corner and the other in the northwest corner). This habitat contains California tule, water smartweed, willow-herb, and arroyo willow. The non-native grassland in W2 is not sharply distinct in species composition from the adjacent upland. The lowest portion of the area is overwhelmingly dominated by Italian ryegrass. Several large patches of the non-native herb green dock (*Rumex conglomeratus*) occur in the northern portion of the site, along with two patches of Douglas' baccharis at the margin of the wetland.

Wildlife habitat in W2 includes seasonal aquatic habitat in areas of ponded water and California Red-legged Frogs have been sighted in a small pond in the northwest corner of W2 in 1997 (Mori 1997, EcoSystems West 2002). Pacific tree frogs also use the seasonal wetland habitat for breeding as do many aquatic invertebrates which serve as prey for amphibians, reptiles, birds, and small mammals.

#### *Wetland W3*

W3 is located just north of Delaware Avenue Extension and east of the southern boundary of W2. It is slightly lower in elevation than its surroundings and as a result water ponds after significant rainfall events. W3 receives overland flow from adjacent areas to the north and west; historical aerial photos indicate it was once part of a larger drainage that flowed from west to east and eventually discharged into Antonelli Pond. This drainage pattern was altered by agricultural activities and installation of the Campus access road that extends from the end of Delaware Ave Extension.

Mapped as non-native grassland, W3 is not sharply distinct in species composition from the surrounding areas except that it contains algal mats, reflecting the seasonally flooded condition. Two large patches of the native creeping wild rye occur at the south-east corner of W3. The vegetation is otherwise overwhelmingly dominated by Italian ryegrass with scattered patches of curly dock.

#### *Wetland W4*

W4 is a seasonal drainage swale that originates in the central part of the Terrace Lands (approximately 300 ft [91.5 m] northeast of the NOAA parking lot). During rainfall events water accumulates in the upper portion of the swale and then flows eastward to a corrugated metal pipe culvert near the eastern Campus boundary. Historical aerial photos indicate this was once part of a continuous drainage that flowed to Natural Bridges Lagoon until an underground culvert was installed to accommodate construction of De Anza Mobile Home Park. The upper portion of the remnant swale has been disturbed by agricultural plowing, leaving no clearly defined channel, but a clearly defined drainage way does exist in the lower portion of the swale. The wetland likely functions to improve water quality through settling of suspended solids and associated pollutants while ponded.

The upper portion of the swale is dominated by hydrophytic species, such as willow-herb, Douglas' baccharis, non-native annual rabbit's foot grass (*Polypogon monspeliensis*) and curly dock. The central portion is not sharply distinct in species composition from the adjacent upland non-native grassland. The lower portion of the drainage is dominated by Italian ryegrass with scattered curly dock and wild radish. Patches of brown-headed rush (*Juncus phaeocephalus*) and Douglas' baccharis also occur in the lower portion.

#### *Wetland W5*

This wetland is a seasonal pond that forms in a small topographic depression in the southern portion of the Terrace immediately south of the NOAA building and is the wettest portion of the Terrace Lands. Historical aerial photos show this wetland has been a persistent feature on the terrace since at least the 1950s. The hydroperiod and depth of ponding depends on rainfall and ranges from two to five months and up to approximately 16 inches (40.5 cm) deep. In the early 1900s, a small channel was excavated to drain water from the pond to the ocean bluffs; however, after this ditch ceased to be maintained it rapidly filled in with sediment, limiting drainage to the ocean from the ponded area. The channel exhibited wetland characteristics in 1993 but by 2002 the channel had disappeared except for a linear wetland corridor extending south approximately 200 ft (61 m). A storm drain outlet was constructed from the NOAA site near the pond's northern

end to allow water to flow into the pond when the NOAA underground detention/percolation system reaches capacity. A pre-existing outlet near McAllister Way functions as a hydrologic control and limits lateral expansion of surface water within the pond.

W5 is characterized by the seasonal pond vegetation type. Sedges, broad-leaved cattail, pale spikerush, and pickleweed occur in the wetter areas with Douglas' baccharis and Italian ryegrass dominating the transitional areas that merge with the surrounding non-native grassland habitat.

The pond supports many aquatic and benthic invertebrate species which provide a food source for amphibians, reptiles, and birds. Pacific tree frogs have been observed at W5 and likely breed at this site. The open water area provides habitat for migratory waterfowl and shorebirds to rest and forage. The pond is used recreationally by bird watchers.

#### *Wetland W6*

W6 is a small isolated wetland complex, occupying a low-lying area in the northwestern portion of the site north of the CDFG building along the western edge of McAllister Way. This area may have been used to retain irrigation water when the area was farmed. A partial berm that prevents the area from draining into the adjacent stream habitat of Younger Lagoon is still visible. Although the area mapped as W6 includes only moist meadow habitat, other wetland vegetation types (e.g. freshwater marsh-coastal terrace and central coast arroyo willow riparian forest) occur nearby separated by non-native grassland. These areas are treated together in this SRP. The marsh can contain open water through mid-May or later, and the moist meadow retains moisture much later in the season than the non-native grassland habitat.

Wildlife habitat in W6 includes seasonal aquatic habitat in areas of ponded water and California Red-legged Frogs and Western Pond Turtle have been sighted in a small pond under the W6 willow thicket in 2010 (Glinka, 2010).

W6 and the adjacent upland habitat likely facilitate wildlife movement between YLR and Antonelli Pond/Moore Creek (as well as up the coast along the railroad track corridor) and the relatively dense arroyo willow stand offers screening and escape cover.

*Wetland W7*

W7 is a small isolated wetland located in the northeast corner of the Campus approximately 150 ft (45.72 m) south of the northern Campus property line at the railroad right-of-way.

*Wetland W8*

This seasonal wetland just south of Delaware Avenue Extension occupies a low-lying area immediately adjacent to the roadbed. Vegetation primarily consists of non-native grassland, and is subject to (and probably formed by) periodic disturbance by passing vehicles whose tires leave the paved roadbed. The depressional area supports wetland hydrologic conditions during the rainy season (particularly within the tire ruts) but is hydrologically isolated from other wetlands on the site due to the presence of Delaware Avenue Extension. This wetland is not subject to Section 404 of the Clean Water Act because of its hydrologic isolation, but is subject to California Coastal Act protection policies because hydrology and soil criteria are met.

*Wetland W9*

W9 is a small isolated wetland located northeast of the CDFG facility approximately 200 ft (61 m) south southeast of the road bend where Delaware Avenue Extension turns south to become McAllister Way.

*Wetland W10*



W10 is a small isolated wetland located south of the DeAnza drainage adjacent to the Campus's eastern boundary.

*Wetland W11*

W11 is a small drainage extending west from McAllister Way into YLR.

*Wetland W12*

W12 is a complex of wetlands immediately south and east of W5 and is similar in characteristics to the southern reaches of W5 which formed around the small channel that was dug long ago to drain water from W5.

*Wetland buffers*

Wetland Buffers do not constitute a specific habitat type in themselves and at the time of CLRDP certification they included mostly non-native grassland, coyote brush scrub-grassland, and ruderal vegetation types (Figure 5). Their principal function will be to buffer fauna that use wetland habitat from potential anthropogenic disturbances.



**Figure 5.** Wetland buffer areas.

### *Non-Native weeds*

Non-native weeds on the Terrace Lands are categorized into four categories for removal according to life-history characteristics, current distribution on the Terrace Lands, feasibility of control, and potential for spread (Table 1). The highest removal rating (Priority one) is given to large stature, slow moving exotic plants that are capable of invading and out-competing native plants in established plant communities. These plants are typically perennial or biennial and are generally straightforward to eliminate from an area. The distribution of three species of Priority one weeds on the YLR Terrace Lands is shown in Figure 6. Equal (if not greater) importance is given to the prevention of the introduction of new weeds that are known or suspected to be invasive but do not currently exist on the Terrace Lands (Watch List weeds). These classifications reflect current research on exotic invasives and concur with the California Native Plants Society’s definition of an exotic invasive plant: “*a plant which is able to proliferate and aggressively alter or displace indigenous biological communities*” (California Native Plant Society 1996).

**Table 1. Known non-native weeds on YLR Terrace and adjacent lands.**

<i>Common Name</i>	<i>Scientific Name</i>	<i>Priority Rating* for Removal</i>
Blackwood acacia	<i>Acacia melanoxylon</i>	W
Everblooming acacia	<i>Acacia retinodes</i>	W
Crofton weed	<i>Ageratina adenophora</i>	W
European beachgrass	<i>Ammophila arenaria</i>	W
Giant reed	<i>Arundo donax</i>	W
Mediterranean Linseed	<i>Bellardia trixago</i>	W
Red valerian	<i>Centranthus ruber</i>	W
Portuguese Broom	<i>Cytisus multiflorus</i>	W
Scotch broom	<i>Cytisus scoparius</i>	W
Purple awned wallaby grass	<i>Danthonia pilosa</i>	W
Pepperweed	<i>Lepidium latifolium</i>	W
Yellow parentucellia	<i>Parentucellia viscosa</i>	W
Fountain grass	<i>Pennisetum setaceum</i>	W

<i>Common Name</i>	<i>Scientific Name</i>	<i>Priority Rating* for Removal</i>
Spanish broom	<i>Spartium junceum</i>	W
Ice plant	<i>Carpobrotus edulis</i>	1
Jubata grass	<i>Cortaderia jubata</i>	1
Monterey cypress	<i>Cupressus macrocarpa</i>	1
Cape ivy	<i>Delairea odorata</i>	1
Panic veldgrass	<i>Ehrharta erecta</i>	1
Fennel	<i>Foeniculum vulgare</i>	1
French broom	<i>Genista monspessulana</i>	1
Harding grass	<i>Phalaris aquatica</i>	1
Monterey pine	<i>Pinus radiata</i>	1
Himalayan blackberry	<i>Rubus discolor</i>	1
Wild oat	<i>Avena barbata</i>	2
Oat	<i>Avena fatua</i>	2
Common mustard	<i>Brassica rapa</i>	2
Rescue grass	<i>Bromus catharticus</i>	2
Ripgut brome	<i>Bromus diandrus</i>	2
Soft chess	<i>Bromus hordeaceus</i>	2
Italian thistle	<i>Carduus pycnocephalus</i>	2
Bull thistle	<i>Cirsium vulgare</i>	2
Bermuda grass	<i>Cynodon dactylon</i>	2
Poison hemlock	<i>Conium maculatum</i>	2
Black mustard	<i>Hirschfeldia incana</i>	2
Velvet grass	<i>Holcus lanatus</i>	2
Farmer's foxtail	<i>Hordeum murinum</i> ssp. <i>leporinum</i>	2
Prickly lettuce	<i>Lactuca serriola</i>	2
Wild lettuce	<i>Lactuca virosa</i>	2
Italian ryegrass	<i>Lolium multiflorum</i>	2
Perennial ryegrass	<i>Lolium perenne</i>	2
Mallow	<i>Malva parviflora</i>	2
Sourgrass	<i>Oxalis pes-caprae</i>	2
Bristly ox-tongue	<i>Picris echioides</i>	2
Rabbitsfoot grass	<i>Polypogon monspeliensis</i>	2
Wild radish	<i>Raphanus sativus</i>	2
Curly dock	<i>Rumex crispus</i>	2

<i>Common Name</i>	<i>Scientific Name</i>	<i>Priority Rating* for Removal</i>
Prickly sow thistle	<i>Sonchus asper</i>	2
Sow thistle	<i>Sonchus oleraceus</i>	2
Scarlet pimpernel	<i>Anagallis arvensis</i>	3
Pineapple weed	<i>Chamomilla suaveolens</i>	3
Lambs quarters	<i>Chenopodium album</i>	3
Nettle-leaved goosefoot	<i>Chenopodium murale</i>	3
Brass buttons	<i>Cotula coronopifolia</i>	3
Filaree	<i>Erodium moschatum</i>	3
Cut-leaved geranium	<i>Geranium dissectum</i>	3
Rough cat's ear	<i>Hypochaeris radicata</i>	3
Loosestrife	<i>Lythrum hyssopifolium</i>	3
Bur clover	<i>Medicago polymorpha</i>	3
Cut-leaved plantain	<i>Plantago coronopus</i>	3
English plantain	<i>Plantago lanceolata</i>	3
Annual bluegrass	<i>Poa annua</i>	3
Common knotweed	<i>Polygonum arenastrum</i>	3
Sheep sorrel	<i>Rumex acetosella</i>	3
Common groundsel	<i>Senecio vulgaris</i>	3
Chickweed	<i>Stellaria media</i>	3
Rattail fescue	<i>Vulpia myuros</i>	3

Notes: \*Priority rating:

W. Watch List. These weeds are currently undetected at YLR Terrace Lands but are known to exist on nearby lands. Reserve staff will actively patrol for these weeds and eliminate them as soon as they are detected as part of YLR's Early Detection Rapid Response (EDRR) program (outlined in SRP 3).

1. High priority. These weeds are capable of invading and out-competing native plants in established plant communities. They are typically large stature, slow spreading perennial or biennials. Effective removal techniques for these weeds are generally well documented, and reserve staff will actively work to eliminate these weeds from YLR Terrace Lands. Once eliminated, on-going monitoring for reemergence of these weeds will take place in conjunction with patrols for Watch List weeds.
2. Medium priority. These weeds are mostly biennial or annual and are ubiquitous on YLR Terrace Lands. They are typically smaller in stature than Priority 1 weeds and more difficult to control. Weed control efforts for Priority 2 weeds will take place in conjunction with active restoration projects (e.g. planting), but P2 weeds are not expected to be eliminated from YLR Terrace Lands.
3. Low priority. These weeds are mostly annuals and are ubiquitous on YLR Terrace Lands. They are typically smaller in stature than Priority 1 weeds and more difficult to control. While many can effectively compete with natives once they are established, they typically do not aggressively push out native s. Most are commonly associated with native and non-native grasses and forbs in grasslands. Incidental weed control efforts for Priority 3 weeds may take place in conjunction with active restoration projects (e.g. planting), but P3 weeds are not expected to be eliminated from YLR Terrace..

Source: Modified from John Gilcrest and Associates and Environmental Hydrology 1998.



**Figure 6.** Distribution of three species of priority one weeds.

### ***Native vegetation—Other***

Beyond the scattered patches of coyote brush there are smaller patches of two native species - Creeping wildrye and Douglas' baccharis - throughout the Terrace Lands.

Creeping wildrye is largely restricted to the south-east corner of upper terrace (Figure 2); however, there are scattered individuals throughout the site with some relatively dense patches along the coastal bluff.

The U.S. Fish and Wildlife Service considers creeping wildrye in California to be a Facultative species, meaning that it is equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%) (U.S. Fish and Wildlife Service 1988).

Dense patches of Douglas' baccharis are found throughout the Terrace Lands both within and outside of delineated wetlands (Figure 2).

The U.S. Fish and Wildlife Service considers Douglas' baccharis in California to be an Obligate Wetland species meaning that under natural conditions it occurs almost always (estimated probability 99%) in wetlands (U.S. Fish and Wildlife Service 1988).

### ***Phase one restoration areas***

The CLRDP states that 1/3 of the Terrace Lands (~14 ac [5.67 ha]) need to meet the criteria outlined in section SRP 7 (Tables 3-6) after 7 years (Phase I). Conceptual goals for habitat restoration for the entire project area over the 20 year restoration period are discussed in detail below in SRP 2. Spatial localities for the various target vegetation communities may change based on site conditions, hydrology, etc. overtime if adaptations are deemed necessary/appropriate by the SAC. Phase I of the enhancement effort (this SRP) will focus on six areas: coyote-brush scrub-grassland, grassland, coastal bluff scrub expansion, and central wetland habitat in wetlands 1, 2, 3, 4, 5, and 6 (Figure 7) as well as priority one weed patches. These restoration areas total approximately 16 ac (6.5 ha). Wetlands 1 and 2 will be hydrologically connected. Although efforts will primarily focus on these areas during Phase I, enhancement and protection of other areas will also take place. Existing vegetation is dominated primairliy by non-native



**Figure 7.** Primary restoration areas for Phase I.



grasses and coyote brush. This section briefly describes the locations and baseline conditions of the enhancement areas for Phase I.

#### *Coyote Brush Scrub-Grassland*

During Phase I enhancement and protection of coyote brush scrub-grassland areas will primarily take place across approximately 11 ac (4.5 ha) in areas where coyote brush is already patchily distributed (Figure 7); thus, the enhancement efforts will focus on filling in grassy interstitial spaces between existing coyote brush plants and patches in the middle and lower terrace. Although shrub species besides coyote brush will be the primary type of vegetation planted, native grasses will also be planted to create patches of native grassland within the Coyote Brush Scrub-Grassland areas. Vegetation in these areas is currently dominated by non-native grasses and coyote brush.

#### *Grasslands*

Native grasses will be planted in relatively dense patches throughout approximately 2 ac (0.8 ha) of wetland buffer regions for W4 and W5. Although wetland buffers 4 and 5 will comprise the most intensive grassland restoration for Phase I, native grasses will also be planted throughout the Terrace Lands.

#### *Coastal Bluff Expansion*

The coastal bluff scrub area covers approximately 1.5 ac (0.61 ha) and will ultimately extend to 100 ft (30.5 m) from bluff edge and merge with the restored area south of the SMDC. This area will blend into the adjacent coyote brush scrub-grassland area to the north. The CLRDP includes the maintenance of an existing coastal bluff trail as well as the enhancement of a viewpoint. Construction of the enhanced viewpoint will occur during Phase I of the restoration effort. Vegetation within the coastal bluff area is currently dominated by ice plant and non-native grasses.

#### *Wetland Willow*

The wetland willow restoration area is an approximately 1 acre (0.4 hectare) area at the top of the eastern arm of Younger Lagoon (Figure 7) that encompasses W6 and its buffer. This area is currently dominated by non-native grasses and willow. This area will be planted with native willow, grasses, and shrubs.

#### *Wetland Buffers (Figure 5)*

Wetland buffers represent prescribed distances from wetland edges (100 ft [30.5 m] for all wetlands with the exception of W5 which has a 150 ft [45.7 m] buffer). During Phase I, primary restoration efforts in wetland buffers will focus on approximately 1 acre (0.4 ha) of buffer area in buffers 4 and 5; however, other buffer areas will also be planted. Soil conditions within and among wetland buffer areas differ greatly and thus significantly influence the potential plant species that can inhabit a particular location. As such, wetland buffer areas are currently composed primarily of non-native grasses, coyote brush, Douglas' baccharis, and willow.

#### *Wetlands 1 and 2*

Current vegetation in Wetlands 1 and 2 is comprised primarily of non-native grasses, *Rumex* spp., Douglas' baccharis, small patches of creeping wild rye, and coyote brush. In addition to Priority 1 weed control, active vegetative enhancement in these areas may consist of weed whipping, herbicide application, and/or grazing, as well as enhancement of existing native vegetation with small-scale plantings and collection of seeds and cuttings for propagation. The primary focus during Phase I will be to hydrologically connect Wetlands 1 and 2 in order to reconnect the two wetlands as per the requirements of the CLRDP. Details are provided in below in section SRP 7.

#### *Central Areas of Wetlands 4 and 5*

Wetland 4 (Figure 4)

The central area of W4 is approximately 0.5 ac (0.2 ha). Phase 1A restoration activities in W4 will include weed control, enhancement of existing native vegetation with small-scale plantings and collection of seeds and cuttings for propagation.

#### Wetland 5 (Figure 4)

The central area of W5 is approximately 2.5 ac (1 ha). Phase 1 restoration activities in W5 will include weed control, enhancement of existing native vegetation with small-scale plantings and collection of seeds and cuttings for propagation.

#### *Priority One Weed Patches*

Discrete patches of priority one weeds are located throughout YLR Terrace Lands and MSC (Figure 6). The patch boundary for jubata grass extends beyond the MSC property line. Effective removal/control of these species will require cooperation among reserve staff, UC grounds keepers, and adjacent property owners. Phase I restoration activities will include removal of these species.

### **DESCRIPTION OF PLAN GOALS (SRP 2)**

The goal of the restoration project is to create and protect a mosaic of rare habitats that provide substantial ecosystem services including the preservation of biodiversity, habitat for special status species, and buffering of stormwater runoff. These habitats include coastal bluff, coastal prairie, seasonal wetlands, forested wetlands and grasslands.

Additionally, because the site is a UC Natural Reserve, research focused on restoration and native flora and fauna will provide opportunities to guide future restoration in similar habitats and provide educational and outreach material for Reserve users. This section of the SRP defines restoration goals for Phase I of the restoration effort; conceptual goals for the entire 20 year restoration plan (Figure 8).

Phase I activities will primarily focus on the six distinct restoration projects discussed above: Coyote-brush scrub infill, coastal bluff restoration, native grassland establishment,

central wetland habitat in wetlands 1, 2, 4 and 5, control of priority one weeds, and hydrological modification of Wetlands 1 and 2.

Phase 1 will be divided into two sub-phases. SRP Phase 1A would focus on enhancement of six habitat areas within the Terrace Lands: coyote-brush scrub-grassland, grassland, coastal bluff scrub expansion, and central wetland habitat in wetlands 1, 2, 4 and 5 (Figure 7) as well as priority one weed patches. Phase 1A would include hand planting in central wetland habitat in wetlands W1, W2, W4 and W5, consistent and implementing the goals set forth in the previously-approved RMP. Phase 1A also addresses control and removal of Priority 1 weeds throughout the Terrace Lands. About 14 acres of the Terrace Lands would be subject to restoration during Phase 1; enhancement and protection of vegetation in other natural areas of the Terrace Lands will also take place as opportunities arise. Phase 1B would propose minor hydrologic modifications to improve wetland functioning and enhance plant and wildlife habitat in wetlands W1 and W2. The campus has completed CEQA analysis for Phase 1A, and 1A work is proposed for immediate implementation. Phase 1B would focus primarily on wetland work and potentially will be subject to Clean Water Act and other permitting, and related agency consultation regarding potential effects to California red-legged frogs. The extent of wetland work and exactly how it would be carried out cannot be determined prior to this consultation. For this reason, SRP Phase 1B work is not proposed for immediate implementation. Further plans for Phase 1B work will be prepared during the course of, and with input from, agency consultation and SAC members. A separate NOID will be filed for Phase 1B when project plans for this phase of work are finalized through regulatory agency consultation and following the preparation of additional CEQA documentation.

The overarching goal for Phase I is to meet success criteria for 1/3 of the Terrace Lands natural habitats. Success criteria for Phase I restoration activities are described in detail below in SRP 2. Specific success criteria were established based on setting goals that are achievable within the context of the site and are realistic objectives that will enhance ecological functions of the area. Although restoration efforts during Phase I will be primarily focused on areas identified in Figure 7, planting and weed control will be

conducted throughout the entire site (following specific guidelines outlined below), including testing methodologies to be used in Phase II and III. Below, the restoration goals for each habitat type are outlined in greater detail.

### ***Trails and signs***

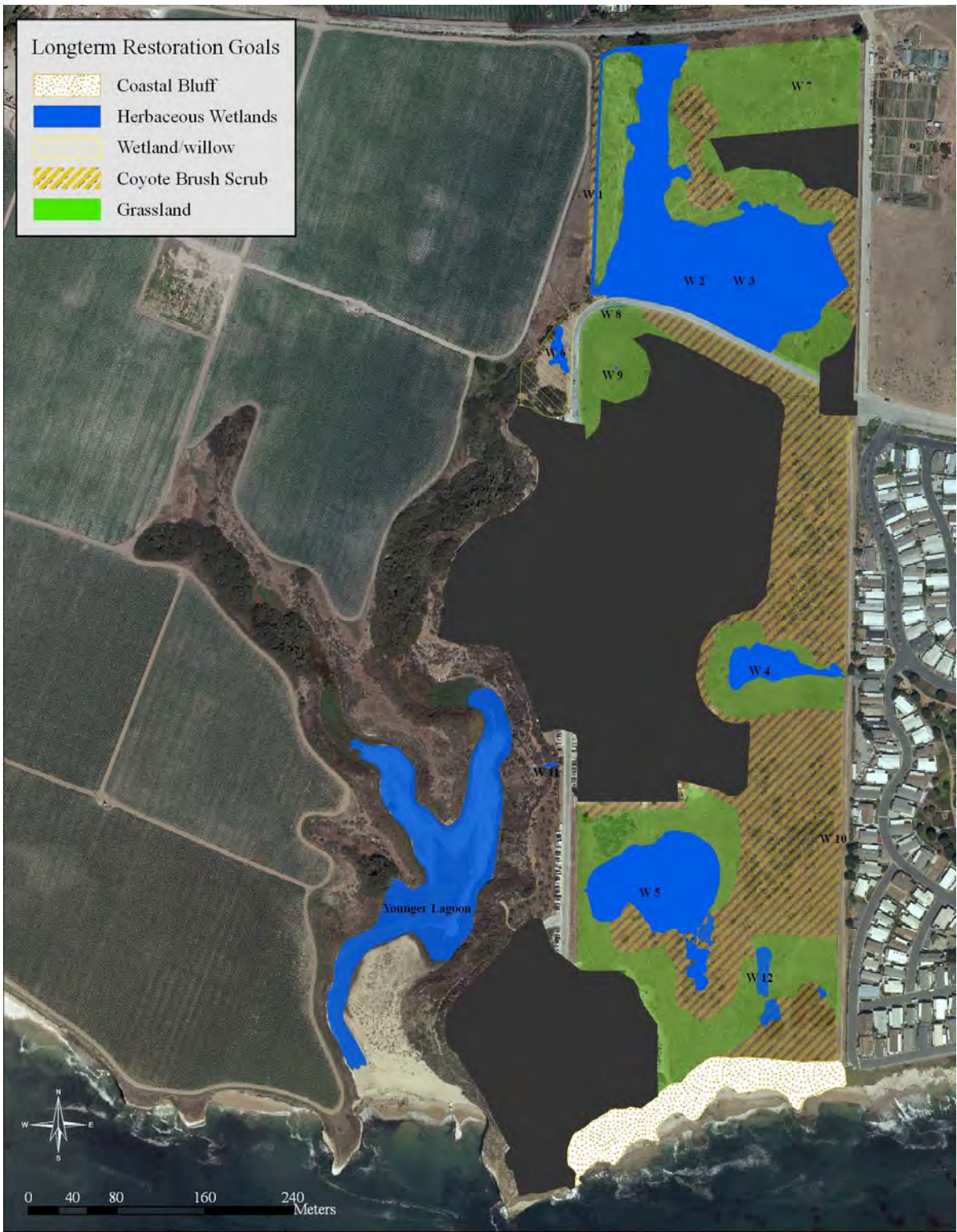
As the Marine Science Campus develops, some of the University's future NOIDs will include Reserve related items (e.g. sign packages, trail development, overlooks, etc.). These projects will be administered by Physical Planning and Construction in coordination with Reserve staff and are anticipated to have little impact on the restoration of the Terrace lands. However, it is important to highlight that this SRP recommends trails be limited primarily to the perimeter of the Reserve. This concept has incorporated into the preliminary conceptual design of the Marine Science Campus (see Appendix 3). Doing so balances public access with resource protection by providing viewing opportunities while reducing fragmentation of the Reserve, increasing native habitat (i.e. trails reduce native habitat), and distancing people from sensitive wetland habitats.

### ***Coyote brush scrub-grassland restoration goals (Phase 1A)***

Restoration within Coyote brush scrub-grassland areas will focus on increasing native plant species richness and percent cover (see Table 2 for restoration palette) and decreasing non-native plant cover. Species richness and percent cover goals are outlined in Table 3. Although scrub species will be the primary focus for these areas, native grasses will also be planted throughout. It is anticipated that there will be patches within the scrub that will remain relatively open. There will be no change in topography and/or hydrology.

*Non-native grassland restoration goals (Phase 1A)*

Restoration within non-native grassland areas will focus on increasing native grass species (see Table 2 for restoration palate) and decreasing non-native plant cover. Species richness and percent cover goals are outlined in Table 3. Although the primary effort will be to increase native grass cover and species richness, other native shrubs will be scattered throughout these areas through natural recruitment. There will be no change in topography and/or hydrology.



**Figure 8.** Twenty year restoration goal for Terrace Lands.

### ***Coastal bluffs restoration goals (Phase IA)***

Restoration within coastal bluff habitat will focus on continuing restoration of native plant species richness and percent cover (see Table 2 for restoration palate) and decreasing non-native plant cover. Species richness and percent cover goals are outlined in Table 4. There will be no change in topography and/or hydrology. These efforts will “connect” the coastal bluff restoration area immediately adjacent to the west within the SMDC and YLR.

### ***Central areas of wetlands 4 and 5 restoration goals (Phase IA)***

Restoration within the central areas of wetlands 4 and 5 will focus on increasing native plant species richness and percent cover (see Table 2 for restoration palate) and decreasing non-native plant cover. Species richness and percent cover goals are outlined in Table 5. There will be no change in topography and/or hydrology.

### ***Wetland buffer restoration goals (Phase IA)***

Restoration efforts in wetland buffers will focus on increasing native plant species richness and percent cover (see Table 2 for restoration palate) and decreasing non-native plant cover. Plants used in the wetland buffers will vary depending upon soil conditions. Buffer areas throughout the Terrace Lands differ drastically depending upon the distance from each particular wetland and moisture content of the soil. As such, species richness and percent cover goals will vary (e.g. some areas will likely be dominated by grasses while others will be dominated by shrubs). Table 6 provides an overview of success criteria for wetland buffer areas. There will be no change in topography and/or hydrology.



### ***Wetland 1 and 2 hydrologic regime change goals (Phase 1B)***

As noted above, Phase 1B of the SRP is described here to the extent it has been developed to date. Implementation details will be subject to agency consultation and permitting and likely will vary, at least in some details, from the conceptual outline provided here. The implementation of SRP Phase 1B is independent of the implementation of Phase 1A, although results of both would be monitored and reported at the end of SRP Phase 1. Due to the uncertainty related to the Phase 1B elements and implementation criteria it would be too speculative to evaluate the environmental effects of Phase 1B implementation at this time.

The restoration program for W1 and W2 will address historical modifications to site hydrology that served to drain wetlands on the site (e.g. drainage ditch at site W1). However, the restoration efforts will leave intact historic modifications that may have increased the extent and duration of inundation of wetlands (e.g. roadway). Management of site hydrology will advance several objectives, specifically, increasing the cover of native wetland plant species, potentially enhancing breeding habitat for amphibians, maintaining raptor foraging habitat, and improving water quality of inputs to YLR. Furthermore, restoration of both hydrology and vegetation will create a continuous north-south area for wildlife movement to YLR.

Once the hydrology of the area is altered by the diversion of water from W1 (that currently serves as a drainage ditch) and the placement of a partial diversion at the culvert area (see Figure 10) it is likely the vegetation composition of W1 and W2 will change. Thus, specific success criteria for the restoration of this area will be deferred until Phase II or III. Enhancement of existing native vegetation in W1 and W2 with small-scale plantings and collection of seeds and cuttings for propagation as well as weed control activities will take place during Phase 1A. The area to the west of W1 will be replanted with shrubs and serve as a buffer between the agricultural land and W1/W2 (the “living fence”). Presently the buffer includes land that is not being farmed on the adjacent agricultural lands; thus, increasing the extent of the buffer. Over time it is possible that

the unfarmed lands on the adjacent parcel may be put back into production; thus, decreasing the overall extent of the buffer to the west of W1.

Slight modifications to topography will likely occur when diversion structures are put into place (see Figure 10).

### ***Priority one weed removal goals (for all P1weeds)***

All priority-one weeds (see Table 2) will be controlled as they are detected throughout the Terrace Lands. Elimination of reproductive individuals is the goal, however YLR is surrounded by priority-one weed seed sources and it is likely that there will always be some level of priority-one weeds persisting on the terrace.

## **SITE AREA PREPARATION AND INVASIVE PLANT REMOVAL (SRP 3)**

### ***Early Detection Rapid Response (EDRR)***

Preventing the introduction of new invasive species is the first line of defense against new invasions. However, even the best prevention efforts will not stop all invasive species introductions, particularly at a small urban reserve like YLR which is surrounded by potential weed sources. Besides prevention, the most time and cost-effective way to manage the potential negative impacts of new invasive plants is through EDRR efforts.

EDDR focuses on surveying and monitoring at-risk areas to find infestations at their earliest stages of invasion and then rapidly beginning the control of these species. These efforts greatly increase the likelihood that new invasions will be addressed successfully and new weeds will be prevented from becoming established and widespread in a given area. Along with prevention this method is the most successful, cost effective, and least environmentally damaging means of control (National Invasive Species Council 2008).

After initial introduction of a new invasive plant there is a short period of opportunity for eradication or containment. Once permanently established a new invader becomes a long-term management problem. The costs associated with catching weeds before they become established are also drastically less than those of long-term invasive species management for noxious weeds that have already become widespread. Therefore, any low incidence weed known or suspected to be invasive (and feasible to control) will be removed when detected.

Weeds that are currently undetected on YLR Terrace Lands, but known to exist nearby (W – see Table 1) will be actively patrolled for and eliminated as soon as they are detected. High priority (P1 – see Table 1) weeds will be eliminated from YLR Terrace Lands. Once eliminated, on-going monitoring for reemergence of these weeds will take place in conjunction with patrols for watch-listed weeds. Control efforts for medium priority (P2 – see Table 1) weeds will take place in conjunction with active restoration projects (e.g. planting), but P2 weeds are not expected to be eliminated from YLR Terrace Lands. Incidental control efforts for low priority (P3 – see Table 1) weeds may take place in conjunction with active restoration projects (e.g. planting), but P3 weeds are not expected to be eliminated from YLR Terrace Lands.

Site area preparation and invasive plant removal techniques will vary from site to site as needed, but will draw from a set of standard methods for weed control, outlined below.

### ***Priority one weed control***

Removal techniques for priority one weeds may include one or more of the following: hand pulling / mechanical control, clipping / weed whacking, flaming, solarization, burning, grazing, and herbicide application. When herbicide is applied all listed safety instructions will be followed to protect surrounding biological resources and will follow campus policy on pesticide applications. Due to their potential to re-invade, all priority one weeds with viable propagules will either be solarized and composted on site or bagged after removal and disposed of offsite. Some priority one weed control activities

will be ongoing throughout the year. Other activities will be restricted to the winter and spring months (exact timing will be dependent on soil moisture conditions and seed-set).

In addition to the above removal techniques, modifications to Wetlands 1 & 2 will likely alter species composition in these areas. The expected increase in inundation time in wetlands 1 & 2 may decrease the viability of many of the non-native plants that exist within these areas.

The distribution of priority-one weed species on YLR Terrace Lands and possible weed control methods for each is described below.

*Ice plant (Carpobrotus edulis). Family: Aizoaceae*

*Extent of Ice plant on YLR Terrace Lands*—Ice plant is primarily found along the coastal bluffs, with some scattered patches present throughout the lower terrace (Figure 6).

*Methods of Control for Ice plant on YLR Terrace Lands* —Ice plant can be controlled by manual methods (hand or tractor pulling), solarization, and herbicide application (glyphosate) (Bossard et al. 2000). When hand removal is employed all above-ground plant material will be removed and the soil will be raked in order to expose and remove any remaining roots or stolons. When solarization is employed, black agricultural plastic held in place by sandbags will be used to tarp Ice plant patches for 3-6 months. After solarization or herbicide application, dead ice plant may be left in place to prevent erosion and control weeds; dead ice plant can serve as ‘mulch’ that can be planted into.

*Jubata grass (Cortaderia jubata). Family: Poaceae.*

*Extent of Jubata grass on YLR Terrace Lands*—Jubata grass is restricted almost entirely to the upper Terrace primarily along the northern and western property lines (Figure 6).

*Methods of Control for Jubata grass on YLR Terrace Lands* —Jubata grass is effectively controlled by mechanical means (hand pulling / grubbing), and herbicide application (glyphosate) (Bossard et al. 2000). When hand removal is employed, all above ground jubata grass material will be removed before seed set, and then the root mass will be removed. When winching is employed the root mass will be removed from the ground.

As the jubata grass on YLR Terrace Lands is part of a population that extends beyond the northern and western property lines (Figure 6), effective control of jubata grass will require cooperation between adjacent land owners and reserve staff.

*Monterey cypress (Cupressus macrocarpa). Family: Cupressaceae.*

Monterey cypress is native to the Monterey coast area, but is considered moderately invasive in other parts of California (including Santa Cruz County) where it spreads via seed from planted windbreaks or hedgerows.

*Extent of Monterey cypress on YLR Terrace Lands*—All of the Monterey cypress trees that currently exist on YLR Terrace Lands are ‘volunteers’ that have grown from seeds that were either brought to the site in landscaping mulch or that blew into the reserve from MSC landscaping plantings.

*Methods of Control for Monterey cypress on YLR Terrace Lands*—Mature Monterey cypress trees will be controlled by cutting the above ground material from the root. Seedlings will be controlled by hand pulling/digging. In addition to removal efforts on Terrace Lands, collaborative efforts among UCSC staff and other MSC groups (e.g. NOAA/NMFS, CDFG, and Island Conservation) will be initiated to limit the transport of Monterey cypress to the site.

*Cape ivy (Delawarea odorata). Family: Asteraceae.*

*Extent of Cape ivy on YLR Terrace Lands*—Cape ivy is not present on the Terrace Lands; however, it is established in a patch on the northwest border of Younger Lagoon (Figure 6). The patch is located on a shady west facing slope. Cape ivy has overrun the herbaceous understory of the area and is beginning to climb into the Arroyo willow canopy.

*Methods of Control for Cape ivy on YLR Terrace Lands* —Cape ivy is difficult to eliminate for two reasons: stolons and underground parts readily fragment while being

removed and plants will grow from almost any remaining fragment. Therefore, frequent post removal monitoring and maintenance is necessary if removal efforts are to be successful. Cape ivy can be controlled through mechanical means or herbicide application (glyphosate and triclopyr or Transline) (Bossard et al. 2000). When hand removal is employed, all above ground plant material (both native and non-native plants, except native trees) will be removed in the infested area. After the removal of above ground material soil will be raked to expose and remove any remaining roots or stolons.

*Panic veldgrass* (*Ehrharta erecta*). *Family: Poaceae.*

*Extent of Panic veldgrass on YLR Terrace Lands* – Panic veldgrass on YLR Terrace Lands is currently restricted to several small patches located adjacent to SMDC.

*Methods of Control for Panic veldt grass on YLR Terrace Lands* —Once established panic veldgrass is extremely difficult to control / eliminate. Mechanical means of control (hand pulling / grubbing), and herbicide application (Fusilade, and glyphosate) have had mixed results (Bossard et al. 2000). Therefore, the highest priority must be given to preventing the further spread of this weed and eliminating it while it is still at a low incidence. When hand removal is employed, the entire plant will be removed from the ground (including the root mass).

*Fennel* (*Foeniculum vulgare*). *Family: Apiaceae.*

*Extent Fennel on YLR Terrace Lands* – Fennel is currently limited to a few scattered individuals on the west side of the middle and upper terrace.

*Methods of Control for Fennel on YLR Terrace Lands* —Fennel is effectively controlled by mechanical means (hand pulling / grubbing), and herbicide application (triclopyr and glyphosate) (Bossard et al. 2000). When hand removal is employed all above ground fennel material will be removed before seed set (root mass will also be removed).

*French broom* (*Genista monspessulana*). *Family: Fabaceae.*

*Extent of French broom on YLR Terrace Lands*—French broom was not detected on YLR Terrace Lands in 2009. However, it has previously been sighted in the middle terrace Development Zone near the greenhouses. In addition, an extremely large French broom population is located north of the reserve in the City of Santa Cruz Moore Creek Preserve making future re-infestations likely.

*Methods of Control for French broom on YLR Terrace Lands* —French broom is effectively controlled by hand pulling (weed wrenching), prescribed burning, flaming of seedlings, grazing by goats, herbicide application, or a combination (Bossard et al. 2000). Weed wrenches will be used to remove entire plants before seed set. Seedlings will be removed by flaming or manual methods.

*Harding grass (Phalaris aquatica) Family: Poaceae*

*Extent of Harding grass on YLR Terrace Lands* – Harding grass on the Terrace Lands is currently limited to a few scattered individuals on the west side of the middle and upper terrace.

*Methods of Control for Harding grass on YLR Terrace Lands* —Harding grass is effectively controlled by mechanical means (hand pulling / grubbing), and herbicide application (glyphosate) (Bossard et al. 2000). When hand removal is employed all above ground material will be removed before seed set (the root will also be removed).

*Monterey pine (Pinus radiata). Family: Pinaceae.*

Monterey pine is the most widely planted commercial timber tree in the world (Bossard et al, 2000). However, in its native range, consisting of five populations in California and Baja California, Mexico, the species is threatened by development, human-dispersed plant pathogens, non-native herbivores, etc (Bossard et al, 2000). Our classification of Monterey pine as a Priority one weed on the YLR Terrace Lands is specifically based on the fact that the Monterey pines on the YLR Terrace Lands became established on the site due to human introduction. Once established, Monterey pines can displace and shade

out native vegetation and alter fire regimes. Monterey pines produce thousands of light winged seeds that are easily wind dispersed.

*Extent of Monterey pine on the YLR Terrace Lands* – Monterey pine on the YLR Terrace Lands is currently limited to a few scattered individuals.

*Methods of Control for Monterey pine on YLR Terrace Lands*—Mature Monterey pine trees will be controlled by cutting the trunk at ground level. Seedlings will be controlled by hand pulling/digging. In addition to removal efforts on Terrace Lands, collaborative efforts among UCSC staff and other MSC groups (e.g. NOAA/NMFS, CDFG, and Island Conservation) will be initiated to limit the transport of Monterey pines to the site.

*Himalayan blackberry* (*Rubus discolor*). *Family: Roseaceae.*

*Extent of Himalayan blackberry on YLR Terrace Lands* – Himalayan blackberry is found at low incidence throughout YLR Terrace Lands.

*Methods of Control for Himalayan blackberry on YLR Terrace Lands* — Himalayan blackberry is effectively controlled by mechanical means (hand digging /weed wrenching). All above ground Himalayan blackberry material will be removed before seed set (roots will also be removed).

### ***Medium and low priority grassland weed control***

Although mowing, grazing, herbicide application, scraping, and burning are effective methods for reducing annual seed set and thatch in non-native grasslands, managing to reduce exotic grasses without seeding or planting natives is relatively ineffective in restoring natives because it simply shifts the species composition to low stature exotic forbs (DiTomasso 2000, Hayes and Holl 2003a, Hayes and Holl 2003b, Stromberg et al. 2007). Therefore medium and low priority weeds will not be controlled until active restoration projects (e.g. planting) are taking place in a site. Once active restoration has begun, a combination of weed control techniques will be implemented. Additionally, an



experimental approach to non-native grass control may be used to evaluate emerging techniques with the goal of incorporating promising methodologies into management activities.

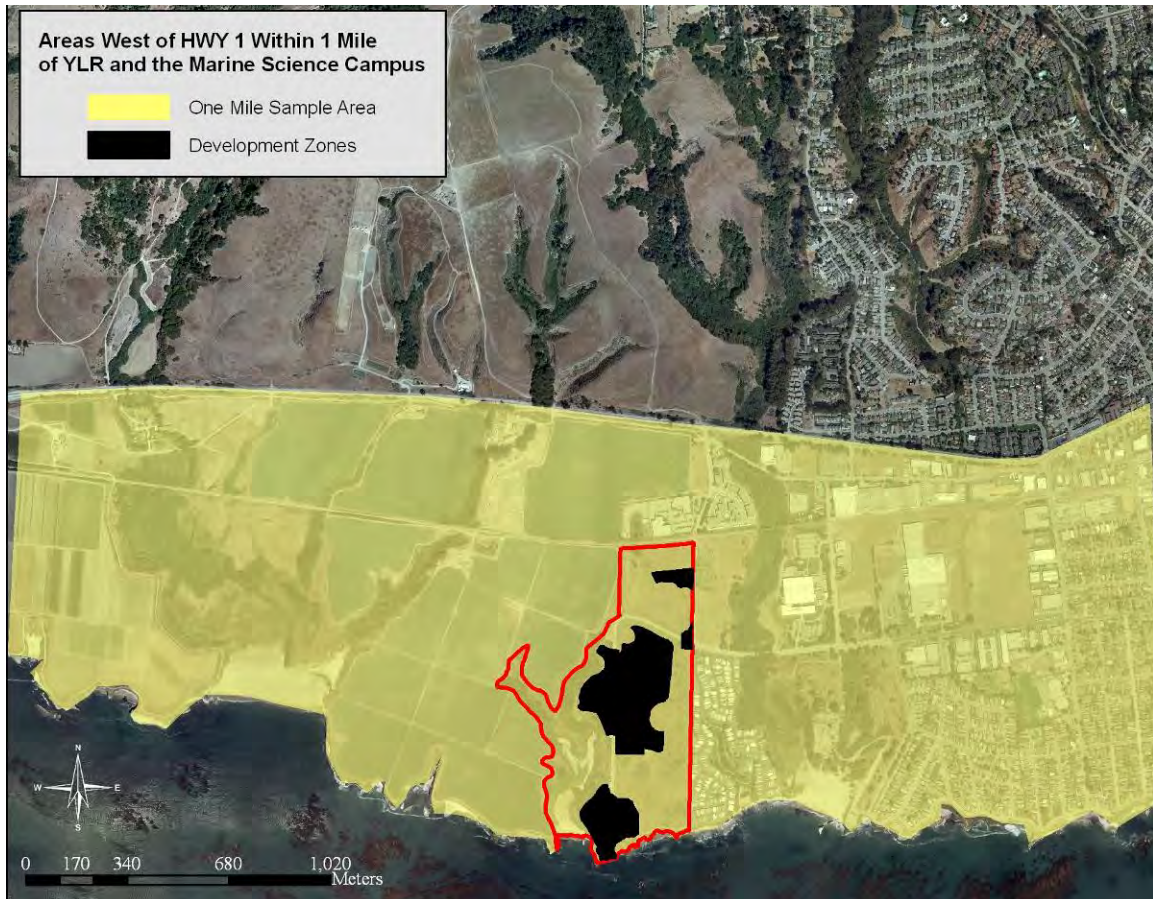
Some non-native grassland control activities will be ongoing throughout the year. Other activities will be restricted to the winter and spring months (their exact timing dependent on soil moisture conditions and seed-set).

#### **PLANTING PLAN (SRP 4)**

The planting plan is composed of the following key components for successful restoration, plant palette and selection, planting design (plant mix and spacing), local plant material source, plant installation, erosion control, irrigation, and remediation. The planting palette is made up exclusively of native taxa that are appropriate to the habitat and region. Seed and/or vegetative propagules will be obtained from local natural habitats so as to protect the genetic makeup of natural populations. Horticultural varieties will not be used.

The use of locally collected seeds and cuttings in restoration projects reduces the risks of introducing non-local genes into the population; potentially decreasing species fitness. In order to maintain the genetic integrity of the rich assemblage of plants found along the central coast of California, all seeds and cuttings will be collected from coastal Santa Cruz and San Mateo Counties. However, the collection zone (within approximately one mile [1.6 km] of the Marine Science Campus and seaward of Highway 1) as outlined by the CLRDP is too small to meet CLRDP restoration goals. The prescribed collection zone is bounded by Hwy 1 to the north, the ocean to the south, Fair Ave to the east, and Coast Rd to the west (Figure 9). Much of this area is highly disturbed by urban and agricultural development, and is of limited value for collection. Although a portion of the botanically rich Wilder Ranch Beach and Lagoon and YLR itself are included in the collection zone, it is unlikely that a high enough quantity and diversity of seeds can be collected in this restricted geographic area. Therefore, the size of the seed collection zone will be expanded to include similar habitats along the coast of western Santa Cruz county and southern San Mateo County (first and lower reaches of the second marine terraces).

The restoration planting palate (Table 2) is comprised of possible revegetation species for each habitat type. If other species appropriate for restoration are identified they will be added to the restoration palate.



**Figure 9.** Seed collection area as defined by the CLRDP.

**Table 2. Possible revegetation species.**

<i>Common Name</i>	<i>Scientific Name</i>	<i>Grassland/ Erosion Control</i>	<i>Coastal Bluff</i>	<i>Wetland/ Riparian</i>	<i>Wildlife Corridor</i>	<i>Upland Buffer</i>	<i>Coastal Scrub</i>
<b>Trees</b>							
California box elder	<i>Acer negundo</i> var.			x	x		

<i>Common Name</i>	<i>Scientific Name</i>	<i>Grassland/ Erosion Control</i>	<i>Coastal Bluff</i>	<i>Wetland/ Riparian</i>	<i>Wildlife Corridor</i>	<i>Upland Buffer</i>	<i>Coastal Scrub</i>
	<i>californicum</i>						
California buckeye	<i>Aesculus californica</i>				X	X	
Coast live oak	<i>Quercus agrifolia</i>				X	X	
Wax myrtle	<i>Myrica californica</i>			X	X		
Arroyo willow	<i>Salix lasiolepis</i>			X	X		

**Shrubs and Subshrubs**

California sagebrush	<i>Artemisia californica</i>		X		X	X	X
Mugwort	<i>Artemisia douglasiana</i>		X	X			
Douglas' baccharis	<i>Baccharis douglasii</i>			X			
Coyote brush	<i>Baccharis pilularis</i>		X		X	X	X
Blue blossom ceanothus	<i>Ceanothus thyrsiflorus</i>				X		
California goldenbush	<i>Ericameria ericoides</i>		X				X
Seaside daisy	<i>Erigeron glaucus</i>		X			X	
Coast buckwheat	<i>Eriogonum latifolium</i>		X			X	X
Lizardtail	<i>Eriophyllum staechadifolium</i>		X			X	X
Oceanspray	<i>Holodiscus discolor</i>				X	X	X
Deerweed	<i>Lotus scoparius</i>	X					X
Yellow bush lupine	<i>Lupinus arboreus</i>		X		X	X	
Bush monkeyflower	<i>Mimulus aurantiacus</i>		X		X	X	X
Wax myrtle	<i>Myrica californica</i>				X		X
Coffeeberry	<i>Rhamnus californica</i>				X		X
California wild rose	<i>Rosa californica</i>	X		X		X	X
California blackberry	<i>Rubus ursinus</i>			X		X	X
Red elderberry	<i>Sambucus racemosa</i> var. <i>racemosa</i>			X	X	X	X

**Forbs**

Yarrow	<i>Achillea millefolium</i>		X	X		X	X
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<i>Common Name</i>	<i>Scientific Name</i>	<i>Grassland/ Erosion Control</i>	<i>Coastal Bluff</i>	<i>Wetland/ Riparian</i>	<i>Wildlife Corridor</i>	<i>Upland Buffer</i>	<i>Coastal Scrub</i>
Sea pink	<i>Armeria maritima</i>		x				
California aster	<i>Aster chilensis</i>	x	x	x			
Fat hen	<i>Atriplex triangularis</i>			x			
Beach saltbush	<i>Atriplex leucophylla</i>			x			
Sun cup	<i>Camissonia ovata</i>	x					
Wight's indian paintbrush	<i>Castilleja wightii</i>		x				x
Soap plant	<i>Chlorogalum pomeridianum</i>	x					x
Brownie thistle	<i>Cirsium quercetorum</i>	x	x				
American wild carrot	<i>Daucus pillus</i>	x	x				
Sea lettuce	<i>Dudleya farinosa</i>		x				
Western goldenrod	<i>Euthamia occidentalis</i>		x				
Beach strawberry	<i>Fragaria chiloensis</i>		x				
Gum plant	<i>Grindelia stricta</i>		x	x			x
Cow parsnip	<i>Heracleum lanatum</i>		x			x	
Douglas' iris	<i>Iris douglasiana</i>	x	x				
Coast trefoil	<i>Lotus formosissimus</i>	x					
Sky lupine	<i>Lupinus nanus</i>	x	x		x	x	
Lindley's varied lupine	<i>Lupinus variicolor</i>	x	x		x	x	
Wild cucumber	<i>Marah fabaceus</i>					x	
Pacific oenanthe	<i>Oenanthe sarmentosa</i>			x			
California polypody	<i>Polypodium californicum</i>					x	x
Pacific silverweed	<i>Potentilla anserina</i> ssp. <i>pacifica</i>			x			
Self heal	<i>Prunella vulgaris</i>	x	x				
California buttercup, coastal form	<i>Ranunculus californicus</i>	x		x		x	
Pacific sanicle	<i>Sanicula crassicaulis</i>				x		x

<i>Common Name</i>	<i>Scientific Name</i>	<i>Grassland/ Erosion Control</i>	<i>Coastal Bluff</i>	<i>Wetland/ Riparian</i>	<i>Wildlife Corridor</i>	<i>Upland Buffer</i>	<i>Coastal Scrub</i>
California bee plant	<i>Scrophularia californica</i>			x			x
Blue-eyed grass	<i>Sisyrinchium bellum</i>	x		x			
Coast hedge nettle	<i>Stachys bullata</i>			x			
<b>Rushes/Sedges</b>							
Baltic rush	<i>Juncus balticus</i>			x			
Western rush	<i>Juncus occidentalis</i>			x			
Common rush	<i>Juncus patens</i>			x			
Brown-headed rush	<i>Juncus phaeocephalus</i>			x			
Three-square	<i>Scirpus americanus</i>			x			
California tule	<i>Scirpus californicus</i>			x			
Low club rush	<i>Scirpus cernuus</i>			x			
<b>Grasses</b>							
Bent grass	<i>Agrostis pallens</i>	x	x	x	x	x	
California brome	<i>Bromus carinatus</i>	x		x	x	x	x
California oatgrass	<i>Danthonia californica</i>	x		x			x
Tufted hairgrass	<i>Deschampsia cespitosa</i>	x		x			
Saltgrass	<i>Distichlis spicata</i>		x				
Western ryegrass	<i>Elymus glaucus</i>				x		
Meadow barley	<i>Hordeum brachyantherum</i>			x			
Creeping wildrye	<i>Leymus triticoides</i>			x	x	x	
Foothill needlegrass	<i>Nassella lepida</i>	x			x	x	
Purple needlegrass	<i>Nassella pulchra</i>	x	x		x	x	x

Plants will be installed approximately 12 to 36 inches (30 to 90 cm) on center, depending on species. Smaller stature plants will be grouped and spaced closer together, while larger stature plants will be spaced further apart. In general, plants will be placed in non-linear arrangements to mimic plant distribution patterns observed in nature.

Seeds will be collected from local sources and grown by UCSC staff and students at the UCSC Arboretum, UCSC Teaching Greenhouses, and YLR. Some species may be grown by local restoration contractors.

With the exception of trees, all plants will be grown in Ray Leach ‘Conetainers’ or similar sized pots. Trees will be grown in ‘tree pots’. These containers will maximize utilization of greenhouse space and minimize per plant costs while producing relatively large plants with well developed root systems. Installation will begin after the first winter rains.

#### *Erosion control*

Because the Terrace Lands are essentially flat erosion is not likely to be a concern. If following planting or weeding efforts erosion control is required, appropriate materials (e.g. wood-chip mulch, jute netting, etc.) will be installed.

#### *Irrigation*

Ideally, plant installation will commence after the first winter rain and end well before the rains stop, ensuring that plants are naturally watered in and established before the summer drought. However, if supplemental irrigation is needed, plants will be watered using one or all of the following methods: vehicle application, drip hose, and/or overhead sprinkling. Water will be obtained from MSC infrastructure or other sources (e.g. rain, reclaimed water, etc.).

*Remediation (maintenance / replacement plantings)*

It is anticipated that plant mortality will likely be in the 10-40% range due to herbivory, desiccation, and/or trampling (by volunteers during planting and monitoring). Thus, plants will be installed at relatively high densities. If mortality is lower than anticipated, plants will be removed as necessary to ensure successful growth and reproduction and future planting densities will be adjusted. If a particular planting effort fails, plants will either be replanted that season or the following year if failure occurs after the rainy / planting season. Additionally, an alternative planting palette may be considered.

**REPORTING ON IMPLEMENTATION ACTIVITIES (SRP 5)**

A plan for documenting and reporting the physical and biological “as built” condition of the site will be prepared at the completion of the initial plan implementation activities. This report will describe the field implementation of the approved resource plan in narrative and photographs and report any problems in the implementation and their resolution.

The YLR manager will be on-site during restoration activities to take notes, photos, and to direct crews. After the end of the busy spring/summer restoration project season, she/he will compile notes and photos into a simple report describing the physical and biological “as built” condition of the site areas. This report will be submitted annually as an appendix to the YLR annual monitoring report.

**INTERIM MONITORING AND MAINTENANCE (SRP 6)**

Monitoring of restored areas on the Terrace Lands will provide data on coverage and richness of native species and thus gauge the “success” of restoration efforts. Specific monitoring methodologies, timing, and discussion of performance standards are included below in sections SRP 7 and SRP 8. Timing and methods for planting and weeding

(maintenance) are detailed in sections SRP 4 and SRP 5 above. Data from annual monitoring efforts will be used to assess whether restoration efforts are proceeding in the desired trajectory (e.g. increased coverage and richness of natives and decreased coverage of non-natives). Interim success criteria and remediation measures are specified in Tables 3-6 for each habitat type. A report on the progress towards both interim and final success criteria (as per SRP 7 below) will be compiled.

Data compiled from monitoring and maintenance activities will be included in an annual report that will be provided to the UC Santa Cruz Planning Director and the SAC by December 31<sup>st</sup> of each year following year one of the project period in which monitoring has been conducted. Each report will be cumulative (building upon previous efforts), will summarize monitoring results, and include a “Performance Evaluation” section where data will be summarized and used to evaluate restoration efforts. In order to remedy potential deficiencies in meeting success criteria each report will also include a “Recommendations” section that will discuss solutions and/or adaptive strategies to tackle unforeseen circumstances or new findings that require a change in restoration practices, maintenance, monitoring, or success criteria.

### **SUCCESS CRITERIA FOR HABITAT TYPES (SRP 7)**

The SAC has defined final success criteria for species richness and coverage as well as remediation actions if criteria are not met. Success criteria will be evaluated by the SAC and may be changed if need be. Final success criteria will be evaluated only after a period of at least 3 years wherein the study site has been subject to no remediation or maintenance activities other than weeding. This section provides information on success criteria for each habitat type and a general overview of methods used to achieve these goals. Specific details regarding planting, site preparation, and weeding are included in sections SRP 2 (restoration and weeding goals), SRP 3 (site preparation), and SRP 4 (planting plan) above.



***Ruderal, coyote brush scrub-grassland, and grassland areas***

Enhancement and protection goals for ruderal, coyote brush scrub-grassland, and grassland are to maintain open space areas, protect and enhance the grassland, ruderal, and coyote brush scrub-grassland areas through eliminating priority one weeds, controlling to the extent possible lower priority weeds, promoting the abundance and diversity of native plant species (through weed abatement and phased revegetation), and preventing unauthorized trail development. During Phase 1 infilling/restoration/enhancement of ruderal, coyote brush scrub-grassland, and grassland will primarily be focused in areas where coyote brush habitat is currently present (see Figure 2); however, restoration efforts will also take place throughout the entire site as needed (e.g. weed abatement efforts, small scale planting, experimental manipulations, etc.). Interim and long-term goals for restoration of ruderal, coyote brush scrub-grassland, and grassland are included in Table 3.

Coyote Brush Scrub-Grassland enhancement in the northwestern region of the upper terrace (Figure 7) will focus on revegetating an earthen berm to create a “living fence” between the agricultural lands to the west and the upper Terrace. This habitat will provide cover for animals moving from the upper Terrace into Younger Lagoon.

**Table 3. Summary of restoration activities, success criteria, and implementation actions for ruderal, coyote brush scrub-grassland, and grassland areas.**

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
<b>RMP PS 1</b> Priority 1 weeds	Eliminate on Terrace Lands	Year 3 and annually thereafter	No priority 1 weeds surviving to reproduction each year	Continue weed monitoring and control

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
			Priority 1 weeds reproducing on site	Increase frequency of monitoring and weed control; consider alternative control methods
<b>RMP PS 2</b> Priority 2 Weeds	Reduce weedy seed set after planting efforts are initiated.	Timed to correspond with planting efforts.	Planted plants are established	Continue weeding program
			Annual weeds out-competing native plants.	Change weeding schedule or evaluate alternative methods.
<b>RMP PS 2</b> Priority 3 Weeds	Incidental weed control efforts during active restoration projects (e.g. planting).	Timed to correspond with planting efforts.	Planted plants are established	Continue weeding program
			Annual weeds out-competing native plants.	Change weeding schedule or evaluate alternative methods.

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
<b>RMP PS 3</b> Native plant species richness in Phase 1 grassland, ruderal, and coyote brush scrub-grassland areas	8 native plant species appropriate for habitat established in restoration areas.	Year 3--two years after planting**	6 or more native plant species established.  <i>and</i> 10% cover (shrubs), 5% cover (non-shrubs), and evidence of natural recruitment present.	Continue monitoring
	40% cover of shrubs in ruderal, coyote brush scrub-grassland where coyote brush scrub is the primary target.  25% cover of non-shrubs (grasses, herbs, etc.) in grassland areas where grassland restoration is the primary target.		Fewer than 6 native plant species present.  <i>or</i> < 10% cover (shrubs), < 5% (non-shrubs) or no evidence of natural recruitment present	Perform supplemental planting using different species, propagule type, soil preparation methods, irrigation, and/or weed abatement methods

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
		Year 5	<p>6 or more native plant species established.</p> <p><i>and</i></p> <p>≥ 25% cover (shrubs) &gt;15% cover (non-shrubs) and evidence of natural recruitment present</p>	Continue monitoring
			<p>Fewer than 6 native plant species</p> <p><i>or</i></p> <p>&lt; 25% cover (shrubs) and &lt;15% cover (non-shrubs)</p> <p><i>or</i></p> <p>no evidence of natural recruitment present</p>	Perform supplemental planting using different species, propagule type, soil preparation methods, irrigation, and/or weed abatement methods

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
		Year 7 and every 5 years thereafter **	8 or more native plant species present comprising $\geq$ 40% cover (shrubs) and >25% cover (non-shrubs)  <i>and</i> evidence of natural recruitment present	Continue monitoring
			Fewer than 8 native plant species or < 40% cover (shrubs) and <25% cover (non-shrubs) of native species  <i>or</i> no evidence of natural recruitment present	Perform supplemental planting using different species, propagule type, soil preparation methods, irrigation, and/or weed abatement methods. Consult SAC.
<b>RMP PS 4</b> Native plant richness in Phase 2 and Phase 3 grassland, ruderal, and coyote brush scrub-grassland areas	Same criteria as for Phase 1 as adjusted by SAC.	Same criteria as for Phase 1 as adjusted by SAC.	Same criteria as for Phase 1 as adjusted by SAC.	Same criteria as for Phase 1 as adjusted by SAC.

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
<b>RMP PS 5</b> Protection of revegetation in progress	No disturbance to revegetation plantings	Ongoing until revegetation is successful	Plantings undisturbed	Continue monitoring until revegetation is successful
			Plantings disturbed (plants broken, trampled, dislodged, removed)	Install signs or low fencing as appropriate and consistent with the CLRDP.

### *Coastal bluff*

Enhancement and protection of coastal bluff habitat will be achieved by eliminating priority one weeds, promoting the abundance and diversity of native plant species through plantings, preventing unauthorized trail development, and increasing the extent of coastal bluff vegetation. Restoration of all coastal bluff habitat will begin during Phase I of the project. Interim and long-term goals for restoration of coastal bluff habitats are provided in Table 4.

**Table 4. Summary of restoration activities, success criteria, and implementation actions for coastal bluff habitat.**

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
<b>RMP PS 6</b> Priority 1 weeds except	Eliminate on coastal bluff	Year 3 and annually thereafter	No priority 1 weeds surviving to reproduction	Continue weed monitoring and control

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
iceplant			Priority 1 weeds reproducing on site	Use different species weed abatement methods or frequency
<b>RMP PS 7</b> Iceplant removal	Eliminate on coastal bluff	Prior to first rainy season following initiation of construction for first development project in Lower Terrace development zone	No iceplant on coastal bluff	Continue monitoring and control
			Iceplant growing on coastal bluff	Use different species, weed abatement methods or frequency
<b>RMP PS 8</b> Native plant revegetation	8 native plant species appropriate for coastal bluff habitat.  40% cover of native species.	2 years after planting	4 or more native plant species established comprising $\geq$ 20% cover within bluff areas  <i>and</i>  evidence of natural recruitment present	Continue monitoring

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
			Fewer than 4 native plant species or < 20% cover of native species in bluff areas  <i>or</i>  no evidence of natural recruitment present	Perform supplemental planting using different species, propagule type, soil preparation methods, irrigation, and/or weed abatement methods
		5 years after planting	8 or more native plant species established comprising $\geq$ 30% cover within bluff areas  <i>and</i>  evidence of natural recruitment present	Continue monitoring
			Fewer than 8 native plant species or < 30% cover of native species in bluff areas  <i>or</i>  no evidence of natural recruitment present	Perform supplemental planting using different species, propagule type, soil preparation methods, irrigation, and/or weed abatement methods



<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
		10 years after planting and every 5 years thereafter	8 or more native plant species established comprising $\geq$ 40% cover within bluff areas  <i>and</i> evidence of natural recruitment present	Continue monitoring
			Fewer than 8 native plant species or < 40% cover of native species in bluff areas  <i>or</i> no evidence of natural recruitment present	Perform supplemental planting using different species, propagule type, soil preparation methods, irrigation, and/or weed abatement methods. Consult SAC.
<b>RMP PS 9</b> Protection of coastal bluff vegetation	No disturbance to coastal bluff vegetation	Ongoing	Vegetation undisturbed	Continue monitoring
			Vegetation disturbed (plants broken, trampled, dislodged, removed)	Install additional signs or low fencing as appropriate

## *Wetlands*

Enhancement and protection goals for wetlands include increasing surface water flow, controlling weeds, promoting the abundance and diversity of native plant species, creating buffers, and controlling access by humans and non-native animals. Maintaining trails primarily along the perimeter of the Terrace area (i.e. eliminating trails that bisect the Reserve from East to West) will reduce the potential impact humans have on wildlife in wetland habitats. Table 5 highlights the performance standards and enhancement activities for wetlands across the entire project area and for the 20 year duration. The primary focal areas for wetland restoration during Phase 1 of the project will include PS 10, 12, 13, 16, and 17 (as per Table 5) as well as planting in the core areas of wetlands 1, 2, 4 and 5. Implementation efforts focused on hydrologically reconnecting Wetlands 1 and 2 will be initiated subsequent to Commission approval of the SRP Phase 1B NOID.

Plans for hydrologically reconnecting Wetlands 1 and 2 are described below to the extent it has been developed to date. Implementation details will be subject to agency consultation and permitting and likely will vary, at least in some details, from the conceptual outline provided here. The implementation of SRP Phase 1B is independent of the implementation of Phase 1A, although results of both would be monitored and reported at the end of SRP Phase 1. Due to the uncertainty related to the Phase 1B elements and implementation criteria it would be too speculative to evaluate the environmental effects of Phase 1B implementation at this time.

Initial efforts to reconnect W1 and W2 during Phase IB of the restoration will focus on modifying the flow pattern of Wetland 1 by installing an earthen dam, or other appropriate structure, at both the upstream and/or downstream end of Wetland 1 and/or a flash dam at the southern end of W1 (Figures 10 and 11).

The earthen dam, or other appropriate structure, at the head of W1 is expected to decommission the drainage ditch, diverting surface water into W2. The extent of W1 is unlikely to change significantly because of the steep side slopes and subsurface flow. Additional diversion structures in W1 may be considered to direct more surface flow into

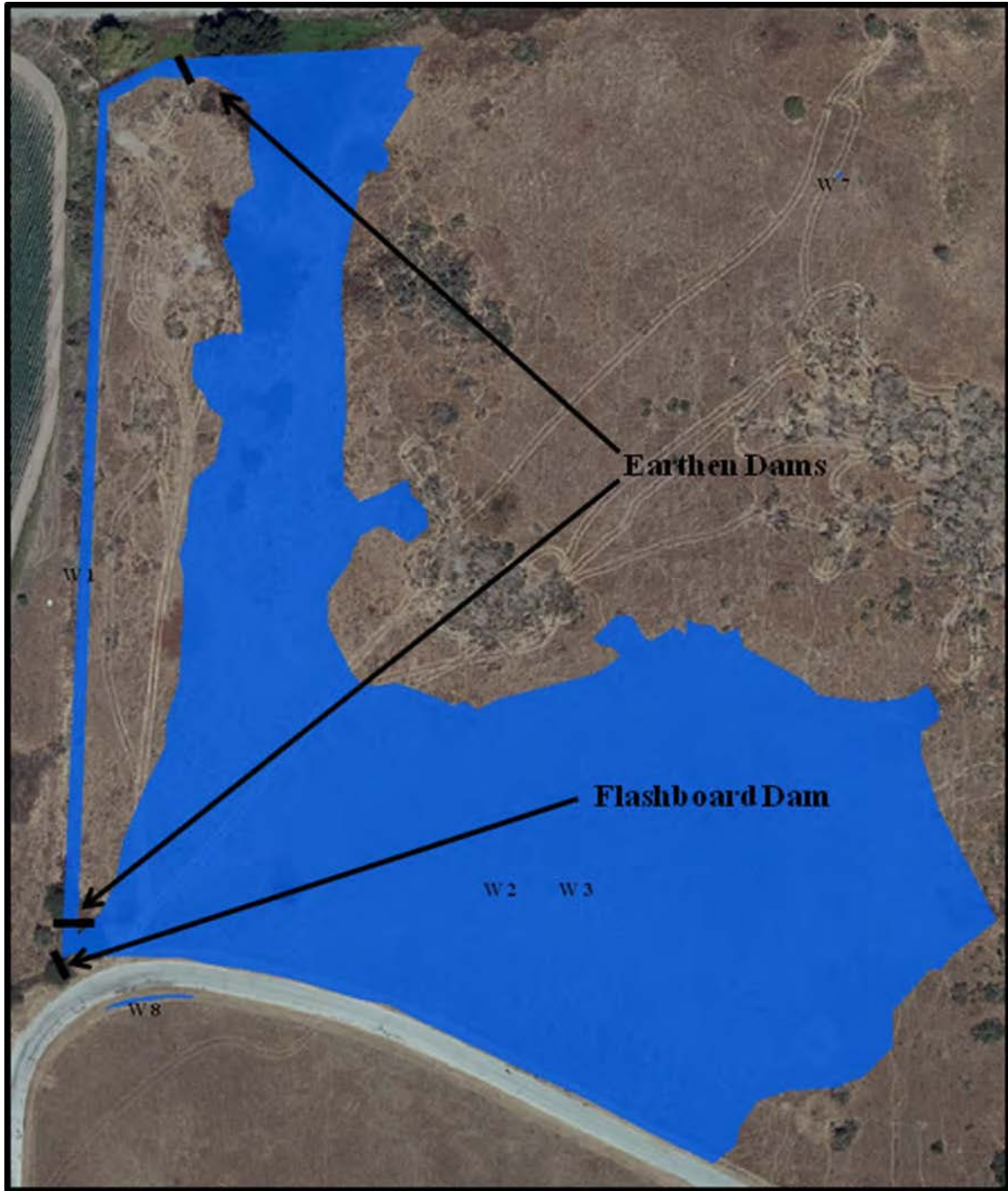
W2. Water pooled in W1 behind these dams may provide amphibian breeding habitat. This approach of plugging the ditch will likely create small open water pool habitats. If the diversion structures at W1 prove successful, they will be rebuilt in a permanent manner. If they do not meet anticipated goals additional design and planning will occur during Phase II of the restoration project.

The broad geometry and dense vegetation of W2 is expected to spread the water that formerly flowed through W1 over a much greater area. This is expected to facilitate weed control, improve water quality, and may increase the extent of W2. It is also expected to promote infiltration and the subsurface storage of winter runoff, which will lengthen the duration of inundation in the spring.

The diversion structure at the southern end of W1 will be constructed by modifying an existing water control structure that consists of two short culverts in a concrete headwall. A flashboard dam in this location will enable management of wetland hydrology in the lower portion of W2. The structure is expected to increase the extent and duration of inundation in W2 without adversely affecting the other uses or the roadway, with benefits similar to those described above.



**Figure 10.** Hydrology of wetlands 1 and 2.



**Figure 11.** Potential modifications to Wetland 1.

**Table 5.** Summary of restoration activities, success criteria, and implementation actions for wetland areas.

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
<b>RMP PS 10.</b> Wetland 2 - flow diversion from Wetland 1	Wetland functioning as expected per design	1, 2, and 3 years after diversion completed	Structure remains intact  Water diversion functioning as expected	Continue monitoring
			Structure fails  Water diversion not functioning as expected	Fix with better structure  Develop and implement plans to correct functioning; continue monitoring
<b>RMP PS 11.</b> Combined Wetland W1/W2 – creation of willow riparian corridor and restoration plantings west and east of the	3 native plant species appropriate for habitat established in planted areas to comprise 30% cover (e.g. Coyote brush, willow, etc.).	3 years after planting**	3 or more native plant species established comprising $\geq$ 20% cover within planted areas  <i>and</i>  evidence of natural recruitment present	Continue monitoring

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
combined W1/W2 hydrologic corridor			Fewer than 3 native plant species  <i>or</i>  < 20% cover of native species established within planted areas or no evidence of natural recruitment present	Perform supplementa l planting using different species, propagule type, soil preparation methods, irrigation, and/or weed abatement methods
		10 years after planting** and every 5 years thereafter	3 or more native plant species established comprising $\geq$ 30% cover within planted areas  <i>and</i>  evidence of natural recruitment present	Continue monitoring

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
			Fewer than 3 native plant species <i>or</i> < 30% cover of native species established within planted areas or no evidence of natural recruitment present	Perform supplemental planting using different species, propagule type, soil preparation methods, irrigation, and/or weed abatement methods. Consult SAC.
<b>RMP PS 12.</b> Priority 1 weeds	Eliminate in wetlands	Year 3 and annually thereafter	No priority 1 weeds surviving to reproduction	Continue weed monitoring and removal as necessary
			Priority 1 weeds reproducing on site	Increase frequency of monitoring and weed removal efforts; consider alternative control methods
<b>RMP PS 13</b> Priority 2 Weeds	Reduce weedy seed set after planting efforts are initiated.	Timed to correspond with planting efforts.	Planted plants are not established	Continue weeding program



<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
			Annual weeds out-competing native plants.	Change weeding schedule or evaluate alternative methods.
<b>RMP PS 13</b> Priority 3 Weeds	Incidental weed control efforts during active restoration projects (e.g. planting)	Timed to correspond with planting efforts.	Planted plants are not established	Continue weeding program
			Annual weeds out-competing native plants.	Change weeding schedule or evaluate alternative methods.
<b>RMP PS 14.</b> Native plant revegetation	4 native plant species appropriate for habitat established in planted areas to comprise 30% cover within selected areas	2 years after planting**	Fewer than 4 native plant species <i>or</i> <10% cover of native species established in planted areas or no evidence of natural recruitment present	Perform supplemental planting using different species, propagule type, soil preparation methods, irrigation, and/or weed abatement methods

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
			4 or more native plant species established comprising $\geq$ 30% cover within planted areas  <i>and</i>  evidence of natural recruitment present	Continue monitoring
		5 years after planting** and every 5 years thereafter	Fewer than 4 native plant species  <i>or</i>  < 25% cover of native species established in planted areas  <i>or</i>  no evidence of natural recruitment present	Perform supplemental planting using different species, propagule type, soil preparation methods, irrigation, and/or weed abatement methods. Consult SAC.
			Plantings undisturbed	Continue monitoring until revegetation is successful

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
<b>RMP PS 15.</b> Protection of revegetation in progress	No disturbance to revegetation plantings	Ongoing until revegetation is successful	Plantings disturbed (plants broken, trampled, dislodged, removed)	Determine cause; develop appropriate solution
			Wetlands undisturbed	Continue monitoring
<b>RMP PS 16.</b> Protection of wetlands	No unauthorized human disturbance to wetlands	Ongoing	Vegetation disturbed (plants broken, dislodged, trampled, removed); soils disturbed or compacted; other signs of trespass present	Install additional signs or low fencing as appropriate and per CLRDP specifications
			Wetlands undisturbed	Continue monitoring
<b>RMP PS 17.</b> Minimize anthropogenic changes to existing	Minimal changes to surface topography from management	Ongoing	Substantial changes to surface topography and/or drainage patterns evident	Determine cause; correct as necessary

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
surface drainage patterns in open space areas (except for W1/W2 hydrologic integration)	activities; no changes to surface topography due to unauthorized activities			

***Wetland buffers***

Enhancement and protection goals for wetland buffer areas (Figure 5 and 7) are to protect wetlands from adverse impacts due to weeds, noise, human and non-native animal intrusion, lighting, predation, and sedimentation. During Phase 1, restoration of wetland buffer habitat will be conducted primarily in the Wetlands 4, 5 and 6 buffers, but will also occur throughout other wetland buffer areas at a less intensive effort. Wetland buffers are delineated as 100 ft (30.5 m) beyond classified wetland habitat (with the exception of Wetland 5 which has a 150 ft [45.7 m] buffer area). Because conditions within wetland buffer areas vary, within and among wetlands, plant species used in revegetation efforts will be largely dependent upon soil conditions. In order to achieve the goal of “insulating” wetland habitat from noise and intrusion (both physical and visual) by people, planting efforts will include shrubs near the outer edge of the wetland buffer areas and adhere to interim and long-term goals for restoration of ruderal, coyote brush scrub-grassland, and grassland (see Tables 3 and 6).

**Table 6. Summary of restoration activities, success criteria, and implementation actions for wetland buffer areas.**

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
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<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
<b>RMP PS 18.</b> Reduce disturbance from automobile traffic	Construct new campus access road that diverts traffic between the Delaware Avenue/Shaffer Road intersection and the CDFG facility and abandon former access road (see management measures above)	See Table A.12 of CLRDP.	Roadway realigned and former roadway improved/restored	Maintain new roadway and trail/restoration areas of former roadway thereafter. Breaking up and removing pavement and then planting with native shrubs will enhance corridor along wetland 1.
<b>RMP PS 19.</b> Priority 1 weeds	Eliminate in buffer areas	Year 3 and annually thereafter	No priority 1 weeds surviving to reproduction	Continue weed monitoring and removal as necessary
			Priority 1 weeds reproducing on site	Increase frequency of monitoring and weed removal efforts; consider alternative control methods
<b>RMP PS 20</b> Priority 2 Weeds	Reduce weedy seed set after planting efforts are initiated.	Timed to correspond with planting efforts.	Planted plants are not established	Continue weeding program

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
			Annual weeds out-competing native plants.	Change weeding schedule or evaluate alternative methods.
<b>RMP PS 20.</b> Priority 3 weeds	Incidental weed control efforts during active restoration projects (e.g. planting).	Timed to correspond with planting efforts.	Planted plants are established	Continue weeding program
			Annual weeds out-competing native plants.	Change weeding schedule or evaluate alternative methods
<b>RMP PS 21.</b> Creation of vegetated berm at periphery of the buffer for wetland W5 (seasonal pond); see also management measures above	Establish vegetated berm (note: weed removal and planting requirements for the berm shall be the same as for the remainder of the weed removal and planting performance standards specified in this table)	See Table A.12 of CLRDP.	Vegetated berm established <i>and</i> weed control/planting successful per this table	Monitor and maintain in its design state thereafter
			Vegetated berm not established <i>and/or</i> weed control/planting not successful per this table)	Establish berm, and pursue remedial planting actions per this table.

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
<b>RMP PS 22.</b> Native plant revegetation	8 native plant species appropriate for habitat established to comprise 40% cover within buffer areas that will be planted with shrubs and 25% cover in areas that will be planted with grasses and herbaceous plants.	2 years after planting**	4 or more native plant species established comprising $\geq$ 10% cover within buffer areas  <i>and</i> evidence of natural recruitment present	Continue monitoring
			Fewer than 4 native plant species or < 10% cover of native species established in buffer areas  <i>or</i> no evidence of natural recruitment present	Perform supplemental planting using different species, propagule type, and/or soil preparation methods

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
		5 years after planting**	<p>6 or more native plant species established comprising <math>\geq</math> 25% cover for shrubs and 15% cover for grasses and herbs within buffer areas</p> <p><i>and</i></p> <p>evidence of natural recruitment present</p>	Continue monitoring thereafter
			<p>Fewer than 6 native plant species or &lt; 25% cover for shrubs and 15% cover for grasses and herbs of native species established in planted areas</p> <p><i>or</i></p> <p>no evidence of natural recruitment present</p>	Perform supplemental planting using different species, propagule type, and/or soil preparation methods



<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
		7 years after planting** and every 5 years thereafter	8 or more native plant species established comprising $\geq$ 40% cover (shrubs) and 25% cover (grasses/herbs) within buffer areas  <i>and</i>  evidence of natural recruitment present	Continue monitoring thereafter
			Fewer than 8 native plant species or < 40% cover (shrubs) and 25 % cover (grasses/herbs) of native native established in buffer areas  <i>or</i>  no evidence of natural recruitment present	Perform supplemental planting using different species, propagule type, and/or soil preparation methods. Consult SAC.
<b>RMP PS 23.</b> Protection of revegetation in progress	No human disturbance to revegetation plantings	Ongoing until revegetation is successful	Plantings undisturbed	Continue monitoring until revegetation is successful

<i>Feature</i>	<i>Goal</i>	<i>Time Period*</i>	<i>Result</i>	<i>Action</i>
			Plantings disturbed (plants broken, trampled, dislodged, removed)	Install signs or low fencing as appropriate
<b>RMP PS 24.</b> Protection of buffer areas	No unauthorized human disturbance to buffer areas	Ongoing	Buffer areas undisturbed	Continue monitoring
			Buffer areas disturbed (plants broken, dislodged, trampled, removed); soils disturbed or compacted; other signs of damage present	Install additional signs or low fencing as appropriate and per the CLRDP requirements
<b>RMP PS 25.</b> Minimize anthropogenic changes to existing surface drainage patterns (except for those contemplated by and consistent with the CLRDP, including the Drainage Concept Plan (Appendix B)).	Minimal changes to surface topography from management activities; no changes to surface topography due to unauthorized activities	Ongoing	Wetlands/buffers undisturbed	Continue monitoring and work with Campus Planning and Construction to ensure potential temporary impacts from construction are not having long-term impacts on wetland buffer habitats.

### **SUCCESS CRITERIA (SRP 8)**

Detailed success criteria for each habitat type are described in SRP 7 above. These criteria set an initial threshold of species richness and cover for specific habitat types throughout the restoration area. However, during the spring of 2010 species richness and cover data will be collected for grassland, scrub, and wetland habitats at five “Reference Sites.” Possible reference Sites include Franklin Point, coastal prairies near Gualala (Sea Ranch), Lighthouse field, Point Lobos State Park, Arana Gulch, Twin Lakes, Eliccott Slough, and Pogonip. These sites will be surveyed using the same methodologies described below in SRP 9. Results from surveys of Reference Sites will be presented to the SAC and used to assess whether the success criteria outlined in Tables 3-6 should be modified. Data from these areas will be used as a guideline and will not necessarily dictate specific success criteria. Thus, determination of whether enhancement and restoration efforts have met pre-determined goals will be measured by comparing percent cover and species richness of native species to the criteria outlined above in section SRP 7 or, depending upon guidance from the SAC, from data collected at the local Reference Sites. If success criteria are not achieved, the SAC will evaluate potential causes for the lack of success and recommend future adaptive management strategies to obtain desired goals.

### **MONITORING (SRP 9)**

This section of the SRP defines the monitoring approach that will be used to evaluate whether success criteria for native plant cover and richness is being met. In order to assess the progress towards meeting defined success criteria, monitoring efforts will focus on Phase I target restoration/enhancement areas (Figure 7). The ultimate goal of Phase I is to meet success criteria for 1/3<sup>rd</sup> of the Terrace Lands (approximately 15 ac [6 ha]). The methodologies outlined below describe survey methods; however, a pilot study will be conducted in Spring of 2010 to refine methodologies and assess the appropriate number of plots necessary to ensure an adequate sample size that will enable cover to be estimated within 10% (confidence interval of 0.10) of actual cover values with an 80% confidence level ( $\alpha = 0.20$ ). At a minimum, vegetation monitoring will be conducted in

years 1, 4, and 7. However, if extreme weather events occur in these years additional monitoring may be required. Monitoring will occur in the spring when species are blooming and readily identifiable. Percent cover and species richness will be calculated as described below; data will be compared to success criteria outlined in Tables 3-6.

### ***Hydrological monitoring***

Water levels in each major wetland (1, 2, 4, and 5) will be recorded monthly at a series of staff plates positioned strategically throughout the wetlands. The area with water at the ground surface will be mapped at least monthly during the rainy season by walking its periphery with a GPS and entering the data into a GIS. Rainfall data will be collected at a nearby weather station located at Long Marine Laboratory.

### ***Coyote brush shrub-grassland, coastal bluff, willow riparian, and ruderal areas***

These areas are dominated by shrub species. The line intercept method will be used to assess cover in Coyote brush shrub-grassland, coastal bluff, willow riparian, and ruderal areas. Each transect will be 164 ft (50 m) in length and distributed throughout the Phase I restoration areas within each habitat type. The first starting point will be randomly selected within each specific habitat type and additional transects will be established at fixed intervals of 246 ft (75 m) in a north south direction. Specific start locations of each transect will be permanently established; however, orientation of every transect will be randomly selected each time a transect is surveyed (i.e. in different years). This method establishes random transect points while ensuring adequate coverage of the entire restoration area. If transects extend beyond the target habitat type into either developed areas or different habitats, the random orientation or starting point will be reselected in order to ensure sampling occurs within the target habitat. Shrub cover will be quantified by recording the length each shrub species is observed under the transect tape to the nearest 2 in (5 cm); herbaceous and grass cover will not be quantified in areas where shrubs intersect with the transect.

For areas within Coyote brush shrub-grassland, coastal bluff, willow riparian, and ruderal areas that lack shrubs (i.e. interstitial open areas), herbaceous plants and grasses will be quantified using 2.69 ft<sup>2</sup> (0.25 m<sup>2</sup>) rectangular quadrats 0.82 x 3.28 ft (0.25 m x 1.0 m). Quadrats will be placed every 16.4 ft (5 m) perpendicular to the transect with the first quadrat placed randomly between (0-5 m). Quadrats will alternate between the right and left side of the transect (first placement selected randomly) unless only one side contains an open grassy area, in those cases the open area will be chosen. Percent cover of native and non-native species will be determined by estimating total cover of each species within each quadrat.

To adequately survey species richness, additional species (not found in transects or quadrats) that are observed in a 13 ft (4 m) wide belt transect along the line transect (6.5 ft [2 m] to either side of the line) will be recorded. Natural recruitment of native species will be noted in the line intercept and quadrat surveys by tallying the number of recruits per transect and/or quadrat. Recruits will be averaged across transects and quadrats.

### ***Open Grassland Areas***

These areas are dominated by grasses and forbs. Transects will be established as per methodologies described above in Coyote-brush shrubland, coastal bluff, willow riparian, and ruderal areas and serve as a backbone for quadrat surveys. Grasses and herbaceous cover will be quantified using 2.69 ft<sup>2</sup> (0.25 m<sup>2</sup>) rectangular quadrats (0.82 x 3.28 ft [0.25 m x 1.0 m]). Quadrats will be placed every 16.4 ft (5 m) perpendicular to the transect with the first quadrat placed randomly between (0-5 m). Quadrats will alternate between the right and left side of the transect (first placement selected randomly) unless only one side contains an open grassy area, in those cases the open area will be chosen. Percent cover of native and non-native species will be determined by estimating total cover of each species within each quadrat.

To adequately survey species richness, additional species (not found in quadrats) that are observed in a 13 ft (4 m) wide belt transect along the line transect (6.5 ft [2 m] to either side of the line) will be recorded. Natural recruitment of native species will be noted in

the belt transect and quadrat surveys by tallying the number of recruits per transect and/or quadrat. Recruits will be averaged across transects and quadrats.

### ***Wetland Vegetation***

Rectangular quadrats 2.69 ft<sup>2</sup> (0.25 m<sup>2</sup>) will be used to evaluate cover of grass, forb, sedge, and rush species in the wetland areas during Phase I (Figure 7). Quadrat size will be 0.82 x 3.28 ft (0.25 m × 1.0 m). A series of sampling locations will be determined by randomly assigning starting points at the edge of each wetland (determined by vegetation). At each starting point a transect tape will be extended across the wetland at a randomly chosen orientation to the opposite edge of the wetland. If the random orientation results in the transect being outside of the wetland area another orientation will be randomly selected. Quadrats will alternate between the right and left side of the transect (first placement selected randomly) falls within the wetland, in those cases the wetland area will be chosen. Percent cover of native and non-native species will be determined by estimating total cover of each species within each quadrat.

To adequately survey species richness, additional species (not found in quadrats) that are observed in a 13 ft (4 m) wide belt transect along the line transect (6.5 ft [2 m] to either side of the line) will be recorded. Natural recruitment of native species will be noted in the belt transect and quadrat surveys by tallying the number of recruits per transect and/or quadrat. Recruits will be averaged across transects and quadrats.

### ***GIS and GPS Vegetation Surveys***

Beyond on-the-ground transect and quadrat surveys described above, percent cover of large shrubs across the entire site will be calculated by digitizing the perimeters of shrubs occurring in Phase I restoration areas and throughout the Terrace Lands using GIS of recent aerial imagery (see for example Figure 2). Once plants are digitized, area and percent coverage can be calculated using spatial analysis, thus providing an additional

measure of cover for large shrubs. Aerial imagery analysis and on-the-ground GPS mapping will provide a thorough estimate of total coverage of patchily distributed species such as coyote brush, creeping wild rye, Douglas' baccharis, and wetland species (rushes, and sedges) that can be accurately be identified from aerial imagery. Digitizing of aerial imagery will be used when orthoimagery is updated and available (likely every 2-5 years).

### ***Photo monitoring***

On-the-ground photo monitoring will be conducted annually and be timed to correspond when plants are blooming and more easily identified (spring/early summer). Photos will be oriented to capture large scale changes over time and taken at permanent photo points established throughout the project area. Figure 12 identifies several photo points; however, additional points will likely be created over time in order to capture specific areas within the restoration site and ensure growing vegetation does not preclude adequate coverage. Each point has coordinate and bearing in order to ensure repeatability over time. Monitoring information collected for each photo point will include:

1. Photo point number
2. Date
3. Name of photographer
4. Bearing
5. Camera and lens size
6. Coordinates
7. Other comments

All on-the-ground photos will be included in the monitoring reports.



**Figure 12.** Photo monitoring points.



### ***Monitoring study report and schedule***

Results from monitoring efforts will be included in the reports (as per SRP 6) that will be submitted by December 31<sup>st</sup> of each year to UCSC, CCC, and the SAC. Reports will include a summary of restoration activities as well as an evaluation of whether success criteria are being achieved. The report will also discuss any corrective actions or adjusted protocols that may be required.

### **FINAL MONITORING REPORT (SRP 10)**

The final monitoring report will be submitted to the UCSC Planning Director, Scientific Advisory Committee, and California Coastal Commission at the end of the final monitoring period of Phase I. The report will evaluate whether the site area conforms to the goals and success criteria set forth in the approved final resource plan.

### **PROVISION FOR POSSIBLE FURTHER ACTION (SRP 11)**

If the final report (SRP 10) indicates that the project has been unsuccessful, in part or in whole, based on the approved success criteria, then the final report shall identify remediation measures to be implemented to compensate for those portions of the original plan that did not meet the approved success criteria.

## **ACKNOWLEDGEMENTS**

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## **APPENDICES**

### Appendix 1. CLRDP A.6.1: Specific Resource Plan requirements

#### **A.6.1 Specific Resource Plans Required**

The RMP provides a fairly broad outline with general recommendations and specific guidelines for resource protection, enhancement, and management on the Marine Science Campus site. The intent is that the Scientific Advisory Committee (SAC) uses the RMP as the initial framework for development of more detailed and specific resource plans for RMP implementation. These may be adapted to address the current physical and ecological conditions, current understanding of biological and ecological processes, and current approaches to habitat revegetation, restoration, and enhancement, provided that the overall intent of the RMP is carried out, including the level of resource protection and the timing guidelines. For example, the RMP performance standards provide suggestions for standards of biodiversity and vegetative cover, but these might be altered in a detailed plan based on new research or revegetation experience at this site. Adjustments to the performance standards that are more protective of the resources and more responsive to the site conditions based on management experience over time are encouraged.

Therefore, implementation of the requirements of this RMP shall be based on more detailed resource plans. Some of these more detailed resource plans will be developed during the course of projects that emanate from the CLRDP building program that require certain mitigations and capital improvements as part of them, but others may be developed irrespective of the building program (see also Approvals section below). Implementation of the RMP shall be guided by the SAC composed of three to four native restoration professionals and academicians appointed by the UCSC Chancellor and selected in consultation with the Executive Director of the California Coastal Commission. This committee shall meet on an annual basis at a minimum (more frequently as needed), and provide overall direction for resource plan preparation, revegetation installation, long-term maintenance and monitoring.

## Appendix 1. CLRDP A.6.1: Specific Resource Plan Requirements

Specific Resource Plans shall be prepared per 1M 3.2.10 by a qualified restoration ecologist under the guidance of the SAC, and will follow the guidelines below, as appropriate:

1. A baseline assessment, including photographs, of the current physical and ecological condition of the proposed restoration, enhancement, and/or management site area. As appropriate, this may be based on available historical information or include current surveys addressing wetland delineation (conducted according to the definitions in the Coastal Act and the Coastal Commission's Regulations), a description and map showing the area and distribution of vegetation types, and a map showing the distribution and abundance of sensitive species, if any. Existing vegetation, wetlands, and sensitive species shall be depicted on a map that includes the footprint of the proposed site area.
2. A description of the goals of the resource plan, including, as appropriate, topography, hydrology, vegetation, sensitive species, and wildlife usage.
3. A description of planned site area preparation and invasive plant removal.
4. A planting plan including the planting palette (seed mix and container plants), planting design, source of plant material, plant installation, erosion control, irrigation, and remediation. Except for the planting of Monterey cypress, the planting palette shall be made up exclusively of native taxa that are appropriate to the habitat and region. Seed and/or vegetative propagules shall be obtained from local natural habitats so as to protect the genetic makeup of natural populations. Horticultural varieties shall not be used. Materials should be collected from coastal habitats that are located within approximately one mile of the Marine Science Campus and seaward of Highway 1 (Morgan 2002).
5. A plan for documenting and reporting the physical and biological "as built" condition of the site area within 30 days of completion of the initial plan implementation activities. This simple report will describe the field implementation of the approved resource plan in narrative and photographs, and report any problems in the implementation and their resolution.
6. A plan for interim monitoring and maintenance, including:
  - a. A schedule.
  - b. Interim performance standards keyed to final success criteria (#7, below).
  - c. A description of field activities, including monitoring studies (#8, below).
  - d. The monitoring period.

## Appendix 1. CLRDP A.6.1: Specific Resource Plan Requirements

- e. Provision for submission of annual reports of monitoring results to the Planning Director for the duration of the required monitoring period, beginning the first year after submission of the “as-built” report. Each report shall be cumulative and shall summarize all previous results. Each report shall document the condition of the site area with photographs taken from the same fixed points in the same directions. Each report shall also include a “Performance Evaluation” section where information and results from the monitoring program are used to evaluate the status of the project in relation to the interim performance standards and final success criteria. To allow for an adaptive approach to management, each report shall also include a “Recommendations” section to address changes that may be necessary in light of study results or other new findings.
7. Final success criteria for each habitat type, including, as appropriate:
    - a. Species diversity, including total number of taxa, number of native taxa, and number of invasive non-native taxa.
    - b. Vegetation coverage, including total vegetation, native vegetation, invasive non-native taxa, and dominant species.
    - c. Wildlife usage.
    - d. Erosion control and functional hydrology.
    - e. Control of invasive non-native plant taxa.
    - f. Maintenance of suitable habitat, and presence/abundance, for sensitive species or other individual “target” species.
    - g. A requirement that success be determined after a period of at least three years wherein the study site has been subject to no remediation or maintenance activities other than weeding.
  8. The method by which “success” will be judged, including, as appropriate:
    - a. Type of comparison. Possibilities include comparing a census of the site area to a fixed standard derived from literature or observations of natural habitats, comparing a census of the site area to a sample from a reference site, comparing a sample from the site area to a fixed standard, or comparing a sample from the site area to a sample from a reference site.
    - b. Identification and description, including photographs, of any reference sites that will be used.
    - c. Test of similarity. This could simply be determining whether the result of a census was above a predetermined threshold. Generally, it will entail a one- or two-sample t-test.

## Appendix 1. CLRDP A.6.1: Specific Resource Plan Requirements

- d. The field sampling design to be employed, including a description of the randomized placement of sampling units and the planned sample size.
  - e. Detailed field methods; not simply a citation of a publication or standard methodology.
  - f. Specification of the maximum allowable difference between the restoration value and the reference value for each success criterion.
  - g. Where a statistical test will be employed, a statistical power analysis to document that the planned sample size will provide adequate statistical power to detect the maximum allowable difference. Generally, sampling should be conducted with sufficient replication to provide 90% power with  $\alpha=0.10$  to detect the maximum allowable difference. This analysis will require an estimate of the sample variance based on the literature or a preliminary sample of a reference site.
  - h. A statement that final monitoring for success will occur after at least 3 years with no remediation or maintenance activities other than weeding.
9. Monitoring study design for each habitat type, including, as appropriate:
- a. Goals and objectives of the study.
  - b. Field sampling design.
  - c. Study sites, including experimental/revegetation sites and reference sites.
  - d. Field methods, including specific field sampling techniques to be employed. Photomonitoring of experimental/revegetation sites and reference sites shall be included.
  - e. Data analysis methods, including descriptive and inferential statistics with specified acceptable variance and significance levels to examine sample size, univariate and multivariate comparisons, and/or other param as appropriate and necessary to assess progress toward and meeting of success criteria.
  - f. Presentation of results.
  - g. Assessment of progress toward meeting success criteria.
  - h. Recommendations.
  - i. Monitoring study report content and schedule.
10. Provision for submission of a final monitoring report to the UCSC Planning Director and Scientific Advisory Committee at the end of the final monitoring period. The final report must be prepared by a qualified restoration ecologist. The report must

## Appendix 1. CLRDP A.6.1: Specific Resource Plan Requirements

evaluate whether the site area conforms to the goals and success criteria set forth in the approved final resource plan.

- 11.** Provision for possible further action. If the final report indicates that the project has been unsuccessful, in part or in whole, based on the approved success criteria, then the final report shall identify remediation measures to be implemented to compensate for those portions of the original plan that did not meet the approved success criteria.



Appendix 2. Mitigation and monitoring requirements under CEQA

**Appendix 2.** Mitigation and monitoring program requirements under CEQA.

Measure #	Measure Text	Monitoring and Reporting Procedure	Monitoring and Reporting Responsibility	Timing
<p><b>CLRDP Policy 3.2</b></p>	<p><b>Protection and Restoration of Habitat Areas:</b> The biological productivity and the quality of coastal waters, streams, and wetlands, appropriate to maintain the optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through among other means minimizing adverse effects of wastewater discharges, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging wastewater reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural watercourses. Campus natural areas (i.e., areas outside of defined development zones) shall be protected, restored, enhanced, and managed as high-quality open space and natural habitat areas.</p>	<p>Implemented through development of this SRP and, for SRP, through implementation of MM 4.4-1, 4.4-2 and 4.5-1, below; reporting as described in specific mitigation measures, below.</p>	<p>PP&amp;C</p>	<p>Prior to and during construction</p>
<p><b>CLRDP MM 4.4-1</b></p>	<p><b>CA Red-legged Frog:</b> For all projects proposed in the upper terrace under the CLRDP, the University will implement the following:</p>	<p>Conduct survey. Document results.</p>	<p>Prior to construction, of projects in upper terrace</p>	<p>PP&amp;C</p>

Appendix 2. Mitigation and monitoring requirements under CEQA

Measure #	Measure Text	Monitoring and Reporting Procedure	Monitoring and Reporting Responsibility	Timing
	<p>A preconstruction survey for CRLF will be conducted of all areas proposed for grading and construction by a qualified biologist, approved by the USFWS. If CRLF are observed, grading activities shall be postponed and USFWS shall be consulted to determine appropriate actions to avoid impact. Consultation with the USFWS will result in either a determination of the need to obtain a permit or in the identification of measures to avoid take of the individual(s).</p> <p>The biological monitor shall also conduct meetings with the contractor(s) and other key construction personnel to describe the importance of the species, the need to restrict work to designated areas, and to discuss procedures for avoiding harm or harassment of wildlife encountered during construction.</p>	<p>If CRLF are observed, consult with USFWS.</p> <p>Conduct meetings with contractor(s) and construction personnel. Include mitigation specifications in construction contract.</p>	<p>Prior to construction, if CRLF are observed</p> <p>Before beginning construction</p>	
<p><b>CLRDP</b> <b>MM 4.4-2</b></p>	<p><b>Nesting Birds:</b> UCSC shall ensure that construction activities avoid disturbing nests of raptors (and other special-status birds). If ground-disturbing activities are scheduled to occur during the breeding season (February 1 through August 31), the following measures are required to avoid potential adverse effects on nesting special-status raptors and</p>	<p>Conduct survey. Document results.</p> <p>Create no-disturbance buffer in</p>	<p>Before beginning construction on each project</p> <p>Before beginning construction, if active raptor nests</p>	<p>PP&amp;C</p>

Appendix 2. Mitigation and monitoring requirements under CEQA

Measure #	Measure Text	Monitoring and Reporting Procedure	Monitoring and Reporting Responsibility	Timing
	<p>other birds:</p> <p>A qualified wildlife biologist will conduct preconstruction surveys of all potential nesting habitat. For burrowing owls, such surveys will follow the most recent CDFG Burrowing Owl Survey Protocol and Mitigation Guidelines.<sup>1</sup></p> <p>If active raptor nests are found during preconstruction surveys, a no-disturbance buffer acceptable in size to CDFG will be created around active raptor nests and nests of any other special-status birds during the breeding season, and maintained until it is determined that all young have fledged. Raptor or other bird nests initiated during construction are presumed to be unaffected, and no buffer is necessary. However, the “take” of any individuals will be prohibited.</p> <p>If preconstruction surveys indicate that nests are inactive or potential habitat is unoccupied during the construction/restoration period, no further mitigation is required. Trees and shrubs that have been determined to be unoccupied by special-status birds or that are located</p>	<p>consultation with qualified biologist. Include mitigation specifications in construction contract.</p>	<p>are found</p>	

<sup>1</sup> California Department of Fish and Game, *Staff Report on Burrowing Owl Mitigation*, The Resources Agency, October 17, 1995.

Appendix 2. Mitigation and monitoring requirements under CEQA

Measure #	Measure Text	Monitoring and Reporting Procedure	Monitoring and Reporting Responsibility	Timing
	outside the no-disturbance buffer for active nests may be removed.			
<b>CLRDP</b> <b>MM 4.5-1</b>	<b>Human Remains:</b> If human remains are discovered during the construction of a development project under the CLRDP, the University and/or its employees shall notify the Santa Cruz County Coroner’s Office immediately. Upon determination by the County Coroner that the remains are Native American, the Coroner shall contact the California Native American Heritage Commission, pursuant to subdivision (c) of Section 7050.5 of the Health and Safety Code, and the County Coordinator of Indian Affairs and appropriate Native American consultation shall be conducted, as outlined by PRC 5097.98. Implementation Measure 3.9.1, Construction Monitoring, as identified in the CLRDP, shall also apply. UCSC will be responsible for implementing this mitigation measure.	<p>Include in construction contract the requirement that the University be notified if suspected human bone is discovered.</p> <p>Contact archaeologist and County Coroner in the event of discovery of suspected human bone. Contact California Native American Heritage Commission and conduct Native American consultation if Coroner determines the remains are Native American.</p>	<p>Before beginning construction</p> <p>During construction</p>	PP&C

Appendix 2. Mitigation and monitoring requirements under CEQA

Measure #	Measure Text	Monitoring and Reporting Procedure	Monitoring and Reporting Responsibility	Timing
<p><b>CLRDP IM 3.9.1</b></p>	<p><b>Cultural Resources Construction Monitoring:</b> Should archaeological and/or paleontological resources be encountered during any construction on the Marine Science Campus, all activity that could damage or destroy these resources shall be temporarily suspended until qualified archaeologist/paleontologists and Native American representatives have examined the site and mitigation measures have been developed that address and proportionately offset the impacts of the project on archaeological and/or paleontological resources. Development shall incorporate measures to address issues and impacts identified through any archaeologist/ paleontologist and/ or Native American consultation.</p>	<p>Include in construction contract the requirement that work be suspended if archaeological resources are disclosed.</p> <p>Contract with qualified archaeologist to develop appropriate mitigation measures.</p>	<p>Before beginning construction</p> <p>If archaeological resources are disclosed</p>	<p>PP&amp;C</p>
<p><b>CLRDP IM 3.10.1</b></p>	<p><b>Use, Containment and Cleanup of Hazardous Materials.</b> The University, through the Office of Environmental Health and Safety, will manage the use, and in the event of spillage, the containment and cleanup of, hazardous materials and petroleum on the UCSC Marine Science Campus in compliance with federal and state regulations related to the storage, disposal, and transportation of hazardous substances.</p>	<p>For UC entities, continue to implement UCSC Environmental Health and Safety programs involving oversight of individual units' compliance efforts and advising on improvements in procedures related to storage, disposal, and transportation of hazardous substances.; document activity of relevant EH&amp;S programs</p>	<p>Ongoing, frequency varies with the type and quantity of hazardous materials; document annually</p>	<p>UCSC EH&amp;S</p>

Appendix 2. Mitigation and monitoring requirements under CEQA

Measure #	Measure Text	Monitoring and Reporting Procedure	Monitoring and Reporting Responsibility	Timing
<p><b>CLRDP Policy 7.1</b></p>	<p><b>Productivity and Quality of Coastal Waters.</b> The Marine Science Campus shall be developed and used in a manner that shall sustain and, where feasible, enhance and restore, the biological productivity and quality of coastal waters on and adjacent to the Campus through controlling, filtering, and treating runoff and other non-point sources of pollution, preventing depletion of groundwater supplies and substantial interference with surface water flow, encouraging wastewater reclamation, and maintaining natural vegetation buffer areas that protect riparian habitats.</p>	<p>Implement Resource Management Plan as described in this SRP  Construction practices consistent with Stormwater Concept Plan</p>	<p>Throughout construction</p>	<p>PP&amp;C</p>
<p><b>CLRDP IM 7.1.8</b></p>	<p><b>Irrigation and Use of Chemicals for Landscaping.</b> Any water used for landscape irrigation on the Marine Science Campus shall not be applied in a manner that would cause significant erosion. Any use of chemicals for fertilizer and/or weed and pest control shall be minimized to the degree feasible, including as required by the Drainage Concept Plan, and any chemicals unavoidably used shall not enter habitat areas or the ocean in concentrations sufficient to harm wildlife and/or to degrade habitat.</p>	<p>Establish polices for irrigation and use of chemicals in landscaping to minimize erosion potential and runoff into habitat areas or the ocean.</p>	<p>Before occupancy of first project developed under the CLRDP</p>	<p>Physical Plant</p>

**Appendix 3.** Conceptual Location of Perimeter Trail.



Figure is replicated from the UCSC Marine Science Campus Area Plan (2008). The figure includes conceptual design and buildout of the Marine Science Campus. This figure is included here simply to identify the approximate location of trails (denoted in yellow) within the YLR Terrace area.

Appendix 5. Beach Monitoring Report for Fiscal Year 2009-2010



# Younger Lagoon Natural Reserve

## Beach Monitoring Report

### 2010



Gage Dayton and Beth Howard  
Younger Lagoon Natural Reserve

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## **Overview**

In March 2010, the California Coastal Commission (CCC) approved the University of California's Notice of Impending Development Implementation for Implementation Measure 3.6.3 of the CLRDP (NOID 10-1). NOID 10-1 requires that (through controlled visits) the public have access to Younger Lagoon Reserve beach and that a monitoring program be created and implemented to document the condition of native flora and fauna within Younger Lagoon and its beach. The monitoring plan will be implemented over a 5-year time period. At the end of the 5-year period (Winter 2015) results are to be compiled and included in a report that summarizes and discusses the potential effect of controlled beach access on flora and fauna at Younger Lagoon. The report will be submitted to the California Coastal Commission.

This document serves as a summary report for activities under NOID 10-1 for spring, summer and fall of 2010.

## Introduction

Nearly 45 years ago, the University of California Natural Reserve System (UCNRS) began to assemble, for scientific study, a system of protected sites that would broadly represent California's rich ecological diversity. Today the UC Natural Reserve System is composed of 36 reserves that encompass approximately 135,000 acres of protected natural land available for university-level instruction, research, and public service. The University of California Natural Reserve System supports research and education through its mission of contributing *“to the understanding and wise management of the Earth and its natural systems by supporting university-level teaching, research, and public service at protected natural areas throughout California.”* By creating this system of outdoor classrooms and laboratories and making it available specifically for long-term study and education, the NRS supports a variety of disciplines that require fieldwork in wildland ecosystems. UC Santa Cruz administers four UC Reserves: Younger Lagoon Natural Reserve, Año Nuevo Island Reserve, Landels-Hill Big Creek Reserve, and Fort Ord Natural Reserve.

The goal of the beach monitoring program is to document the presence and distribution of flora and fauna within Younger Lagoon Natural Reserve (YLR) and to evaluate changes in distribution and density over time. Additionally, YLR staff decided to monitor nearby beaches with varying levels of use (Natural Bridges and Sand Plant Beach) in order to examine differences in the flora and fauna among the three sites. Importantly, the data collected in this study will provide a quantitative assessment of various attributes (species composition, abundance, etc.) but it is realized that the sites vary significantly from one another and there is no replication. Although data comparisons will likely be informative there are significant constraints that make meaningful statistical comparisons between the sites impossible; thus, while results will be informative they shouldn't necessarily be used to create strict prescriptions. Data from the 5-year monitoring program will be compiled and presented to the Coastal Commission at the end of the 5-year period. Reports will also be provided to Coastal Commission staff annually in order to provide progress updates and identify any necessary changes or unforeseen issues that may arise during monitoring efforts. Results of the monitoring study will be used to evaluate the trade-offs between ecological protection and public access. Variables that will be monitored include: user data, changes to habitat (as observable in photo documentation and vegetation surveys), tidewater goby presence, species composition and seed production of beach dune vegetation, species composition of mammals and invertebrates, and abundance of birds. Details for each of the aforementioned parameters are described below.

### ***Younger Lagoon Access History***

#### **History of Public Access to Younger Lagoon Beach**

Prior to 1972, Younger Beach was privately owned and closed to the public. The owners (Donald and Marion Younger) actively patrolled for, and removed, trespassers from their property, including the beach. In 1972, the Younger Family donated approximately 40 acres of their property to the University of California for the study and protection of the marine

environment. These lands included Younger Lagoon and Beach (approximately 25 acres), and an adjoining parcel of land (approximately 15 acres) which became the site of the original Long Marine Laboratory (LML). At the time of their donation, Donald and Marion Younger intended that the lagoon, beach and surrounding slopes be protected in perpetuity by the University as a bird sanctuary.

In the years between the donation of the property and the start of LML construction (1976), the University leased the future LML site back to farmers who had been farming the property for the Younger Family prior to the donation. During those years, the same no trespassing rules for the beach were enforced as they had been when the property was owned by the Younger Family.

Once construction of the Long Marine Lab began in 1976, the land was no longer under the watch of the farmers, and public pressure on the beach began to increase. Many Santa Cruz locals remember the next several years at Younger Beach fondly as it became a popular nude beach. The increased public access had a noticeable impact on the flora and fauna of the beach, and was not in accordance with the intention of the original donation by the Younger family. By 1978 discussions had begun between the University and the California Coastal Commission regarding the impact of uncontrolled public access to the beach. In 1981, it was decided that the impacts to Younger Beach were significant and the beach was closed to uncontrolled public access under coastal permit P-1859.

After the approval of coastal permit P-1859, the University began to actively patrol the beach for trespass and to educate the public about the closure. After YLR was incorporated into the UCNRS in 1986, users were required to fill out applications, or contact NRS staff, for specific research, education, or outreach efforts. As the LML campus grew, a protective berm and fencing were constructed around the perimeter of the lagoon, and informational 'beach closed' signs were posted on the cliffs above the beach. Over time, trespass decreased and the reduced public access had a noticeable positive impact on the flora and fauna of the beach.

Public access to YLR beach came to the forefront again during the CLRDP negotiation process (2000-2008). At the time negotiations began, YLR supported a rich composition of plant and animal species despite being surrounded by agricultural and urban development. Reserve staff were concerned that any increase in public access could threaten the already heavily impacted habitat. At the time of CLRDP certification (2010), all parties agreed to the Beach Access Management Plan outlined in NOID 10-1 (Appendix 1). Under the Beach Access Management Plan, the YLR beach remains closed to unsupervised public access and the reserve is implementing a management and monitoring plan that includes docent-guided tours.

Because of the importance of maintaining a natural and pristine environment and protecting scientific studies and equipment, uncontrolled access to YLR is not allowed. Uncontrolled use of YLR is likely to have a negative impact on native coastal flora and fauna that inhabit the Reserve, hamper research endeavors, and impact the area for future scientific and educational endeavors. Rather than an open public access policy, users are required to fill out applications, or contact NRS staff, for specific research, education, or outreach efforts. In 2010 YLR began hosting docent-guided tours that are offered by the Seymour Marine Discovery Center (SMDC).

## Beach Access Tours

Beach access tours (Figure 1) are offered two times per month (one tour on a weekday and one on a weekend). The extent of the beach access area varies depending upon the location of plants (i.e. foot traffic is seaward of the dune vegetation) and tidal conditions. Thus, the exact access area is determined by vegetation and tide level and may vary slightly from time to time. The trail provides an interpretive experience for visitors that begins with an overview of the lagoon, a walk through a restored coastal scrub habitat with viewing opportunities of the rear dune, and ends up on the beach. Tours are led by SMDC docents trained in the natural history and ecology of YLR and provide detailed information about flora, fauna, geology, and the UC Natural Reserve System. Tour curriculum focuses on the unique ecology of the YLR beach, and was first presented to SMDC docents during the regular winter docent training program in 2010. YLR Beach tours began in the spring of 2010; as of December 15, 2010 35 people have taken the tour. Beach tours are advertised via the SMDC website: <http://www2.ucsc.edu/seymourcenter/calendar.html> and filled via phone reservation: (831) 459-3800. The SMDC allocates tour spaces and keeps track of all user data. Tours are limited to twelve (12) persons and are best suited for adults in good physical condition and children over 10 years of age. Public members entering YLR are required to adhere to the UCNRS Reserve Use guidelines.



Figure 1. Seymour Marine Discovery Center Visitor Programs Manager Chris Reeves and Docent George Hamilton lead a public tour of the YLR beach.

## **Study Areas**

Flora, fauna, and human use were monitored at Natural Bridges State Park, Younger Lagoon Natural Reserve, and Sand Plant Beach (Figure 2). These three sites have similar characteristics (all have beach and lagoon habitat), are within close proximity to one another, and experience varying levels of human use. Although site characteristics are similar in many ways, they are also different in many ways, and these differences likely influence species composition. Three of the primary differences among the sites are human use levels, composition of adjacent upland habitat, and the overall size of the beach and wetland areas.

### ***Younger Lagoon Reserve***

Younger Lagoon Reserve is located in Santa Cruz County, approximately 4.5 miles from the main UC Santa Cruz campus; adjacent to the UC Santa Cruz Long Marine Laboratory. One of the few relatively undisturbed wetlands remaining on the California Central Coast, Younger Lagoon Reserve encompasses a remnant Y-shaped lagoon on the open coast just north of Monterey Bay. For most of the year, the lagoon is cut off from the ocean by a sand barrier. During the winter and spring months, the sand barrier at the mouth of Younger Lagoon breaches briefly connecting the lagoon to the ocean. The lagoon system provides protected habitat for 100 resident and migratory bird species. Approximately 25 species of water and land birds breed at the reserve, while more than 60 migratory bird species overwinter or stop to rest and feed. Opossums, weasels, brush rabbits, ground squirrels, deer mice, coyote, bobcat, woodrat, and skunk are known to occupy the lagoon; gray and red foxes have also been sighted. Reserve habitats include salt and freshwater marsh, backdune pickleweed areas, steep bluffs with dense coastal scrub, pocket sand beach, grassland, and dense willow thickets.

### ***Sand Plant Beach***

Sand Plant Beach is located in Santa Cruz County, approximately 1.5 miles west of YLR adjacent to Wilder Ranch State Park. Sand Plant Beach is approximately 23 acres and includes a pocket beach, dunes, cliffs and lagoon. Sand Plant Beach is open to the public for recreational use from dawn until dusk, 365 days a year. The surrounding Wilder Ranch State Park covers approximately 7,000 acres and allows human, bike and equestrian access. Dogs are not allowed at Wilder Ranch State Park. Much of the interior lagoon/upland habitat has been modified for agricultural production and/or uses over the past century. Today much of the vegetation that persists inland of the lagoon itself is dominated by freshwater emergent vegetation and willow thickets. Major wetlands restoration projects have increased native flora and fauna in the area (Friends of Santa Cruz State Parks, 2010).

### ***Natural Bridges Lagoon***

Natural Bridges Lagoon is located in Santa Cruz County, approximately 0.5 miles east of YLR on the urban edge of the city of Santa Cruz CA in Natural Bridges State Park. Natural Bridges Lagoon, beach, and State Park encompasses approximately 63 acres and includes a wide pocket



beach, lagoon, cliffs, and diverse upland habitat (scrub, grass, iceplant, willow thicket, live oak, eucalyptus, and cypress). The park is world-renowned for its yearly migration of monarch butterflies and famous natural bridge. Natural Bridges State Park allows human access as well as dogs that are on leash and remain on paved roads and in parking lots (Friends of Santa Cruz State Parks, 2010). The beach is a popular destination at all times of the year; however, it is especially popular in the spring, summer, and fall months.



Figure 2. Study areas.

## **Methods**

### ***User Data***

User data from tours conducted by the SMDC, as well as research and education use of YLR, were recorded and maintained by SMDC and YLR Staff. User data from educational programs and fee collection are recorded and maintained by California State Parks staff for Natural Bridges State Parks. No user data was available for Sand Plant Beach.

### ***Human Beach Use***

We used remote cameras to quantify human use of Sand Plant Beach, Younger Lagoon, and Natural Bridges. Cameras were placed along the eastern edge of Sand Plant Beach and Natural Bridges Beach and at the western edge of Younger Lagoon for two days during three separate sampling events (May 1-2, August 12-13, and November 18-19, 2010). Cameras were set to automatically take photos at 15 minute intervals. Number of people were quantified for each 15 minute interval between 7:00 and 19:00. The total area of photo documentation varied between sites and among individual sampling efforts due the placement of the camera and available habitat for human users at the time of the survey (i.e. less beach area at Sand Plant Beach and Younger Lagoon compared to Natural Bridges). In order to control for area, specific regions of photos were chosen and number of individuals within each specific region were counted; thus, the number of people counted per unit area was standardized. We used the largest survey area during each sampling period to standardize use within each specific region of the beach during each sampling effort. Thus, if a particular site had more or less habitat monitored, the number of individuals was standardized across sites making comparisons comparable.

### ***Photo Documentation of Younger Lagoon Natural Reserve***

Photo point locations were established at four locations within YLR (Figure 3). These locations were chosen to ensure coverage of all major areas of the beach. Photos were taken two times during the reporting period (December 10, 2010, and March 4, 2010). At each photo point we collected photo point number, date, name of photographer, bearing, and camera and lens size.

### ***Tidewater Goby Surveys***

Tidewater goby surveys were conducted at YLR, Natural Bridges, and Sand Plant Beach on April 9, August 18, and November 13, 2010. Surveys were conducted using a 4.5 ft x 9 ft beach seine with 1/8 inch mesh. The objective of the surveys were to document tidewater goby presence and evidence of breeding activity (determined by the presence of multiple size/age classes). All fish were identified to species and counted. When individuals exceeded ~50 per seine haul, counts were estimated. Sampling was conducted with the goal of surveying the various habitats within each site (e.g. sand, sedge, willow, pickleweed, deep, shallow, etc.); thus, different numbers of seine hauls were conducted at each site. Species richness was compared among sites.



Figure 3. Locations of monitoring points, plots, and regions for YLR beach. Monitoring areas varied slightly between sampling efforts depending upon the high water mark, vegetation patterns, and water levels.

### ***Species Composition and Coverage of Beach Dune Vegetation***

Dune vegetation from the lowest (nearest to the mean high tide line) occurring terrestrial plant to 10 meters inland into the strand vegetation was surveyed three times at each site (April 10-11, August 16, November 17, 2010). The exact location and extent of the area surveyed each time varied depending upon the location of the “lowest” plant detected during each sampling effort. At each location, we measured the distance from the estimated mean high tide line to the “lowest” plant on the beach. At each location a 50 m east-west transect was established across the dune vegetation. Herbaceous species composition was measured by visual estimation of absolute cover for each species in ten 0.25 m<sup>2</sup> quadrats along the transect. Quadrats were placed every 5 m on alternating sides of the transect starting at a randomly selected point between 1 and 5 meters (a total of 10 quadrats per transect). A clear plastic card with squares representing 1, 5, and 10% of the sampling frame was used to help guide visual cover estimations. Cover of each species (both native and exotic), bare ground, and litter were estimated at 5% intervals. Litter was specifically defined as residue from previous year’s growth while any senescent material that was recognizable as growth from earlier in the current growing season was counted as cover for that species. After all cover estimates had been made, we conducted surveys within 2 m of either side of the transect (a 4 × 50 m belt). In the belt transects, individual plants were recorded as either seedlings or greater than 1 year old. Presence of flowers and seeds was also noted.

### ***Non-avian Vertebrate Monitoring***

#### **Tracks**

Vertebrate tracks were measured using raked sand plots at each site during three sampling periods (May 1-2, August 11-12, and November 17-18, 2010). Tracking stations were placed throughout the beach area in constriction zones where vegetation was absent. The objective of these surveys was simply to detect what species use the beach habitat. As such, size of plot varied from approximately 4 m<sup>2</sup> to 6 m<sup>2</sup> depending upon the amount of available open sandy area at each location. Track stations were raked each evening and checked for tracks in the morning. Stations remained open for two days during each monitoring bout. Tracks were identified to species when possible. Species composition was summarized; however, abundance was not quantified due to the fact that tracks cannot be used to identify individual animals (e.g. a single individual could walk across the plot multiple times).

#### **Small Mammals**

Sherman live traps were placed at each site for two nights during three sampling periods (April 24-25, August 11-12, and November 15-16, 2010). A total of 30 traps were placed at each site and sampled for a period of two evenings (60 trap nights per sampling bout). Traps were set at dusk and collected at dawn. Each trap was baited with rolled oats and peanut butter and piece of synthetic bedding material was placed in each trap to ensure animals did not get too cold. Individuals were identified to species, marked with a unique ear tag, and released at the site of capture.

## **Invertebrate Monitoring**

Terrestrial invertebrates on beach habitat were monitored by placing four 12 oz plastic containers (pit fall traps) at each tracking station (one at each corner of the plot) during tracking efforts. Traps were buried to the lip of the container and checked each morning and all individuals were collected.

## **Avian Monitoring**

We conducted ocular surveys of birds on the beach, lagoon, and cliff habitats at each site. Survey locations were selected along one edge of the beach on the cliff. At YLR and Sand Plant Beach the entire beach area, fore portion of the lagoon, and western cliff were surveyed from the eastern edge of the lagoon. At YLR the top and western face of the rock stack that is located at the beach/ocean edge was also surveyed. At Natural Bridges surveys were conducted from the eastern edge of the beach on the cliff adjacent to De Anza Mobile Home Park; fore lagoon and approximately the western  $\frac{1}{4}$  of the beach area (including beach/ocean interface) was included in the survey area. Survey areas were chosen with the goal of surveying the approximate same area. Counts were conducted six times at each site (April 24 and 26, August 11-12, and November 15-16, 2010). Surveys were conducted in the dawn or dusk hours within approximately 2 hours of sunrise or sunset and of one another. Data from the two days during each sampling effort were combined and individuals were identified and counted. Species richness, abundance, and diversity were calculated for each site.

## **Results**

### ***User Data***

#### **Younger Lagoon Reserve**

YLR was used by UC Santa Cruz, UC Davis, UC Berkeley, Cornell University, Delaware University, Yerba Buena High School, Elkhorn Slough National Estuarine Research Reserve, Seymour Discovery Center, California Department of Fish and Game, California State Parks, United States Fish and Wildlife, Santa Cruz Bird Club, Redwoods to the Sea GeoVentures, Huffman Broadway & Associates, and several local and regional volunteer groups (Table 1). Approximately 3206 people were recorded as users of YLR during the fiscal year 2009-2010 (Table 2). However, approximately 2247 (10% of the individuals that attended user SMDC tours outside of the YLR beach tours) of those users were provided interpretive information via docent led tours to the Marine Mammal overlook and thus never accessed the actual beach. Outside of the SMDC users, approximately 950 individuals used the reserve (e.g. classes, volunteers, etc.) for a total of approximately 2500 user days. Complete use data for YLR is summarized in Table 2. The greatest educational user group for YLR in 2009/2010 was undergraduate education.

Table 1. Younger Lagoon user affiliations.

<b>University of California Campus</b>	<b>Other Universities</b>
University of California, Santa Cruz	Cornell University
University of California, Davis	University of Delaware
University of California, Berkeley	
<b>Government (Federal and State)</b>	<b>Non-governmental organizations</b>
U.S. Fish and Wildlife Service	Elkhorn Slough National Estuarine Research Reserve
California Department of Fish and Game	Santa Cruz Bird Club
California State Parks	Seymour Marine Discovery Center
United States Geological Service	
California Coastal Commission	
<b>K-12 system</b>	<b>Volunteer Groups</b>
Yerba Buena High School	California Native Plant Society
	Sigma Pi Fraternity, Santa Cruz Chapter
<b>For-profit/business groups:</b>	Seymour Marine Discovery Center
Redwoods to the Sea GeoVentures	UCSC Wilderness Orientation
Huffman Broadway & Associates	Seymour Marine Discovery Center

Table 2. Younger Lagoon User groups.

Days	Home Institution		UC Campus		CSU Campus		Community College		Other CA Campus		Out of State		International		Government		TOTALS	
	Users	UDays	Users	UDays	Users	UDays	Users	UDays	Users	UDays	Users	UDays	Users	UDays	Users	UDays	Users	UDays
<b>UNIVERSITY-LEVEL RESEARCH</b>																		
Research Faculty	7	10	0	0							0	0			1	1	8	11
Research Scientist	1	5	0	0							0	0			9	27	10	32
Research Assistant	2	5	0	0							0	0			3	14	5	19
Research Graduate Student	2	8	1	2							1	1			0	0	4	11
Research Undergraduate Student	15	253	0	0							0	0			0	0	15	253
Subtotal	27	281	1	2							1	1			13	42	42	326
<b>UNIVERSITY-LEVEL INSTRUCTION</b>																		
University Instructor	30	237	0	0							0	0			0	0	30	237
University Student	421	1408	20	20							0	0			0	0	441	1428
Subtotal	451	1645	20	20							0	0			0	0	471	1665
<b>PUBLIC SERVICE</b>																		
K-12 Instructor	1	1	0	0							0	0			3	3	4	4
K-12 Student	0	0	0	0							0	0			33	33	33	33
Government (Fed/State/Local)	0	0	0	0							0	0			2	2	2	2
NGOs / Non-profits Organization*	0	0	0	0							0	0			17	81	17	81
For Profit / Business	0	0	0	0							0	0			0	0	0	0
Volunteer	5	6	0	0							0	0			385	553	390	559
Other	0	0	0	0							0	0			2247	2277	2247	2277
Subtotal	6	7	0	0							0	0			2687	2949	2693	2956
<b>TOTALS</b>	<b>484</b>	<b>1933</b>	<b>21</b>	<b>22</b>							<b>1</b>	<b>1</b>			<b>2700</b>	<b>2991</b>	<b>3206</b>	<b>4947</b>

NOTES:

List all K-12 users in "Public Service."

University-level use that is not formal instruction or research (such as retreats, etc.) is "Public Service."

Research that is part of university-level coursework may be counted as both "Research" and "Instruction."

\* NGO = non-governmental organization. The United Nations defines NGO as "any non-profit, voluntary citizens' group which is organized on a local, national or international level. Task-oriented and driven by people with a common interest, NGOs perform a variety of services and humanitarian functions, bring citizens' concerns to Governments, monitor policies and encourage political participation at the community level. They provide analysis and expertise, serve as early warning mechanisms and help monitor and implement international agreements. Some are organized around specific issues, such as human rights, the environment or health."

\*\*\*"Other" includes members of the public who took the Seymour Marine Discovery Center's daily tour. All SMDC docents are trained to interpret YLR from the Long Marine Lab Marine Mammal / YLR Overlook, which is a mandatory stop on the daily tour. In FY 2009-2010, 22,368 visitors took the SMDC daily tour. Although all tours include information on YLR, we estimate that 10% of these visitors can be reasonably counted as users.



## Sand Plant Beach

Sand Plant Beach is located adjacent to Wilder State Park and is frequented by Wilder State Park visitors along a coastal bluff trail. Because of the size of Wilder Ranch State Park (over 7,000 acres, with over 35 miles of trails) and its multiple points of access, it is unknown exactly how many people visit Sand Plant Beach each year. However, it is one of the more popular beaches along this section of Wilder Ranch.

## Natural Bridges Lagoon

We were unable to obtain user data for 2010; however, more than 925,000 people are estimated to have visited Natural Bridges State Park in 2005 (Santa Cruz State Parks 2010). The proportion of those visitors that use the beach and lagoon habitat is unknown.

## Human Use During Survey Efforts

Number of users at each beach during the survey efforts varied among beaches as well as between sampling dates. However, the pattern of total use (Table 3 and Figure 4) and the number of people per photo (15 minute interval standardized for area surveyed) was consistent across sampling periods with use being highest at Natural Bridges and lowest at Younger Lagoon (Table 3 and Figure 5). Examples of photos captured during a typical monitoring session are included as Figure 6.

Table 3. Number of people observed in photo human use monitoring during sampling efforts.

<b>Site</b>	<b>Month</b>	<b><sup>1</sup>Total # of people</b>	<b><sup>1</sup>Ave # of People / 15 minute</b>
Natural Bridges	May	1862	18.62
Sand Plant	May	233	1.32
Younger Lagoon	May	40	0.39
Natural Bridges	August	322	3.22
Sand Plant	August	19	0.19
Younger Lagoon	August	0	0
Natural Bridges	November	207	2.07
Sand Plant	November	17	0.17
Younger Lagoon	November	2	0.07

<sup>1</sup>Standardized by area surveyed.

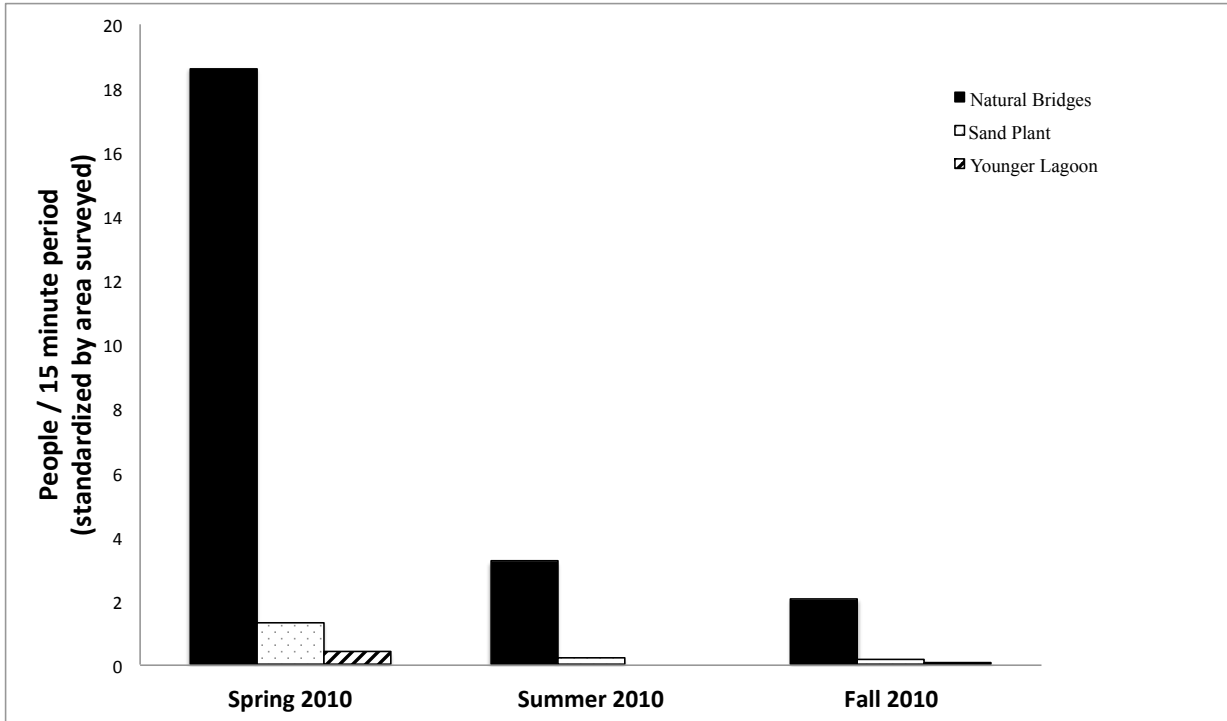


Figure 4. Average number of people per 15-minute interval at Natural Bridges, Sand Plant Beach, and Younger Lagoon Reserve during three sampling efforts in 2010. Cameras were placed onsite for two days and took pictures at 15-minute intervals.

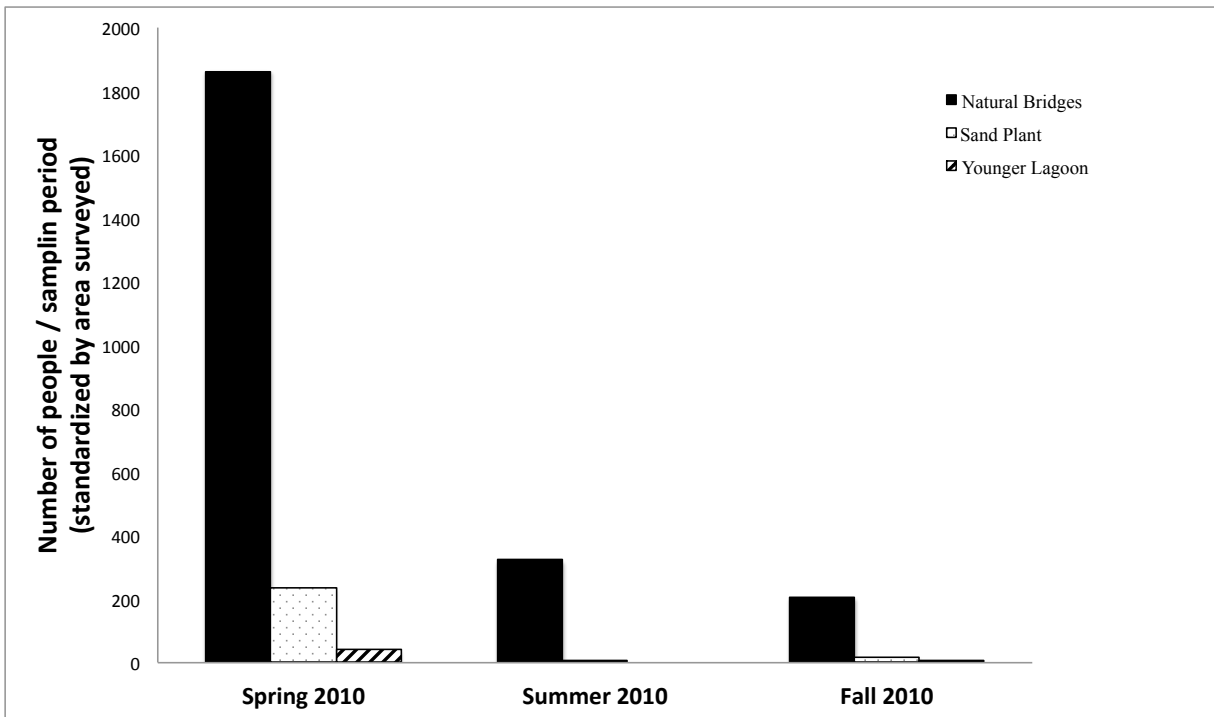


Figure 5. Total number of people counted in photographs during three sampling efforts in 2010. Cameras were placed on site for two days and took pictures at 15 minute intervals.



Figure 6. Photos captured by remote camera during the Spring 2010 monitoring effort. Top to bottom: Sand Plant Beach, Natural Bridges, and Younger Lagoon.

## Photo Documentation of YLR

Photos were taken two times during the reporting period and are include as Appendix 2.

## Tidewater Goby Surveys

Tidewater goby were found at all sites during each sampling effort. Evidence of breeding (multiple size classes) was also observed at each site during each sampling effort. Fish species richness was greatest at Natural Bridges which had sculpin and mosquito fish as well as tidewater goby and stickleback (Table 4).

Table 4. Fish species encountered at Sand Plant Beach, Younger Lagoon, and Natural Bridges during 2010 seining surveys.

	Tidewater Goby <sup>1</sup>	Stickleback	Sculpin	Mosquito Fish
April 9, 2010				
Sand Plant Beach	X	X		
Younger Lagoon	X	X		
Natural Bridges	X	X	X	
August 13, 2010				
Sand Plant Beach	X	X		
Younger Lagoon	X	X		
Natural Bridges	X	X	X	X
November 18, 2010				
Sand Plant Beach	X	X		
Younger Lagoon	X			
Natural Bridges	X	X	X	X
<b>No. of sites occurred</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>1</b>

<sup>1</sup>Multiple size/age classes present during each sampling effort.

## Species Composition and Coverage of Beach Dune Vegetation

Evidence of reproduction (flowers and seeds) were observed at all three sites; however, none of the plants surveyed in spring, summer, and fall 2010 were recorded as seedlings (no cotyledons, branching habit, etc). Because vegetation sampling did not begin until April 2010, it is possible that some of these plants germinated in 2010 but had grown past a recognizable seedling stage by the time sampling began. Future winter monitoring efforts will provide further insight into plant recruitment on the beaches. Distance from mean high tide to the lowest plant on the beach was consistently greatest at Natural Bridges (Table 5). Younger Lagoon consistently had the highest plant coverage (as exhibited by proportion of bare ground) during the sampling efforts (Figure 7).

Table 5. Distance (m) from mean high tide to the lowest plant on the beach.

Site	Spring	Summer	Fall
Younger Lagoon	56	51	20
Sand Plant Beach	33	34	56
Natural Bridges	128	130	141

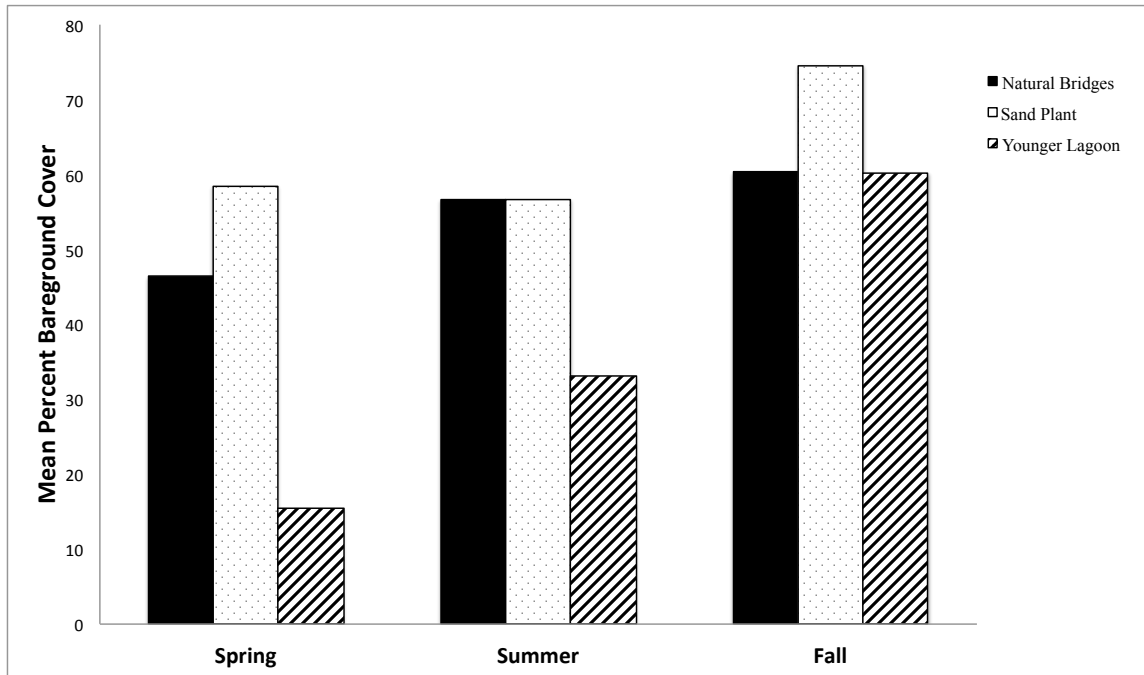


Figure 7. Mean percent bare ground encountered at each site during each of the three sampling periods.

Native plant species richness was consistently greatest at Younger Lagoon (Figure 8). Number of non-native species was greatest at Natural Bridges with 40 – 60% of the species encountered representing non-native species (Table 6).

Table 6. Number and proportion of native and non-native species encountered during surveys at each site.

Site	Spring	Summer	Fall
<b>Natural Bridges</b>			
Native	7 (41%)	8 (44%)	9 (60%)
Non-native	10 (59%)	10 (56%)	5 (40%)
Total	17	18	14
<b>Younger Lagoon</b>			
Native	11 (85%)	11 (85%)	11 (85%)
Non-native	2 (15%)	2 (15%)	2 (15%)
Total	13	13	13
<b>Sand Plant Beach</b>			
Non-native	1 (12%)	2 (37%)	3 (30%)
Native	7 (88%)	7 (63%)	7 (70%)
Total	8	9	10

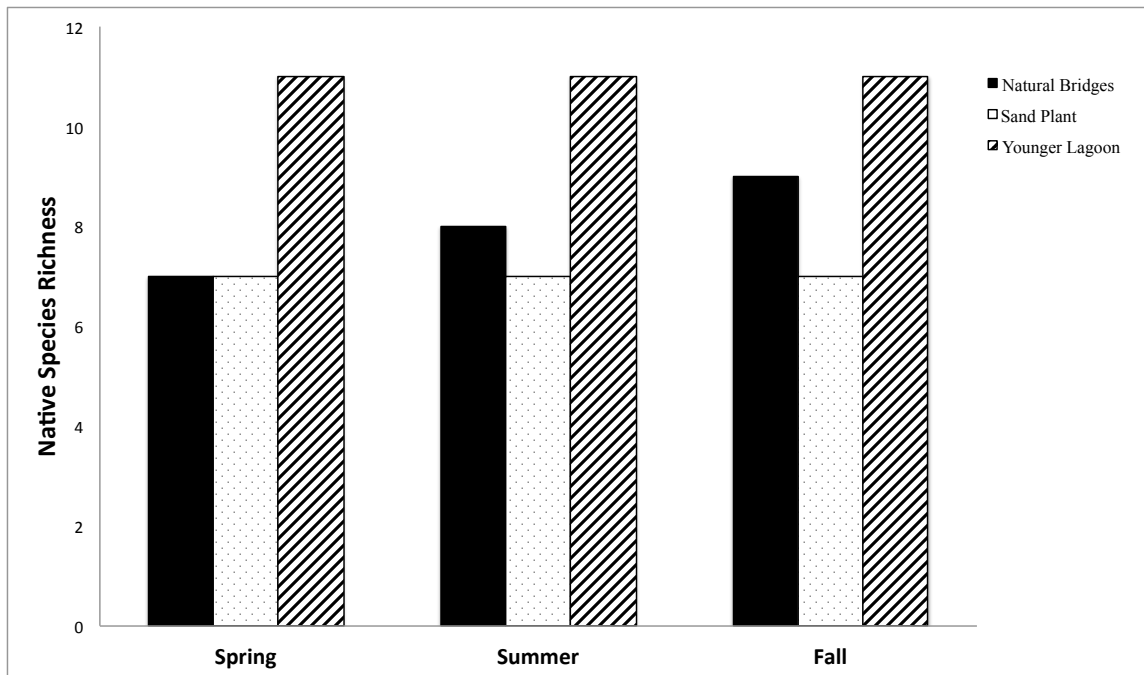


Figure 8. Number of native plant species encountered at each site during each of the three sampling periods.

## Track Plate Monitoring

Species richness of mammals detected in raked sand plots was greatest in Sand Plant Beach (n = 7) and equal in Natural Bridges and Younger Lagoon (n = 6). Species not detected at Natural Bridges or Younger Lagoon were the ground squirrel and coyote respectively (Table 7). Coyote have been observed at Younger Lagoon and it is likely that ground squirrels occur at Natural Bridges; however, they were not detected in our survey efforts. Dogs and bicycles were detected at Natural Bridges and Sand Plant Beach and vehicles were detected at Natural Bridges (Table 7). Frequency of detection for each species is included in Table 8.

Table 7. Summary of track plate sampling effort at Sand Plant Beach, Younger Lagoon, and Natural Bridges during 2010.

	Rodent <sup>1</sup>	Raccoon	Cottontail	Bobcat	Skunk	Squirrel	Coyote	Bicycle	Vehicle	Dog	Human
May 1-2											
Sand Plant Beach	X			X	X	X	X	X			X
Younger Lagoon	X	X		X	X						X
Natural Bridges	X	X		X	X		X	X	X	X	X
August 11-12											
Sand Plant Beach		X		X	X					X	X
Younger Lagoon	X	X	X	X		X					
Natural Bridges	X	X	X							X	X
November 17-18											
Sand Plant Beach	X		X	X			X				X
Younger Lagoon	X	X									X
Natural Bridges	X	X		X				X	X	X	X
No. of sites occurred	3	3	3	3	3	2	2	2	1	2	3
	<sup>1</sup> Unidentified small rodent										

Table 8. Frequency, and native species richness, of animals and human use types at San Plant Beach, Younger Lagoon, and Natural Bridges over the three sampling events during 2010 track plate sampling efforts. For example, 100% indicates a particular species was observed during each of the three sampling efforts.

Site	Rodent	Raccoon	Cottontail	Bobcat	Skunk	Squirrel	Coyote	Bicycle	Vehicle	Dog	Human	<sup>1</sup> Richness
Sand Plant Beach	66%	33%	33%	100%	66%	33%	66%	33%	0%	33%	100%	7
Younger Lagoon	100%	100%	33%	66%	33%	33%	0%	0%	0%	0%	66%	6
Natural Bridges	100%	100%	33%	66%	33%	0%	33%	33%	66%	100%	100%	6

<sup>1</sup>Bicycle, vehicle, dog, and human excluded.



### Small Mammal Trapping

A total of 37 individual small mammals representing four species were captured during small mammal trapping efforts. Sand Plant Beach had the greatest number of individuals captured. Species richness was equal across sites (Table 9).

Table 9. Summary of Sherman trapping effort at Sand Plant, Younger Lagoon and Natural Bridges beaches during 2010.

Site	Pema <sup>1</sup>	Mica <sup>1</sup>	Reme <sup>1</sup>	Rara <sup>1,2</sup>	TOTAL
April 24 -25, 2010					
Sand Plant Beach	8	5			13
Younger Lagoon	2				
Natural Bridges			3		3
August 11-12, 2010					
Sand Plant Beach	5	4			9
Younger Lagoon		1			1
Natural Bridges					
November 15-16, 2010					
Sand Plant Beach	5	1			6
Younger Lagoon				1	1
Natural Bridges		3	1		4
<b>TOTAL</b>	<b>20</b>	<b>13</b>	<b>5</b>	<b>1</b>	<b>37</b>

<sup>1</sup>Pema = *Peromyscus maniculatus*; Mica = *Microtus californicus*; Reme = *Reithrodontomys megalotis*; Rara = *Rattus norvegicus*

<sup>2</sup>Escaped before positive ID; however, suspected to be Norway Rat.

### Invertebrate Monitoring

A total of 27 unique taxa were captured during sampling efforts. Younger Lagoon consistently had the greatest number of individuals captured; however, patterns of species richness varied among sampling sessions (Figures 10-11). Species were identified as distinct taxa; however, at the time of the writing of this report they have not been taxonomically keyed out. Further data compilation and species identification will take place during 2011.

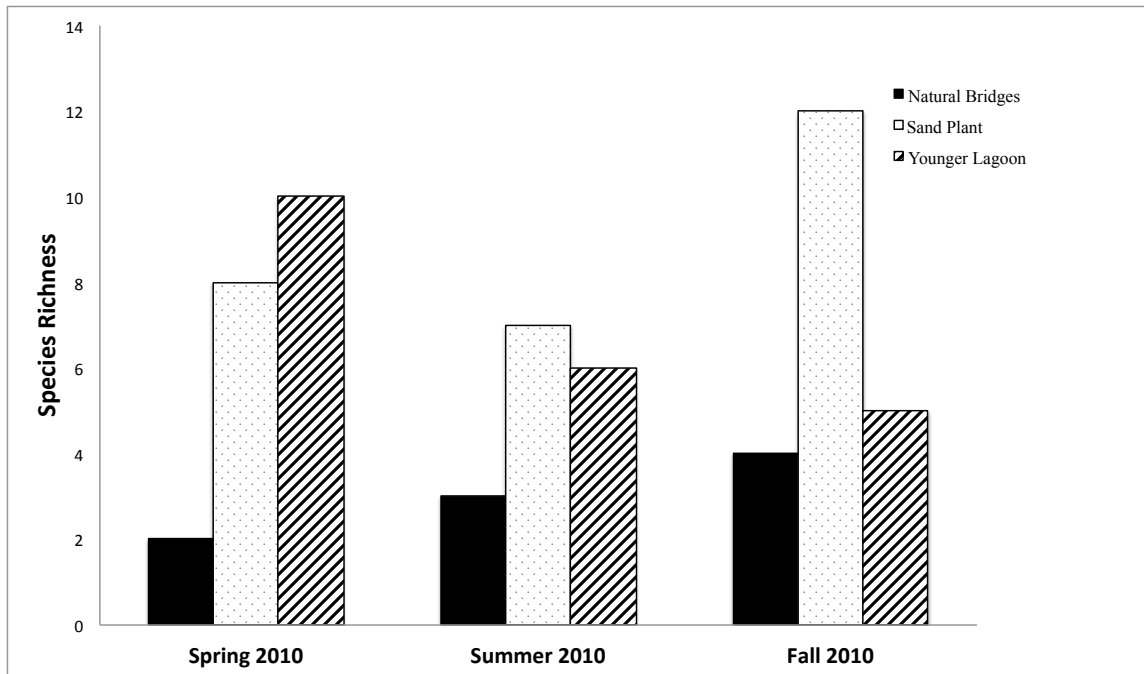


Table 10. Species richness of invertebrates at Natural Bridges, Sand Plant Beach, and Younger Lagoon for three sampling efforts conducted in 2010.

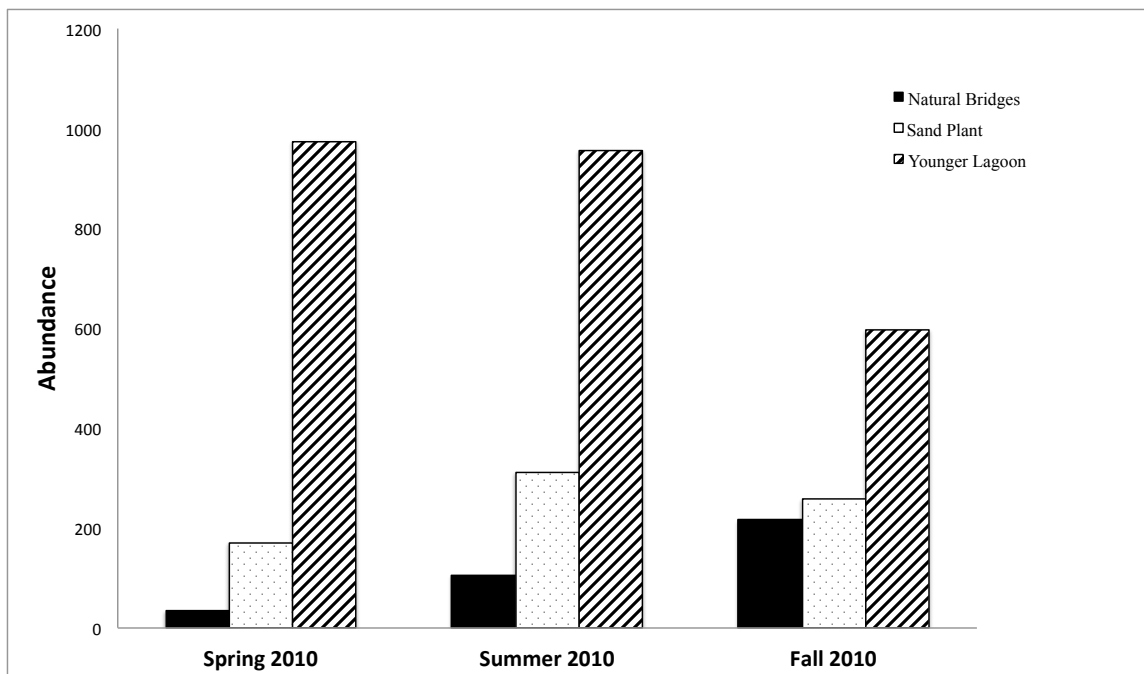


Table 11. Total abundance of invertebrates at Natural Bridges, Sand Plant Beach, and Younger Lagoon for three sampling efforts conducted in 2010.

### Avian Surveys

Avian species richness and diversity varied among sites and sampling dates (Table 12); however, richness and diversity were consistently greatest at Younger Lagoon and Natural Bridges.

Table 12. Summary of bird surveys at Sand Plant Beach, Younger Lagoon and Natural Bridges beaches during 2010.

Site	AMCR	BLOY	BLTU	BRBL	BRPE	CAGU	COOT	DOCO	DUSP	EUST	GRHE	GREG	HEGU	KILL	LOCU	MALL	MEGU	PECO	SAND	SNEG	SPSA	WEGU	WHIM	Richness	Diversity
April 24 & 26																									
Sand Plant Beach																2								1	0.30
Younger Lagoon																3					2		2	3	0.49
Natural Bridges				2										1										2	0.20
August 11-12																									
Sand Plant Beach													1											1	0.36
Younger Lagoon		2						1		1			2	2	1	10					4		32	9	1.15
Natural Bridges	2			19										1									3	5	0.71
November 15 & 16																									
Sand Plant Beach											3													2	0.20
Younger Lagoon			1		27			2	3	1								15	11		1	4	9	1.05	
Natural Bridges				1							2	2	24	4			2		140	1	1	17	1	11	1.85

## Discussion

Conducting biological monitoring at Natural Bridges, Younger Lagoon, and Sand Plant Beach provides insight into differences and similarities between flora and fauna, as well as the intensity of human use, across these three coastal beach/lagoon habitats. These sites are in close proximity to one another and share many ecological similarities; however, it is important to realize that these sites are different in many ways (size, proximity to the city, access, adjacent upland habitat, etc.).

Vertebrate surveys revealed that with the exception of avian diversity and richness, the three sites were similar to one another. Sand Plant Beach had the greatest small mammal abundance which may be a result of the extensive freshwater vegetation directly adjacent to the beach and the close proximity of upland scrub on the lagoon sides to the relatively confined beach. Track survey results were also similar across sites and it is anticipated that we will find additional species at each of the beaches in future surveys. In fact, track surveys and camera traps at Younger Lagoon prior to and independent of this monitoring effort, have detected other mammalian species using the beach that were not detected during the current survey.

The most profound differences between the three sites were the plant community and amount of human use. Native plant species richness was greatest at YLR whereas non-native species richness was the lowest at Younger Lagoon. Although, the mechanisms responsible for shaping the vegetation patterns that were observed are unknown for certain, it is very likely that increased human use has resulted in direct impacts to vegetation and perhaps resulted in the introduction of non-native species. A parameter that we did not quantify in this study, but that is evident from visual observation and photo documentation, is the presence of dune hummocks and downed woody material at YLR, both of which are almost entirely absent at Sand Plant Beach and Natural Bridges. It is likely that the hummocks and woody material are absent due to human trampling and collection. Although Younger Lagoon does experience human use, the intensity and number of users is far less than both Sand Plant Beach and Natural Bridges. The relatively natural state of YLR beach and dune vegetation is unique among the three sites and most pocket beaches in Santa Cruz County. The beach and dune habitat at Younger Lagoon likely represents a glimpse into what many of the pocket beaches in the greater Monterey Bay area looked like prior to significant human disturbance.

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Friends of Santa Cruz State Parks. Wilder Ranch. Retrieved from <http://thatsmypark.org/wilderRanch.php>. Accessed December 10, 2010.

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University of California at Santa Cruz. 2008. Final Compiled Coastal Long Range Development Plan. Prepared for California Coastal Commission, December 2008.

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Appendix 1. Beach NOID.

**CALIFORNIA COASTAL COMMISSION**

CENTRAL COAST DISTRICT OFFICE  
725 FRONT STREET, SUITE 300  
SANTA CRUZ, CA 95060  
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[www.coastal.ca.gov](http://www.coastal.ca.gov)



Page: 1

Date: February 18, 2010

**IMPORTANT PUBLIC HEARING NOTICE****NOTICE OF IMPENDING DEVELOPMENT**

**PERMIT NUMBER:** UCSC NOID-2 (Younger Lagoon Reserve Beach Access Management Plan)

**APPLICANT(S):** University Of California At Santa Cruz

**PROJECT DESCRIPTION:**

Provide docent-led tours to Younger Lagoon Reserve and the adjacent beach, and to implement a five-year flora and fauna monitoring program at Younger Lagoon Beach, pursuant to the certified Coastal Long Range Development Plan (CLRDP)

**PROJECT LOCATION:**

Terrace Point, Santa Cruz (Santa Cruz County)

**HEARING DATE AND LOCATION:**

**DATE:** Friday, March 12, 2010  
**TIME:** Meeting begins at 9:00 AM      **ITEM NO:** F10a  
**PLACE:** Santa Cruz County Board of Supervisors Chambers  
701 Ocean Street, Santa Cruz, CA  
**PHONE:** (831) 588-4112 (this phone number will only be in service during the meeting)

**HEARING PROCEDURES:**

This item has been scheduled for a public hearing and vote. People wishing to testify on this matter may appear at the hearing or may present their concerns by letter to the Commission on or before the hearing date. The Coastal Commission is not equipped to receive comments on any official business by electronic mail. Any information relating to official business should be sent to the appropriate Commission office using U.S. Mail or courier service.

**AVAILABILITY OF STAFF REPORT**

A copy of the staff report on this matter is available on the Coastal Commission's website at <http://www.coastal.ca.gov/mtgcurr.html>. Alternatively, you may request a paper copy of the report from Susan Craig, Coastal Program Analyst, at the Central Coast District office.

**SUBMISSION OF WRITTEN MATERIALS:**

If you wish to submit written materials for review by the Commission, please observe the following suggestions:

- We request that you submit your materials to the Commission staff no later than three working days before the hearing (staff will then distribute your materials to the Commission).
- Mark the agenda number of your item, the application number, your name and your position in favor or opposition to the project on the upper right hand corner of the first page of your submission. If you do not know the agenda number, contact the Commission staff person listed on page 2.

**IMPORTANT PUBLIC HEARING NOTICE**  
**NOTICE OF IMPENDING DEVELOPMENT**

- If you wish, you may obtain a current list of Commissioners' names and addresses from any of the Commission's offices and mail the materials directly to the Commissioners. If you wish to submit materials directly to Commissioners, we request that you mail the materials so that the Commissioners receive the materials no later than Thursday of the week before the Commission meeting. Please mail the same materials to all Commissioners, alternates for Commissioners, and the four non-voting members on the Commission with a copy to the Commission staff person listed on page 2.
- You are requested to summarize the reasons for your position in no more than two or three pages, if possible. You may attach as many exhibits as you feel are necessary.

**Please note:** While you are not prohibited from doing so, you are discouraged from submitting written materials to the Commission on the day of the hearing, unless they are visual aids, as it is more difficult for the Commission to carefully consider late materials. The Commission requests that if you submit written copies of comments to the Commission on the day of the hearing, that you provide 20 copies.

**ALLOTTED TIME FOR TESTIMONY:**

Oral testimony may be limited to 5 minutes or less for each speaker depending on the number of persons wishing to be heard.

**ADDITIONAL PROCEDURES:**

The above item may be moved to the Consent Calendar for this Area by the Executive Director when, prior to Commission consideration of the Consent Calendar, staff and the applicant are in agreement on the staff recommendation. If this item is moved to the Consent Calendar, the Commission will either approve it with the recommended actions in the staff report or remove the item from the Consent Calendar by a vote of three or more Commissioners. If the item is removed, the public hearing described above will still be held at the point in the meeting originally indicated on the agenda.

No one can predict how quickly the Commission will complete agenda items or how many will be postponed to a later date. The Commission begins each session at the time listed and considers each item in order, except in extraordinary circumstances. Staff at the appropriate Commission office can give you more information prior to the hearing date.

Questions regarding the report or the hearing should be directed to Susan Craig, Coastal Program Analyst, at the Central Coast District office.



**CALIFORNIA COASTAL COMMISSION**

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**F10a**

Prepared February 17, 2010 (for March 12, 2010 hearing)

To: Coastal Commissioners and Interested Persons

From: Dan Carl, District Manager *DCM*  
Susan Craig, Coastal Planner *S. Craig*

Subject: **UCSC Marine Science Campus Coastal Long Range Development Plan (CLRDP) Notice of Impending Development 2 (Younger Lagoon Reserve Beach Access Management Plan)**. Coastal Commission consideration of UCSC's notice regarding their intent to implement the first required five-year beach access management plan, including docent-led tours to Younger Beach and a five-year flora and fauna monitoring program, pursuant to the certified CLRDP.

## A. Staff Recommendation

### 1. Summary of Staff Recommendation

University of California at Santa Cruz's (UCSC's) Marine Science Campus Coastal Long Range Development Plan (CLRDP) was certified by the Coastal Commission on January 7, 2009. UCSC is now pursuing its second project pursuant to the CLRDP, and has submitted the above-referenced notice of impending development (NOID) to the Commission and is requesting that the Commission concur that the proposed project is consistent with the certified CLRDP.

UCSC proposes to implement a management plan to allow for supervised access to Younger Beach, which is a component of Younger Lagoon Reserve (Reserve). This beach area has been closed to general public access since 1981, with access since then limited to UCSC researchers. When the Commission certified the CLRDP in 2009, it required that the five-year re-review parameters associated with the original closure extend into the CLRDP and that supervised access, and at a minimum docent-led access, be provided to Younger Beach. This is UCSC's first proposed management access plan pursuant to those CLRDP provisions.

The University's proposal includes docent-led public tours to the beach area twice a month. The extent of the beach access area will vary from year to year depending upon the location of dune plants (i.e. foot traffic will be confined to areas seaward of the dune vegetation). Access to the beach will be provided on an existing trail that begins with an overview of the lagoon, includes a walk through restored coastal scrub habitat with viewing opportunities of the rear dune along the way, and terminates at Younger Beach. Docents will be trained in the natural history and ecology of the Reserve and will provide detailed information about the flora and fauna to tour visitors.

The proposal also includes implementation of a five-year monitoring program to document the presence



California Coastal Commission

UCSC NOID-2 (Younger Lagoon Reserve Beach Access Management Plan) stfprt 3.12.2010 hrg.doc

and distribution of flora and fauna within the beach area and to evaluate changes in distribution and density over time. Data from the 5-year monitoring program will be used to evaluate the trade-offs between ecological protection and supervised public access.

The CLRDP places limitations on public access to the Reserve by requiring controlled access to protect the habitats and species found in the Reserve. The CLRDP also describes other requirements with respect to controlled public access to the Reserve, including specific parameters related to beach access, such as the minimum required frequency of docent-led tours, trail management, and the areas within the Reserve to which access will be allowed. Furthermore, the CLRDP requires that long-term maintenance and monitoring programs for the Younger Lagoon Reserve be developed and implemented to assist in long-term preservation of species and habitats. The proposed beach access plan satisfies the standards of the CLRDP, and will allow for beach access as required by the certified document. As identified therein, the access management plan will be reevaluated and updated in five years, satisfying respective requirements of the CLRDP. **Staff recommends that the Commission determine that the project is consistent with the certified CLRDP.** The necessary motion and resolution are found directly below.

## **2. Staff Recommendation on CLRDP Consistency**

Staff recommends that the Commission, after public hearing, find the proposed development project consistent with the certified CLRDP.

**Motion.** I move that Commission determine that the development described in UCSC Notice of Impending Development Number 2 is consistent with the certified University of California at Santa Cruz Coastal Long Range Development Plan.

**Staff Recommendation of Concurrence.** Staff recommends a **YES** vote. Passage of this motion will result in a determination that the development described in the UCSC NOID-2 is consistent with the certified UCSC CLRDP, and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

**Resolution to Find CLRDP Consistency.** The Commission hereby determines that the development described in UCSC Notice of Impending Development Number 2 is consistent with the certified University of California at Santa Cruz Coastal Long Range Development Plan for the reasons discussed in the findings herein.

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2. Staff Recommendation on CLRDP Consistency .....	2



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  - A. Applicable CLRDP Provisions .....6
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- C. Exhibits
  - Exhibit A: Location Map
  - Exhibit B: Proposed Younger Beach Access Management Plan
  - Exhibit C: Proposed Public Access Tour Route
  - Exhibit D: Locations of Proposed Monitoring Areas

**B. Findings and Declarations**

The Commission finds and declares as follows:

**1. UCSC CLRDP**

**A. General CLRDP Background**

As an alternative to project-by-project coastal permit review, Coastal Act Section 30605 allows for universities to develop long range development plans for Coastal Commission certification. Once certified, each university is the primary entity responsible for ensuring that future development on the site is consistent with the certified long range development plans, subject to ongoing Commission oversight. UCSC’s Marine Science Campus CLRDP was certified by the Coastal Commission on January 7, 2009.

**B. UCSC’s Marine Science Campus**

UCSC’s Marine Science Campus site is located directly adjacent to the Monterey Bay National Marine Sanctuary just within the western border of the City of Santa Cruz in Santa Cruz County (see Exhibit A for a location map). The Campus site has been known locally for many years as Terrace Point. The main UCSC campus is located roughly two miles inland of the Marine Science Campus in the rolling foothills northwest of downtown Santa Cruz. The Marine Science Campus is located at the outskirts of the City, seaward of Highway One, at the transitional boundary between the urbanized City area to the east and the rural north coast of the unincorporated County to the west. The Santa Cruz County north coast area is well known to the Commission for its sweeping vistas of both coastal agricultural fields and natural landscapes framed by the undulating coastal range. Much of this area is in extensive State Park and



## **UCSC CLRDP NOID 2**

### **Younger Lagoon Reserve Beach Access Management Plan**

#### **Page 4**

other rural public land holdings, and all of it is traversed by a rural stretch of Highway One. Although there are some limited residential enclaves (e.g., Davenport along the coast, and Bonny Doon in the mountains) in these mostly pastoral areas, this north coast area is part of the stretch of largely agricultural and undeveloped coastal lands extending nearly 50 miles to Half Moon Bay upcoast. The Campus site is located at the beginning of this stretch of coast as one heads upcoast out of the City of Santa Cruz and, by extension, out of the urbanized portion of northern Monterey Bay.<sup>1</sup>

The Campus is primarily made up of a relatively flat terrace area (roughly 73 acres) sloping gently from north to south (to the ocean) with the remainder occupied by a large arroyo feature (roughly 25 acres) on the west of the site, at the base of which lies Younger Lagoon, an estuarine lagoon that connects (at times) to the ocean. A sandy beach area fronts Younger Lagoon below the terrace. The lagoon, the beach, the arroyo and a portion of the terrace<sup>2</sup> make up Younger Lagoon Reserve (Reserve). The terrace portion of the site includes within it a 2.5 acre federally-owned parcel completely surrounded by UCSC property. Altogether, the Campus (including the federal in-holding and the Reserve) is about 100 acres.

In the general Campus vicinity, agricultural land extends to the west along the coast beyond the Reserve and the western Campus boundary. To the north is the Union Pacific Railroad tracks, the Raytek industrial facility, and Highway One. To the south lies the Sanctuary and the Pacific Ocean, and to the east is Antonelli Pond (above, or north of, Delaware Avenue) and the densely packed De Anza Mobile Home Park (residential) (below Delaware Avenue) beyond which is Natural Bridges State Park and past that West Cliff Drive in the City of Santa Cruz.

### **C. UCSC's Marine Science Campus CLRDP**

UCSC's Marine Science Campus CLRDP was certified by the Coastal Commission on January 7, 2009. The CLRDP provides a blueprint for future development of the site including a maximum increase of about 600,000 square feet of new Campus facilities mostly within four distinct development zones (occupying about half of the terrace area) for an expanded Marine Science Campus. The CLRDP provides for roughly 340,000 gross square feet of potential new facilities within the four development zones in new one- and two-story buildings up to 36 feet tall, with the remainder in outdoor research and support areas. The CLRDP also accounts for additional areas of roads, and some natural drainage ponds, outside of the four development nodes. Overall, and at full buildout, the CLRDP allows for the Campus to grow by about three times its size at certification. In addition to the building program, the CLRDP also provides for an expanded public access trail system and natural habitat restoration in those wetland and open space areas on the terrace that are not part of the proposed development zones (roughly 41

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<sup>1</sup> The City of Santa Cruz is located at the upcoast end of the larger urban portion of northern Monterey Bay that extends downcoast through unincorporated Live Oak, the City of Capitola, and the more urban portion of south Santa Cruz County (i.e., the Aptos-Rio del Mar-Seascape areas). Though defined by city limit boundaries, these more urban areas all blend somewhat together as a larger urban "zone."

<sup>2</sup> As required by the CLRDP, the terrace areas located outside of the allowed development footprint for the marine science campus were added to Younger Lagoon Reserve in 2009. Thus, when added to the original 25-acre Reserve area, Younger Lagoon Reserve now occupies 67 acres at Terrace Point.



acres) that, per the CLRDP, have been recently added to Younger Lagoon Reserve.

#### **D. Younger Lagoon Reserve**

The 67-acre Younger Lagoon Reserve is included in the University's Natural Reserve System and is jointly managed by UCSC and the UC Natural Reserve System for teaching and research uses. Much of the Reserve qualifies as environmentally sensitive habitat area (ESHA) by Coastal Act standards and access to the Reserve has been limited during most of the time it has been under UCSC control. In 1981, the Commission approved a management plan (as required by coastal permit P-04-76-1859) that allowed for the closure of Younger Beach to uncontrolled public access. This closure was reviewed and re-approved on a temporary basis by the Commission in 2001 (CDP 3-83-76-A13). When the CLRDP was certified in 2009, the criteria for re-review of the public access closure were translated into the CLRDP. Specifically, the CLRDP requires that supervised access to the beach area be provided subject to a management plan that must be re-reviewed and reauthorized every five years. In certifying the CLRDP, the Commission explicitly found that the beach itself was not ESHA.

The connection between the Lagoon and the Monterey Bay and other surrounding habitats, including the Moore Creek/Antonelli Pond system and Wilder Creek, coupled with its management as a part of the Reserve with limited human disturbance, contributes to an overall high wildlife and habitat value. Eleven distinct habitat types occur in the Reserve. Seven of these habitat types occur in the lowlands: coastal strand, coastal salt marsh, three types of freshwater marsh, central coast arroyo willow riparian forest (extending onto upland slopes in some areas), and barren area. Four habitat types occur in the uplands: coastal scrub, coastal scrub-grassland, central coast arroyo willow riparian forest, and ruderal.

Both the aquatic and upland areas of the Reserve provide excellent wildlife habitat for vertebrates and invertebrates. The beach and associated cliffs in the Reserve provide high quality habitat for wildlife to nest, rest and/or forage on. A high diversity and abundance of birds also occurs throughout the remainder of the Reserve's boundaries.

## **2. Notices of Impending Development**

Under a certified CLRDP, University development of specific projects contained in the CLRDP can proceed without a coastal permit provided the University sends a Notice of Impending Development (or a "NOID") to the Commission prior to undertaking development, and either the Commission deems the identified development project consistent with the CLRDP (with or without conditions to make it so) or does not respond in a timely manner to the NOID.<sup>3</sup> Pursuant to Coastal Act Sections 30605 and 30606, the Commission may impose conditions on such development project proposals only if it finds them

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<sup>3</sup> Coastal Act Section 30606 requires that the University provide notice of an impending development at least 30 working days prior to pursuing it. CCR Section 13549 provides that a NOID is only filed following Executive Director review of the NOID and any supporting materials to ensure there is sufficient information for making the consistency determination. CCR Section 13548 requires that the Commission take action on the notice within 30 working days of filing of the NOID. In sum, if the Commission does not take action within 30 working days of filing of the NOID, the identified development project is deemed consistent and can proceed.



## **UCSC CLRDP NOID 2**

### **Younger Lagoon Reserve Beach Access Management Plan**

#### **Page 6**

inconsistent with the certified CLRDP.

This NOID was filed as complete on February 2, 2010, and the 30-working day action deadline is March 17, 2010. Thus, unless UCSC's Director of Campus Planning waives the University's right to a hearing within 30 working days of the NOID being filed, and agrees to an extension to a date certain (up to three months is allowed per the CLRDP), the Commission has until March 17, 2010 to act upon this NOID.

### **3. CLRDP Consistency Analysis**

#### **A. Applicable CLRDP Provisions**

The CLRDP includes multiple provisions that require protection of Reserve resources while allowing supervised public beach access, and that require the development of a beach access management plan:

*Implementation Measure 3.2.5 – Protect Habitat Areas From Human Intrusion. Habitat areas on the Marine Science Campus shall be protected against degradation from human intrusion by developing trails and interpretive signs, managing trail use, and implementing other enhancement measures in accordance with the provisions of this CLRDP.*

*Implementation Measure 3.2.6 – Natural Area Management. The University shall restore, enhance, and manage all areas located outside of defined development zones (except for approved streets and trails) as high-quality open space and natural habitat area.*

*Policy 3.5 - Special Protection for Younger Lagoon Reserve. The University recognizes the special biological significance of Younger Lagoon Reserve for habitat value and for research and education and therefore shall continue to provide special protection for the property by retaining it as part of the University's Natural Reserve System and protecting it consistent with this CLRDP.*

*Implementation Measure 3.5.1 – Protection and Enhancement of YLR Habitats. The native plant and animal habitats of Younger Lagoon Reserve shall be protected and enhanced by controlling and removing non-native and invasive plant species, promoting the abundance and diversity of native plant species through small-scale plantings and re-vegetation of areas where exotics and/or invasives have been removed, implementing the Drainage Concept Plan (Appendix B), maintaining and installing fencing/barriers consistent with this CLRDP to control trespass from the terrace portion of the site into YLR, limiting access by humans (except access otherwise allowed by this CLRDP), prohibiting domestic pets, and other appropriate means that may become available.*

*Implementation Measure 3.5.2 – Protection of Special Status Species in YLR. Habitats for special status animal species that use Younger Lagoon Reserve shall be protected and enhanced.*

*Implementation Measure 3.5.3 – Protection of YLR Resources. The biological productivity and*



*quality of YLR shall be protected, including by minimizing the effects of stormwater discharges and entrainment, controlling runoff, preventing depletion of ground water supplies, maintaining natural vegetation buffers areas and minimizing alteration of natural features.*

**Implementation Measure 3.5.4 – Development of Monitoring and Maintenance Program.** *Long-term maintenance and monitoring programs for Younger Lagoon Reserve shall be developed and implemented to assist in long-term preservation of species and habitats in accordance with the provisions of this CLRDP.*

**Implementation Measure 3.5.6 – YLR Manager Consultation.** *Development shall not be authorized by the University without consultation with the YLR Manager. Development shall incorporate measures to address issues and impacts identified through the consultation.*

**Policy 3.6 - Public Access to and within YLR.** *Access to Younger Lagoon Reserve may be controlled consistent with the need to protect YLR resources from disruption and degradation and to provide maximum public access consistent with the Coastal Act.*

**Implementation Measure 3.6.1 – Provision of Controlled Access within YLR.** *Physical access within YLR by authorized management, emergency, research, student personnel, and/or docent-led general public consistent with the public access and recreation diagram and policies contained in this CLRDP shall be provided.*

**Implementation Measure 3.6.3 - Public Beach Access within YLR.** *Supervised beach access to Younger Lagoon beach shall be provided to the general public consistent with and pursuant to a management plan for such access that is based on the best possible assessment of the capacity of the beach area to sustain use and the level of intensity of such use when considered in light of the fragility of the beach area and adjacent resources and ongoing research. Within six months of CLRDP certification, and at five-year intervals post-certification after that, the University shall submit a Notice of Impending Development to the Coastal Commission with all necessary supporting information for a development project to implement such a beach access management plan for the next five years. Each such management plan shall at a minimum include:*

- *A regular schedule of guided, educational tours to the beach area that is coordinated with and similar to other Marine Science Campus education and docent programs and designed to introduce visitors to the special aspects of beach ecology without causing deterioration of that ecology or loss of opportunity for feeding or breeding of beach dependent species. These tours may be weekly weather permitting, but shall be offered a minimum of two times per month.*
- *Identification of all parameters for beach access, including a clear depiction of the area within which such access is allowed, and a clear description of all related implementing measures (e.g., trail alignments, trail design, barriers/fencing, signage, timing restrictions,*



*supervision requirements, etc.). Access shall be by way of controlled access trails shown on Figure 5.6. Trails shall be maintained, marked, and signed for safety and interpretation of YLR ecology.*

- *A monitoring program that evaluates trends in beach area conditions, where at a minimum such program shall include: user data (including identification of all user types and specific data on size and composition of beach tour groups); a selected set of repeatable photo points to be taken seasonally to show all major areas of the beach; presence/absence of tidewater goby and evidence of breeding activity; species composition and coverage of beach dune vegetation from the lowest (nearest to the mean high tide line) occurring terrestrial plant to 10 meters inland into the strand vegetation; evidence of seed production by beach strand species in this zone; species composition and abundance of animal tracks (vertebrate and invertebrate) on the beach and adjacent beach dune area; and regular counts of feeding shorebirds on the beach.*
- *An assessment of beach area resources and the effect of beach area use and activities (including authorized and unauthorized uses, research use, YLR activities, etc.) on such resources in the time since the last five-year review and overall in the time since at least CLRDP certification;*
- *A description of existing public access opportunities on the Campus, and the way in which such opportunities relate to the amount and type of supervised access provided to the beach area.*

**Implementation Measure 6.2.13 – Public Access to Younger Lagoon Beach.** *The University shall provide public access to the Younger Lagoon Beach area consistent with and pursuant to an approved management plan pursuant to Implementation Measure 3.6.3.*

Thus, the CLRDP envisions supervised access to the beach area, including at a minimum docent-led public access tours on existing trails through the Reserve to the beach to introduce visitors to the special aspects of beach ecology without causing deterioration of that ecology. The CLRDP also requires the development and implementation of long-term beach maintenance and beach monitoring programs for the Reserve to ensure preservation of sensitive native plant and animal species and habitats. The beach access management plan must be updated and reauthorized every five years, including to ensure that it strikes the appropriate balance between resource protection and public access as described in the CLRDP.





## **B. Public Access to Younger Lagoon Reserve**

CLRDP Implementation Measures 3.2.5 and 3.2.6 provide protection parameters for habitat areas located on the UCSC Marine Science Campus. CLRDP Policy 3.5 and Implementation Measures 3.5.1-3.5.6 provide special protections, including limiting access by humans, for the habitats and the special status species found in the Younger Lagoon Reserve. CLRDP Policy 3.6, Implementation Measure 3.6.1, and Implementation Measure 6.2.13 provide for supervised public access within the Reserve, and require, at a minimum, that docent-led access be provided. Implementation Measure 3.6.3 describes the specific requirements of the required management plan to provide supervised access to Younger Lagoon Beach. These requirements include docent-led tours designed to introduce visitors to the special aspects of the ecology of the beach without causing deterioration of that ecology, that these tours be offered a minimum of twice a month via existing controlled and maintained access trails, and that the management plan include a clear depiction of the area within which access will be allowed.

In addition, CLRDP Implementation Measure 3.5.4 requires that long-term maintenance and monitoring programs for the Younger Lagoon Reserve be developed and implemented to assist in long-term preservation of species and habitats. CLRDP Implementation Measure 3.6.3 requires the University to develop and implement 5-year management plans that include a monitoring program for the Younger Beach area that evaluates trends in beach area conditions and assesses beach area resources and the effect of beach area uses, including authorized and unauthorized public access and university research uses.

The University proposes to provide docent-led public tours through the Reserve to the beach twice a month (one tour on a weekday and one tour on a weekend day – see Exhibit B for the University’s beach access management plan). The extent of the beach access area will vary from year to year dependent upon the location of dune plants (i.e. foot traffic will be confined to areas seaward of the dune vegetation). Thus the exact beach access area will be determined by vegetation and may vary slightly from the area shown in Exhibit C. Access to the beach will be provided on an existing trail that begins with an overview of the lagoon, includes a walk through restored coastal scrub habitat with viewing opportunities of the rear dune along the way, and terminates at Younger Beach. Tours will be structured similarly to the marine mammal research tours currently offered by the Seymour Marine Discovery Center (SMDC). SMDC docents will be trained in the natural history and ecology of the Reserve and will provide detailed information about the flora and fauna to tour visitors. Beach tours will be advertised via the SMDC website and filled via phone reservation. Tours will be limited to 12 persons. Because beach tours will be led by trained docents, no additional signage or fences will be installed. The trail will be maintained by clipping overgrown vegetation and maintaining the existing earthen path and timber steps as needed.

The University’s proposed Younger Lagoon Reserve Access Management Plan meets the requirements of Implementation Measure 3.6.3 and the other habitat-protection requirements of the CLRDP because the docent-led tours will take place twice a month (the minimum required), will use an existing trail that leads to the beach (as shown in Exhibit C), and will provide an educational interpretive experience for



visitors while protecting the special habitats of the Reserve.

Furthermore, the proposal includes implementation of a five-year monitoring program (see Exhibit D for the location of the various monitoring areas) to document the presence and distribution of flora and fauna within the beach area and to evaluate changes in distribution and density over time. Data from the 5-year monitoring program are meant to dovetail with beach user data as a means to inform future decisions on beach access here. Results of the monitoring study will be used to evaluate the trade-offs between ecological protection and public access. Variables that will be monitored include: user data (i.e. number of visitors on docent-led tours, as well as research and education use), and changes as observable in photographic documentation, tidewater goby surveys, species composition and seed production of beach dune vegetation, species composition of animals, and abundance of feeding shore birds. These variables meet the requirements of Implementation Measure 3.6.3 and will assist in long-term preservation of species and habitats in the Reserve, as required by Implementation Measure 3.5.4.

In summary, the CLRDP envisions supervised access to Younger Beach, including at a minimum docent-led access, and requires such access to be managed pursuant to and consistent with a management plan for such access that is required to be re-reviewed, updated, and reauthorized every five years. The management plan is required to strike that oftentimes tricky balance between maximizing public recreational access and protecting coastal resources, as clearly articulated in the certified CLRDP. The University's submittal is consistent with the parameters certified by the Commission in 2009, and will provide for the first allowed public access, albeit limited to docent-led tours, onto the beach area since the closure in 1981. The University's plan will also appropriately monitor the effect of such access in such a manner that should provide ample information for consideration of the next iteration of the required management plan five years hence. In short, implementation of the Younger Beach Access Management Plan as proposed by the University is consistent with the certified CLRDP.

### **C. California Environmental Quality Act (CEQA)**

Section 13096 of the California Code of Regulations requires the Commission to make a specific finding that a permit application is consistent with any applicable requirements of CEQA. This requirement also applies to the Commission's review of NOIDs, based on Regulation Section 13550(d). Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse effect which the activity may have on the environment.

The University, as the lead agency under CEQA, certified a Final EIR (FEIR) for the CLRDP in September 2004. In November 2006, the University certified an addendum to the FEIR to respond to changes in the CLRDP in the time since the original FEIR certification, including changes stemming from Coastal Commission review of the CLRDP prior to certification.<sup>4</sup> On October 20, 2009, UCSC,

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<sup>4</sup> FEIR Addendum Number 1, dated certified November 29, 2006.

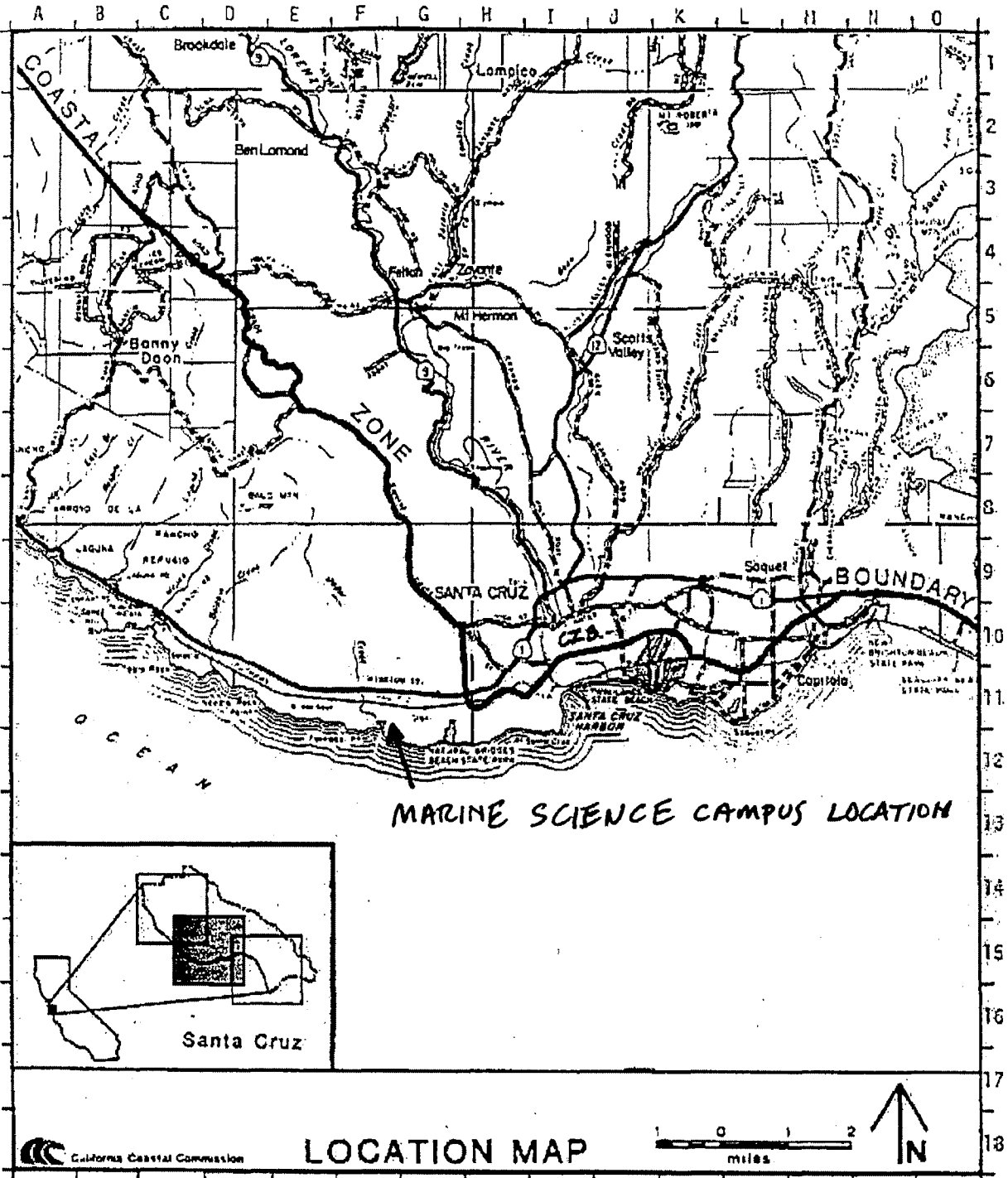


again acting as lead agency, found that the proposed development project was categorically exempt from the requirements of CEQA.

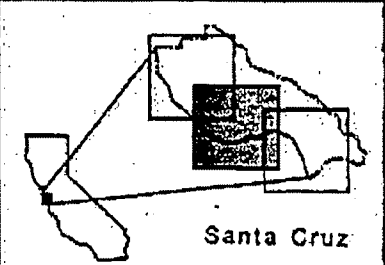
The Coastal Commission's review and analysis of land use proposals has been certified by the Secretary of Natural Resources as being the functional equivalent of environmental review under CEQA. The Commission has reviewed the relevant coastal resource issues raised by the proposed project and has determined that the proposed project will not have adverse impacts on coastal resources. All public comments received to date have been addressed in the findings above. All above findings are incorporated herein in their entirety by reference.

The Commission finds that the proposed project will avoid significant adverse effects on the environment, within the meaning of CEQA. As such, there are no additional feasible alternatives or feasible mitigation measures available that would substantially lessen any significant adverse environmental effects that approval of the proposed project would have on the environment within the meaning of CEQA. The proposed project will not result in any significant environmental effects for which feasible mitigation measures have not been employed consistent with CEQA Section 21080.5(d)(2)(A).





MARINE SCIENCE CAMPUS LOCATION



Santa Cruz



LOCATION MAP



County of Santa Cruz

Sheet 2 of 3

CCC Exhibit A  
 (page 1 of 1 pages)

# 1. Project Report

## 1a. NOID 10-1 Project Description

### **PUBLIC ACCESS TO AND WITHIN YOUNGER LAGOON NATURAL RESERVE (IMPLEMENTATION MEASURE 3.6.3)**

#### **Overview**

Implementation Measure 3.6.3 of the University of California CLRDP (CLRDP 2009) requires that (through controlled visits) the public have access to Younger Lagoon Reserve beach and that a monitoring program be created and implemented to document the condition of native flora and fauna within Younger Lagoon and its adjacent beach. The monitoring plan is then to be implemented over a 5-year time period. At the end of the 5-year period (Winter 2015) results are to be compiled and included in a report that summarizes and assesses the effect of controlled beach access on flora and fauna. The report will be submitted to the California Coastal Commission.

Nearly 45 years ago, the University of California Natural Reserve System (UCNRS) began to assemble, for scientific study, a system of protected sites that would broadly represent California's rich ecological diversity. Today the UC Natural Reserve System is composed of 36 reserves that encompass approximately 135,000 acres of protected natural land available for university-level instruction, research, and outreach. The University of California Natural Reserve System supports research and education through its mission of contributing *"to the understanding and wise management of the Earth and its natural systems by supporting university-level teaching, research, and public service at protected natural areas throughout California."* By creating this system of outdoor classrooms and laboratories and making it available specifically for long-term study and education, the NRS supports a variety of disciplines that require field work in wildland ecosystems. UC Santa Cruz administers 4 Reserves: Younger Lagoon, Año Nuevo Island Reserve, Landels-Hill Big Creek Reserve, and Fort Ord Natural Reserve.

Because of the importance of maintaining a natural and pristine environment and protecting scientific studies and equipment, uncontrolled access to Younger Lagoon Natural Reserve (YLR) is not allowed. Uncontrolled use of YLR is likely to have a negative impact on native coastal flora and fauna that inhabit the Reserve, hamper research endeavors, and impact the area for future scientific and educational endeavors. Currently, rather than an open public access policy, users are required to fill out applications, or contact NRS staff, for specific research, education, or outreach efforts.

The text below serves as the project description for the Notice of Impending Development for Implementation Measure 3.6.3 of the CLRDP, which would allow controlled public access to the areas of the non-terrace area of the Reserve.

### **History of Public Access to Younger Lagoon Beach**

Here we provide an abbreviated history of the closure of Younger Lagoon Beach. The goal of this summary is to provide a coarse overview of the major events centered on beach access at Younger Lagoon. Prior to 1972, Younger Beach was privately owned and closed to the public. The owners (Donald and Marion Younger) actively patrolled for and removed trespassers from their property, including the beach. In 1972, the Younger Family donated approximately 40 acres to the University of California for the study and protection of the marine environment. These lands included Younger Lagoon and Beach (approximately 25 acres), and an adjoining parcel of land (approximately 15 acres) which became the site of the original Long Marine Laboratory (LML). At the time of their donation, Donald and Marion Younger intended that the lagoon, beach and surrounding slopes be protected in perpetuity by the University as a bird sanctuary.

In the years between the donation of the property by the Younger Family to the University and the start of LML construction (1976), the University leased the future LML site back to farmers who had been farming the property for the Younger Family prior to the donation. During those years, the same no trespassing rules for the beach were enforced as they had when the property was owned by the Younger Family.

Once construction of the Long Marine Lab began in 1976, the land was no longer under the watch of the farmers, and public pressure on the beach began to increase. Although the beach was only open to uncontrolled public access for a short period of time, many Santa Cruz locals remember the next several years at Younger Beach fondly as it became a popular nude beach. The increased public access had a noticeable impact on the flora and fauna of the beach, and was not in accordance with the intention of the original donation by the Younger family. By 1978 discussions had begun between the University and the California Coastal Commission regarding the impact of uncontrolled public access to the beach. In 1981, Younger Beach was closed to uncontrolled public access under coastal permit P-1859. The closure was reviewed and re-approved by the Commission in 2001 under

coastal permit 3-83-76 A13, and again in 2009 when the Commission certified UCSC's Marine Science Campus Coastal Long Range Development Plan (CLRDP).

## **Management Plan**

### **Public Beach Access within YLR**

Beach access tours (Figure 1) will be provided two times per month (one tour on a weekday and one on a weekend). The extent of the beach access area will vary from year to year dependent upon the location of plants (i.e. foot traffic will be seaward of the dune vegetation). Thus, the exact access area will be determined by vegetation and may vary slightly from the areas depicted in Figure 1 below (figure was created using a 2007 aerial image) and Figure 3.11 of the CLRDP. The trail will provide an interpretive experience for visitors that begins with an overview of the lagoon, a walk through a restored coastal scrub habitat with viewing opportunities of the rear dune, and ends up on the beach. Tours will be structured similarly to the Marine Mammal Research tours currently offered by the Seymour Marine Discovery Center (SMDC). SMDC docents will be trained in the natural history and ecology of YLR and will provide detailed information about the flora and fauna of YLR. Tour curriculum will focus on the unique ecology of the YLR beach, and will be developed in coordination with SMDC staff during the fall of 2009. Curriculum will be presented to SMDC docents during regular docent training events in winter of 2010. YLR Beach tours will begin in the spring of 2010. Beach tours will be advertised via the SMDC website:

<http://www2.ucsc.edu/seymourcenter/calendar.html> and filled via phone reservation: (831) 459-3800.

The SMDC will allocate tour spaces and keep track of all user data. Tours will be limited to twelve (12) persons and will be best suited for adults and children over 10 years of age. Public members entering YLR will be required to adhere to the UCNRS Reserve Use guidelines. Because beach tours will be limited to groups with trained docents no additional signage or fences will be required. The beach trail consists of a simple dirt/mulch path that is already in place. The trail will be maintained by clipping overgrown vegetation and maintaining the earthen path and timber steps as needed.

**CCC Exhibit B**  
**(page 3 of 6 pages)**

### **Current Species List for YLR**

Species lists for birds, mammals, plants, reptiles, amphibians, and fish are included as Appendices I-IV at the end of the Project Description. These lists provide an overview of the flora and fauna that have been recorded at Younger Lagoon over the years. Although there have been numerous surveys of the area, to the best of our knowledge the proposed monitoring project outlined in this NOID will provide the most extensive survey effort for flora and fauna on the Reserve. Historical data, species lists, and anecdotal observations suggest that Younger Lagoon provides important habitat for numerous animals and supports a rich composition of plant species. The lack of disturbance and low human activity are likely the primary factors that maintain the high diversity in the Lagoon. Recent track survey and camera trap work have documented bobcat, coyote, deer, and numerous other mammals on the beach; many of these species are likely residents within the lagoon boundaries. Track survey work also indicates that several of these mammals are residing (at least occasionally) in the Reserve and use the area as hunting grounds (bobcat sign indicates that this species successfully hunts for roosting pelagic birds within the Reserve boundaries). These observations suggest that although Younger Lagoon is a relatively small area, amidst agriculture and development, this relic habitat is still functioning at a level beyond most developed beaches and lagoons in the region.

### **Beach Monitoring Program**

Beach monitoring will be initiated in winter or spring of 2010 and be conducted over 5 years, as required by the CLRDP implementation measure. The goal of the monitoring program will be to document the presence and distribution of flora and fauna within YLR and to evaluate changes in distribution and density over time. Data from the 5-year monitoring program will be compiled and presented to the Coastal Commission at the end of the 5-year period. Results of the monitoring study will be used to evaluate the trade-offs between ecological protection and public access. Variables that will be monitored include: user data, changes as observable in photo documentation, tidewater goby surveys, species composition and seed production of beach dune vegetation, species composition of animals, and abundance of feeding shore birds. Details for each of the aforementioned parameters are described below.

*User Data*—User data from tours conducted by the SMDC, as well as research and education use, will be recorded and maintained by SMDC and YLR Staff.

**CCC Exhibit B**  
**(page 4 of 6 pages)**



*Photo Documentation*—Photo point locations have been established at four locations within YLR (Figure 2). These locations were chosen to ensure coverage of all major areas of the beach. Photos will be taken two times annually during late spring to early summer (May – July) and in late fall to early winter (November – January). Photos will be taken at these permanent photo points in order to ensure repeatability over time. Monitoring information collected for each photo will include:

- Photo point number
- Date
- Name of photographer
- Bearing
- Camera and lens size
- Coordinates
- Other comments

*Tidewater Goby Surveys*—Tidewater goby surveys will be conducted within Younger Lagoon by a qualified biologist using approved sampling methods. Surveys will be conducted quarterly (fall, winter, spring, and summer). Each survey bout will be completed when tidewater gobies have been detected or at least 50% of the lagoon as been surveyed. The goals of the surveys are to document presence and evidence of breeding activity. Breeding activity will be determined by the presence of multiple size/age classes.

*Species Composition and Coverage of Beach Dune Vegetation*—Implementation Measure 3.6.3 requires that dune vegetation “*from the lowest (nearest to the mean high tide line) occurring terrestrial plant to 10 meters inland into the strand vegetation*” be surveyed to document species composition, cover, and seed production. Figure 2 shows a potential survey area for dune vegetation; however, the exact location and extent of survey area will vary annually depending upon the location of the “lowest” plant detected each year. Within the survey area vegetation will be quantified by counting every plant (abundance), noting whether individual plants are seedlings or greater than 1 year old (this will provide information on seedling recruitment), documenting the presence of seeds, and estimating extent of cover.

*Non-avian Vertebrate Monitoring*—Vertebrate species composition will be monitored quarterly (fall, winter, spring, and summer) by observing tracks in raked sand plots. Eight tracking stations will be placed throughout the beach area (Figure 2) in constriction zones where vegetation is absent. Size of plot will vary from approximately 4 m<sup>2</sup> to 6 m<sup>2</sup> depending upon the amount of available open sandy area at each location. Track stations will be raked each evening and checked for tracks in the morning. Stations will remain open for two days during each monitoring bout. Tracks will be

identified to species if possible and species composition will be summarized. Abundance will not be quantified due to the fact that tracks cannot be used to identify individual animals (e.g. a single individual could walk across the plot multiple times).

*Invertebrate Monitoring*—Terrestrial invertebrates on beach habitat will be monitored by placing four 12 oz plastic containers (pit fall traps) at each tracking station (one at each corner of the plot for a total of 32 traps) during “non-avian vertebrate monitoring” efforts. Traps will be buried to the lip of the container; terrestrial vertebrates will fall into the trap passively. Traps will be checked each morning and all individuals will be identified to species and counted.

*Feeding Shorebirds*—Counts of feeding shorebirds will be conducted from two survey points along the eastern edge of the cliff (Figure 2). Counts will be conducted at least quarterly to and correspond with non-avian vertebrate monitoring efforts described above. Surveys will be conducted in the dawn or dusk hours within 2 hours of sunrise or sunset and correspond as closely as possible with low tides.

CCC Exhibit B  
(page 6 of 6 pages)



Figure 1. Overview of beach tour route. Visitors on docent led tours will have beach access within the "Beach Access Area." The extent of the beach access area will vary from year to year dependent upon the location of plants (i.e. foot traffic will be seaward of the dune vegetation). The above depiction represents the approximate location of plants in the spring of 2009.

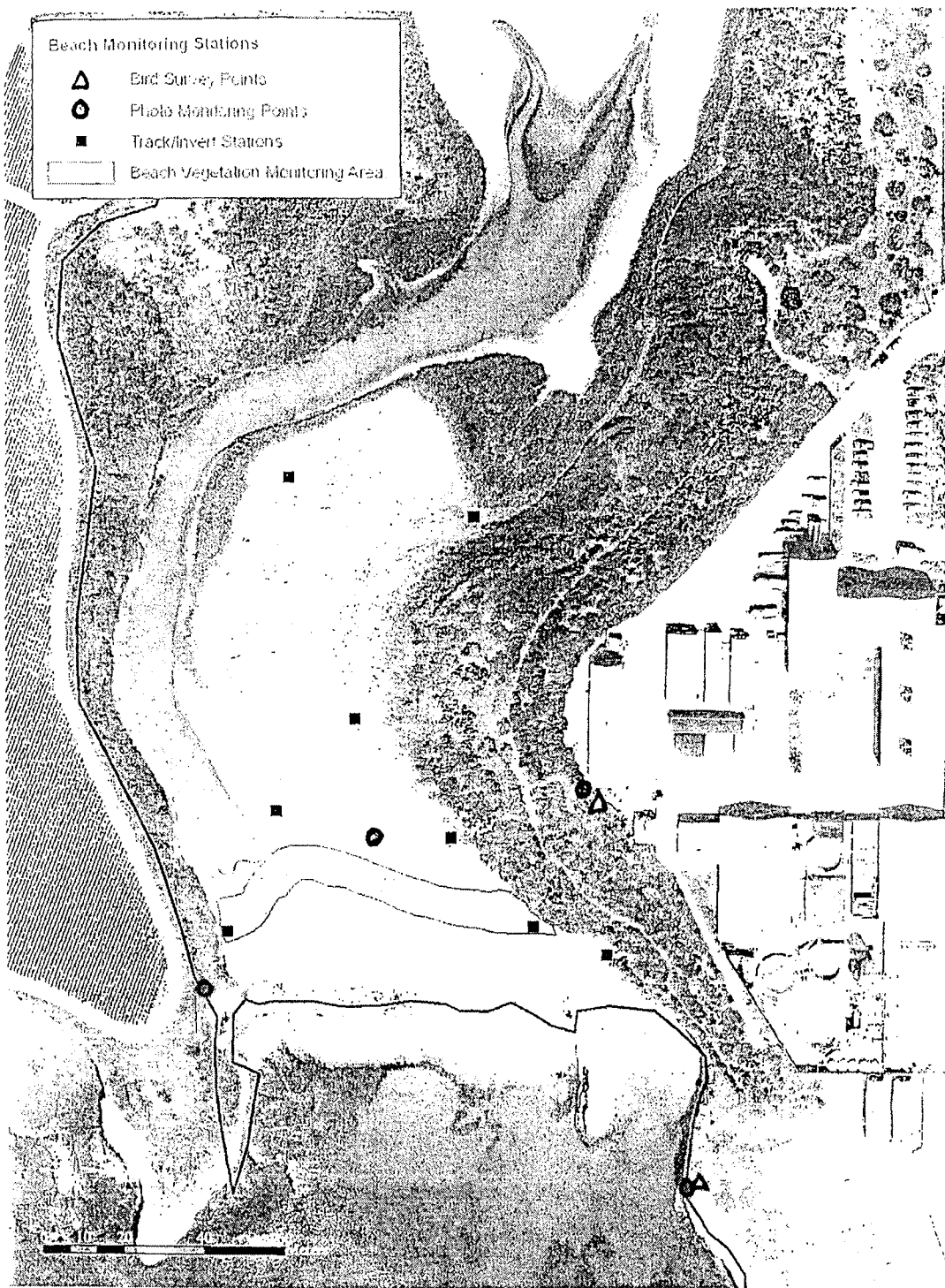


Figure 2. Locations of monitoring points, plots, and regions for YLR beach. The beach monitoring area will vary between years depending upon the high water mark. Dune plant surveys will occur within 10 m of the high water mark as per the CLRDP guidelines.

Appendix 2. Younger Lagoon Photos.



Photopoint #2. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 170°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #2. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 240°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #2. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 310°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





Photopoint #2. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 350°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #1. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 300°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #1. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 330°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #1. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 350°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 170°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 225°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 270°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 305°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 345°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #3. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 15°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #4. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 335°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #4. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 25°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #4. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 45°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #4. March 4, 2010. Photographer: Elizabeth Howard. Bearing: 110°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #1. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 325°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #1. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 350°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





Photopoint #1. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 25°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #2. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 170°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #2. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 200°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #2. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 250°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #2. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 280°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #2. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 300°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #2. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 330°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #2. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 360°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





Photopoint #3. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 170°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #3. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 200°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #3. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 225°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #3. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 270°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #3. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 300°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #3. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 345°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #3. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 15°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #3. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 60°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.





Photopoint #4. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 170°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #4. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 115°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #4. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 40°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #4. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 45°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



Photopoint #4. December 10, 2010. Photographer: Elizabeth Howard. Bearing: 15°. Camera: Sony Cyber-shot Carl Zeiss Vario-Tessar 13.6 Megapixels, lens fully extended wide.



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