

# University California, Santa Cruz

## Younger Lagoon Reserve

Specific Resource Plan Phase 1 Summary Report



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## **Executive Summary**

Over the past seven years, Younger Lagoon Reserve has successfully implemented Phase 1 of the Specific Resource Plan for the Enhancement and Protection of Terrace Lands at Younger Lagoon Reserve. Nearly all Priority 1 weeds have been eliminated from the Terrace Lands. Over ten acres have been planted with native species. Nearly all of those plantings are meeting or exceeding their success criteria targets. Upper terrace wetland reconnection work has been completed. In addition, teaching, research, and public service was incorporated into every aspect of SRP Phase 1 implementation.

## **Introduction**

This report provides a summary of the activities that were conducted at Younger Lagoon Reserve (YLR) during Phase 1 of the Specific Resource Plan for the Enhancement and Protection of Terrace Lands at Younger Lagoon Reserve (SRP). The Resource Management Plan (RMP) within the Coastal Long Range Development Plan (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 Coastal Science Campus (CSC) 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 perpetual funding for the project and continued management of YLR.

The SRP for Phase 1A of restoration (first 7 years) was approved by the CCC in September 2010 (NOID 3, 10-2). The SRP for Phase 1B of restoration (upper terrace wetland work) was approved by the CCC in July 2013 (NOID 6, 13-1). Phase 1A projects included Priority 1 weed removal, re-vegetation, baseline monitoring and selection of reference systems. Phase 1B projects included work in wetland areas, including the reconnection of upper terrace wetlands 1 and 2.

The SRP for Phase 1A and 1B of restoration outlined detailed success criteria for each of the reserve's habitat types (Ruderal, Coyote Brush Grassland-Scrub, and Grassland, Coastal Bluffs, Wetlands, and Wetland Buffers). These criteria set an initial threshold of species richness and cover for specific habitat types throughout the restoration area. These criteria were further refined at the recommendation of the Scientific Advisory Committee (SAC, see Appendix 1) based on results from reference site monitoring of local coastal terrace prairie grassland, seasonal wetland, and coastal scrub sites (See 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016 and 2016-2017 Annual Reports).

### Phase 1A Summary

Over ten acres of the Terrace Lands were planted with native species in Phase 1A (Table 1, Figure 1). Phase 1A restoration sites were located primarily in the middle and lower terrace, although some work also took place in the upper terrace. In addition to native plantings, there are 6.25 acres of native vegetation - primarily coyote brush (*Baccharis pilularis*) and Douglas' baccharis (*Baccharis glutinosa*) on the site.

Table 1. Native Acreage

<b>Habitat type</b>	<b>Acres planted</b>
Coastal Prairie	5.6
Coastal Scrub	4
Wetlands	.64
Research	1.2
Total	10.32



**Figure 1.** SRP Phase 1A Restoration Sites.

*Year 0 (2010)*

The SRP for Phase 1A was approved in September 2010. Restoration activities during this year of SRP Phase 1A implementation included priority 1 weed removal, seed collection, and planting of 0.5 acres of coastal bluff habitat (Figure 2).



**Figure 2.** SRP Phase 1A Planting Areas, 2010.

*Year 1 (2011)*

Restoration activities during the first full year of SRP Phase 1A implementation included priority 1 weed removal, seed collection, and planting of 1 acre of coastal prairie habitat (Figure 3).



**Figure 3.** SRP Phase 1A Planting Areas, 2011.



*Year 2 (2012)*

Restoration activities during the second full year of SRP Phase 1A implementation included priority 1 weed removal, seed collection, and planting of 1.5 acres of grassland, scrub, and wetland buffer habitat (Figure 4).



**Figure 4.** SRP Phase 1A Planting Areas, 2012.

*Year 3 (2013)*

Restoration activities during the third full year of SRP Phase 1A implementation included priority 1 weed removal, seed collection, and planting of 1 acre of coastal prairie and scrub habitats (Figure 5).



**Figure 5.** SRP Phase 1A Planting Areas, 2013.

*Year 4 (2014)*

Restoration activities during the fourth full year of SRP Phase 1A implementation included priority 1 weed removal, seed collection, and planting of 1.15 acres of coastal prairie and scrub habitats (Figure 6).



**Figure 6.** SRP Phase 1A Planting Areas, 2014.

*Year 5 (2015)*

Restoration activities during the fifth full year of SRP Phase 1A implementation included priority 1 weed removal, seed collection, and planting of 1 acre of coastal prairie and scrub habitat (Figure 7).



**Figure 7.** SRP Phase 1A Planting Areas, 2015.

*Year 6 (2016)*

Restoration activities during the sixth full year of SRP Phase 1A implementation included priority 1 weed removal, seed collection, and planting of 1.9 acres of grassland, scrub, and wetland habitats (Figure 8).



**Figure 8.** SRP Phase 1A Planting Areas, 2016.

Year 7 (2017)

Restoration activities during the final year of SRP Phase 1A implementation included priority 1 weed removal, seed collection, and planting of 1 acre of coastal prairie and scrub habitats (Figure 9).



**Figure 9.** SRP Phase 1A Planting Areas, 2017.

## Monitoring

The SRP for Phase 1A of restoration outlined detailed success criteria for each of the reserve's habitat types (Ruderal, Coyote Brush Grassland-Scrub, and Grassland, Coastal Bluffs, Wetlands, and Wetland Buffers). These criteria set an initial threshold of species richness and cover for specific habitat types throughout the restoration area. These criteria were further refined at the recommendation of the SAC based on results from reference site monitoring of local coastal terrace prairie grassland, seasonal wetland, and coastal scrub sites. Final success criteria for each habitat are summarized below (Table 2).

Table 2. Final SRP Phase 1A success criteria

<b>Habitat type</b>	<b>Performance standard</b>
Coastal Bluffs	8 native plant species appropriate for habitat established in planted areas to comprise 40% cover, and evidence of natural recruitment.
Coastal prairie	8 native plant species appropriate for habitat established in planted areas to comprise 25% cover, and evidence of natural recruitment.
Scrub	8 native plant species appropriate for habitat established in planted areas to comprise 40% cover, and evidence of natural recruitment.
Wetlands (except W 1/2)	4 native plant species appropriate for habitat established in planted areas to comprise 30% cover, and evidence of natural recruitment.
Wetland 1/2 Complex	3 native plant species appropriate for habitat established in planted areas to comprise 30% cover, and evidence of natural recruitment.

All plantings are meeting or exceeding the performance standards except for the 2011 coastal prairie site (Table 3 and See 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016 and 2016-2017 Compliance Monitoring Reports). This site met the performance standards initially, and continues to meet the species richness and natural recruitment targets, but has fallen below the 25% percent native cover target (Table 3). Coastal prairie is notoriously difficult to restore and maintain. In addition, the 2011 site was impacted by

construction and drought. The SAC recommended monitoring this site (and any others that fall below target) once a year rather than every other year, and replanting or changing management regimes it does not rebound.

Table 3. Coastal Prairie Restoration Site Performance

Years post planting	Goal	2010 Planting	2011 Planting	2013 Planting	2014 Planting	2015 Planting
2 years after planting	6 or more native plant species established comprising $\geq$ 5% cover and evidence of natural recruitment present	12 native plant species established, 58% native cover, recruitment observed. (2012 Monitoring)	14 native plant species established, 28% native cover, recruitment observed. (2013 Monitoring)	6 native plant species established, 29% native cover, recruitment observed. (2015 Monitoring)	9 native plant species established, 42% native cover, recruitment observed. (2016 Monitoring)	9 native plant species established, 56% native cover, recruitment observed. (2017 Monitoring)
4 years after planting	6 or more native plant species established comprising $\geq$ 15% cover and evidence of natural recruitment present	8 native plant species established, 39% native cover, recruitment observed. (2014 Monitoring)	6 native plant species established, 31% native cover, recruitment observed. (2015 Monitoring)	8 native plant species established, 24% native cover, recruitment observed. (2017 Monitoring)		
6 years after planting and every 5 years after that	8 or more native plant species established comprising $\geq$ 25% cover and evidence of natural recruitment present	10 native plant species established, 26% native cover, recruitment observed. (2016 Monitoring)	10 native plant species established, 18% native cover, recruitment observed. (2017 Monitoring)			



## **Phase 1B**

### *Reconnection of Wetlands W1 and W2:*

The Resource Management Plan within the CLRDP requires the reconnection of Upper Terrace wetlands W1 and W2. Wetland W1, on the western margin of the Upper Terrace, is a former agricultural ditch, probably constructed to drain the adjacent agricultural field. It is separated from wetland W2 (located immediately to the east) by a slightly elevated berm that may partially represent spoils left from the ditch construction.

To reconnect hydrology between W1 and W2, five brush packs (ditch plugs) were installed within W1 in the summer of 2016 and 2017 (Figure 10). Two ditch plugs were installed on the upstream end and constructed at a height to allow for the detention of water to back up and flow through over the berm to W2 but also allow flows to continue downstream to the remaining ditch plugs. Three brush packs were installed on the downstream end and also constructed at a height to allow for the detention of water but also to allow flows to continue downstream through W1. The brush packs were constructed from wooden stakes, biodegradable rope, and coyote brush slash found on-site. The brush packs range between, 13-20' long x 24-31" high x 20-28" wide. (Figure 11).

No native plantings were initiated with the instillation of the brush packs. As the hydrology of the site begins to shift to become more favorable to wetland plants, native wetland plants will be installed on the site.



**Figure 10.** Upper terrace wetland reconnection work. Brush pack locations shown in red.



**Figure 11.** Northern brush packs after installation, summer 2017.

### *Monitoring*

All of the brush packs are intact and functioning as designed (Figure 12 and See 2016-2017 Annual Report). Although not yet observed, the ditch plugs may create small open water pool habitat and potentially provide new breeding habitat for amphibians.



**Figure 12.** Northernmost brush pack during a winter storm, January 2018.

## **SAC Recommendations**

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

Creation and implementation of the Specific Restoration Plan (SRP) for Phase 1 of Restoration was guided by a Scientific Advisory Committee (SAC). The SAC is comprised of four members: Dr. Karen Holl (SAC chair) Professor Environmental Studies at UCSC; Tim Hyland, Environmental Scientist, State Parks, Santa Cruz District; Bryan Largay, Conservation Director, Land Trust of Santa Cruz County; and Dr. Lisa Stratton, Director of Ecosystem Management, Cheadle Center for Biodiversity and Ecological Restoration, University of California, Santa Barbara (UCSB). SAC members met as a group with reserve staff on-site throughout Phase 1 of

Restoration. At their May 2018 meeting, SAC members discussed 1) the outcome of the SRP for Phase 1A and 1B and 2) goal setting/planning for the SRP for Phase 2 of restoration.

The SAC was pleased with the results of Phase 1 of the Specific Resource Plan for the Enhancement and Protection of Terrace Lands at Younger Lagoon Reserve. The SAC recommended keeping all of the success criteria used in Phase 1 for Phase 2 efforts. In response to two of the coastal prairie restoration sites falling below native cover targets, the SAC recommended monitoring these sites (and any others that fall below target) once a year rather than every other year, and replanting or changing management regimes if the sites do not rebound.

### **Conclusion**

Over the past seven years, Younger Lagoon Reserve has successfully implemented Phase 1 of the Specific Resource Plan for the Enhancement and Protection of Terrace Lands at Younger Lagoon Reserve. Nearly all Priority 1 weeds have been eliminated from the Terrace Lands. Over 10 acres have been planted with native species. Nearly all of those plantings are meeting or exceeding their success criteria targets. Upper terrace wetland reconnection work has been completed. In addition, teaching, research, and public service was incorporated into every aspect of SRP Phase 1 implementation. We look forward to the successful implementation of Phase 2 of the Specific Resource Plan for the Enhancement and Protection of Terrace Lands at Younger Lagoon Reserve.



## **Appendix 1 Younger Lagoon Reserve Scientific Advisory Committee (SAC)**

### *Charge*

As outlined in the in the CLRDP, restoration, enhancement, and management activities on the Marine Science Campus will be guided by a Scientific Advisory Committee (SAC) that is made up of independent professionals and academicians experienced in and knowledgeable about the habitats of the natural areas on the Marine Science Campus. The SAC shall guide the development of Specific Resource Plans, which shall be consistent with the performance standards set forth in the Resource Management Plan (RMP), and which may be adapted periodically based on findings from ongoing restoration work. The RMP goals and performance standards may be adjusted as directed by the SAC in coordination with the Executive Director to ensure the success of Campus restoration, enhancement, and management efforts. 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 area in perpetuity consistent with this CLRDP. RMP adjustments in this respect may require a CLRDP amendment, unless the Executive Director determines that an amendment is not necessary.

The committee provides guidance for the restoration, enhancement, and management efforts at YLR, and collaborates with YLR staff on the creation and implementation of the Specific Resource Plan as outlined in CLRDP Implementation Measure 3.2.10 (below).

Implementation Measure 3.2.10 – Natural Areas Habitat Management. *Within six (6) months of CLRDP certification, the University in consultation with the Executive Director of the California Coastal Commission shall convene a scientific advisory committee (SAC) to guide the restoration, enhancement, and management of natural areas (i.e., all areas outside defined development zones, except for Younger Lagoon Reserve) on the Marine Science Campus (see Appendix A). Natural areas restoration, enhancement, and management may be completed in up to three phases corresponding to dividing the natural area into thirds (i.e., where Phase 1 accounts for at least one-third of the natural area, Phase 1 plus Phase 2 accounts for at least*

*two thirds, and all of the three phases together account for all of the natural area). All restoration, enhancement, and management activities shall be guided by Specific Resource Plans developed by the University in accordance with the SAC and the criteria contained in the Resource Management Plan (Appendix A) and current professional standards for such plans. The SAC shall be responsible for guiding development of Specific Resource Plans and shall complete its work on the Specific Resource Plan for Phase I restoration and enhancement efforts within four (4) months of convening. The content of Specific Resource Plans shall be consistent with the performance standards set forth in Appendix A, which may be adapted periodically based on findings from ongoing restoration work. The University shall file a Notice of Impending Development for Phase I work within one (1) year of CLRDP certification. All natural areas restoration and enhancement shall be completed within 20 years of CLRDP certification, with interim benchmarks that at least one-third of the restoration and enhancement shall be completed within seven years of CLRDP certification and that at least two-thirds shall be completed within 14 years of CLRDP certification.*

The SAC was seated in January 2009. In addition to the chair, membership of the committee is comprised of three independent professionals and academicians experienced in and knowledgeable about the habitats of the natural areas on the Marine Science Campus. Brief bios of the four SAC members are below.

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

Dr. Karen Holl has been on the faculty in the Environmental Studies Department at the University of California, Santa Cruz for over 15 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 – Conservation Director, Land Trust of Santa Cruz County.**

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 The Land Trust of Santa Cruz County, he worked as the Tidal Wetland Project Director at

Elkhorn Slough National Estuarine Research Reserve (ESSNER) and 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, University of California, Santa Barbara (UCSB).**

Dr. Lisa Stratton has worked in the field of science-based restoration for over 15 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





