Biodiversity Sustainability Action Research Team

Final Research Report
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I. INTRODUCTION

The mission of the 2016 Biodiversity Team was to celebrate California native diversity on the UCLA campus. Specifically, we were tasked with studying biodiversity on Sage Hill -- a 4-acre plot of undeveloped land. Part of our team's goals for this year was to showcase how this space could be used. We designed and implemented a research project asking the question: *how can we best restore an undeveloped space on campus?* Our project compared two different compositions of California native plants and the effects of weeding and watering. From these manipulations, we measured changes in factors like soil moisture, invertebrate diversity, and plant growth and survivorship. In implementing this project, we reached out to faculty and students in several departments across the campus. Our second goal was to show the university that these natural spaces on campus are important for student learning and campus collaboration. One of the most important aspects of conservation is community outreach and education. Connecting with the local community is necessary to raise awareness and advocacy of Sage Hill. We spent the second half of our project creating outreach programs that included a campus survey and a ecosystem-focused lesson plan for the UCLA Krieger Day Care Facility. Lastly, we wanted to gather more up-to-date information about Sage Hill biodiversity through a comprehensive census and share this information with the public through signage. We plan to present our findings at the 2016 American Association for the Advancement of Science conference at University of San Diego this June. Ultimately, our goal was to raise awareness around campus about the importance of native biodiversity and the responsibility we have to protect it.

II. BACKGROUND

UCLA is hardly known as being a haven for native California species and natural ecosystems. And yet, there's a space on the UCLA's densely populated campus that proves this idea wrong -- Sage Hill. While we might expect this space to be celebrated and protected, this undeveloped land is actually constantly under consideration for further campus expansion.

Last year's Biodiversity Team was interested in understanding the spaces around campus. They monitored different areas of manicured and un-manicured regions on campus, and analyzed the presence of different flora and fauna within those regions. The manicured regions included Bruin Walk, Sculpture Garden, and Dickson Court and the un-manicured regions included Stone Creek Canyon, Sage Hill, and the Botanical Gardens. The team analyzed the species richness of birds, insects, and plants. This year, the program coordinators directed our team towards Sage Hill. Our stakeholder, Tom Gillespie, has guided us in developing our research, while navigating through restrictions and regulations about the space's use. Keeping last year's efforts in mind, we hoped to gather data about the biodiversity in this space.

Several studies have looked at the importance of native natural areas in urban environments and different restorative practices. A review conducted in 2015 aimed to clearly define the benefits of urban green space (Hunter and Luck 2015). Another study done in 2015 examined the effect of urbanization on species richness, specialization, mobility in vascular plants, birds, and butterflies (Cocepción et al. 2015). This study found that there were many negative impacts urbanization had on species diversity. Another study we looked at analyzed different species diversity of plant and arthropods and their effect on restoring a recently fire-impacted area (Gardner et al. 2009).

These works show the importance of considering green spaces in urban development and the possibilities of restoring an ecosystem.

In addition to these past studies, college campuses across the nation provided great examples of campus biodiversity standards that our team could strive for. Ithaca college in New York has preserved 560 acres of undeveloped land, by sharing the responsibilities of maintenance (Zadrozny et al. 2011). Duke University has started several restoration projects that aim to improve biodiversity with reductions in soil erosion and improvements in natural streamflow (Duke Today). The University of California Merced has conserved its vernal pools while also educating its student-population through teaching and public service. Lastly, the University of California Santa Barbara is a great example of community outreach with its K-12 programs and public service ("Santa Barbara Restoration…"). These programs aim to bring attention to invasive species. Our team has drawn on these different sources to create goals to study and improve biodiversity on the UCLA campus.

Planning Stages

The process for deciding how to design our research project, and what objectives we wanted to achieve throughout the process, was a conversation that ranged in scale from our individual member goals to our team goals. We reviewed articles on past biodiversity experiments, and chose to focus our efforts on gathering data about the ecological relationships between different native California plant compositions and treatment conditions. Once we had decided on this focus, our individual and group goals became more specific. Individually, we had goals of learning how to design and implement an ecological experiment and censuses, and analyze the data. As a team, we wanted to be able to produce a set of recommendations for UCLA about

what kinds of compositions and treatments are most favorable to ecological diversity and health on Sage Hill, so that the university could use these recommendations in its redevelopment plans for the site. These recommendations would not only be based on our research and census results, but also on student surveys. Our goal was not only to provide relevant scientific data in our recommendations, but also insight about how Sage Hill might be incorporated into the campus, and what functions it could serve for the student body.

III. EFFECTS OF SELECTIVE PLANTING AND INVASIVE PLANT MANAGEMENT ON ECOSYSTEM FUNCTION

The experimental area where we conducted our research was located on the southwest border of Sage Hill, an open area that is exposed to direct sunlight for most of the day and is covered in non-native grasses. The area has a slope in the middle of it, which was not conducive to planting, and which naturally separated our plots into upper and lower sections.

Using a one-meter^2 quadrant, we sectioned off the area into 72 plots. From these we utilized a checkerboard pattern to choose 36 experimental plots. Plots with irregular topography or foreign objects were discounted. We had two treatments for each plot: testing the effect of 1. different assemblages of plants and 2. invasive plant management upon plant growth and survivorship, soil health, and invertebrate community.

To test the effect of different assemblages of plants, we came up with three different conditions. The first two conditions consisted of different groupings of California native plants. The first grouping consisted of three Californian native sages, *Artemisia californica* (California sage), *Salvia mellifera* (Black sage) and *Salvia apiana* (White sage). The second grouping consisted of

a California native mix: *Encelia californica* (Bush sunflower), *Mimulus aurantiacus* (Monkey-flower), *Trichostema lanatum* (Woolly blue curls), and another *Artemsia californica*. The third condition was our control condition, and on these plots no plants were planted.

The second treatment, invasive plant management, had two conditions: either weeding the plot of all existing invasive plants or leaving the plot as is prior to planting, (control).

We randomly assigned each plot one of the six treatment variations and included 3 replicates of each treatment type.

METHODS

PLANT MEASUREMENTS

Our plant measurements included plant survivorship and stem growth. We measured plant height, in centimeters, and made note of survivorship every week throughout the 10 week duration of our experiment.

SOIL MEASUREMENTS

Our team took pre- and post- experiment samples of soil at 0 cm depth and 15 cm depth. We then weighed the samples before and after drying them in an oven and used the difference in these weights to calculate the total soil water percentage for each plot.

INVERTEBRATE MEASUREMENTS

To gauge the effects of our plant and invasive plant management treatments on the invertebrate community, our team took pre- and post- experiment measurements of species richness within

each plot. We used a pitfall trap placed into the center of each plot left for one day and analyzed the contents based on morphospecies characteristics.

STATISTICAL ANALYSIS

We ran two-tailed, two-sampled t-tests using JMP 12.

RESULTS

SOIL MOISTURE

We found no difference in soil moisture between plots in our preliminary samples ($P>0.050$). However, after the implementation of our experiment, we found that there was a difference in soil moisture between the weeded and the non-weeded plots (Figure E, $P<0.001$). We did not find a significant difference between plant compositions ($P>0.050$).

INVERTEBRATE COMMUNITY

Although we did not find a difference in invertebrate species richness or abundance between the weeding treatments or the plant compositions, we did find a difference in species richness before and after implementing our experiment (Figure G, $P=0.003$). We also observed a change in community composition.

PLANT SURVIVAL AND GROWTH

We found a difference in native plant growth between the weeded and non-weeded plots (Figure F, $P=0.003$). We also found a difference in plant survival with weeding ($P=0.042$), especially in *A. californica* ($P=0.019$).

DISCUSSION

Across all levels of the ecosystem, we found that there was no difference between soil moisture, invertebrate species richness, invertebrate abundance, plant growth, or plant survival as a result of the native plant assemblage. This may be a result of the shorter time span of this experiment, as plants may not have had time to interact with one another as mature adults. However, this may also suggest that there is no difference in planting these particular species that we have chosen. More studies should investigate the relationship between these individual species, but for now we might think that the kinds of natives we plant will not affect the ecosystem. Rather, we found that removing non-natives had a very big impact on the ecosystem.

PLANT SURVIVAL AND GROWTH

We found that native plant growth and survival increased with non-native removal. We would expect that with a decrease in competition, we would find taller and more robust plants (Dalley et al. 2006). Moreover, we found that *A. californica* was the most impacted by weeding, as survivorship drastically increased in weeded plots. This species is often planted on Sage Hill and it would be important in the future to consider this result when planting.

SOIL MOISTURE

Because we were not able to find a difference in soil moisture between plots in our preliminary soil samples, we can assume that the differences we later see are a result of our experiment. With weed removal, we found higher levels of soil moisture. This is to be expected, as there are fewer plants in the weeded plots using the water (Dalley et al. 2006). However, this may also be a result of removing invasive plant species whose life histories strategize using water much faster than natives (Radford et al. 2000). The availability of this excess water in plots with invasive

plant management has the potential the support a new and more sustainable community of natives.

INVERTEBRATE COMMUNITY

We observed no relationship between weeding or plant assemblage with invertebrate abundance or richness. This could have been a result of the relatively small space that we were conducting our research and the distance between treatments that could have been easily traversed by an insect. However, we did observe a change in the community composition before and after the experiment. This may be a seasonal effect as we observed the metamorphosis of the ladybug and the increase in bees with the seasonal bloom. However, we also noticed an increase in the California native Jerusalem cricket and a decrease in the non-native earwig. This increase in species who are known to support plant growth and increase soil aeration may suggest that an increase in native plant species is beneficial for the native fauna (Bassett et al. 2012). Ultimately, invertebrates are often the food source for many higher levels of the ecosystem. Future studies could continue this research on longer scales and through higher trophic levels.

IV. SAGE HILL CENSUS

In order to gain a more comprehensive understanding of the systems we are working with, we decided to conduct a census of Sage Hill's biodiversity. We collaborated with Marina Lindsay and Jesse Garcia from the Grand Challenges project to get a record of reptile and amphibian populations, as well as Tom Gillespie's forest ecosystem class to record bird and mammal species. The grand challenges team, Marina Lindsay and Jesse Garcia operated their research by setting up cover boards in various sections of Sage Hill and systematically recording species

their locations. The mammal team set up camera traps to capture images of native animals such as wood rats and ground squirrels. We also analyzed invertebrate populations using pitfall traps, although this was less about specific species, and more about morphology, behavior, and species richness of the overall changing population. The mammal and bird groups have used the information they gathered to create pamphlets featuring local wildlife for educational and outreach purposes. We are still in the process of this data collection and we hope to use this data as a reference for future restoration efforts on Sage Hill.

V. SAGE HILL SIGNAGE

Our outreach also consisted of the creation of different types of signage that's to be displayed on Sage Hill. The goal of the designed Signage was to educate the general student body as well as UCLA faculty on the ecosystem of Sage Hill, as well as the many different species that inhabit it. Initially, the idea was to make one large sign that incorporated detailed information about different species and environmental factors. We then decided that the most impactful way of teaching the public was to make 4 different species signs consisting of information on Mammals, Plants, Reptiles, and Birds. Alongside this sign, we designed an additional sign that displays basic information on the regulations of Sage Hill. Our Sign of Native Mammals displays information on the Wood Rat, Ground squirrel, Coyote, and Opossum. Next, our sign of Native Herpetofauna consists of the California Slender Salamander, Ground Skink, Western Fence Lizard, and the Side Blotched Lizard. After that we used the Allen's Hummingbird, Red Tail Hawk, Spotted Towhee, Flycatcher, and Western Scrub Jay for the Native Birds sign. Lastly, we incorporated the Coastal Live Oak, Sunflower, California Sycamore, Yucca, Laurel sumac, and

Coastal Sage for our plant signage. Each sign includes an image of the species, the common name, the scientific name, as well as a basic description on the background of each category. The main sign of Sage Hill regulations consists of opening and closing hours, notification that restoration is in process, and a directory of the entrance of Sage Hill. We also worked alongside Dr. Gillespie's Forest Ecosystems Class who aided in the production of these signs. Different groups in Dr. Gillespie's class were assigned different parts of signage in which they were to look for and identify the different species to be put on the signs. Working with the students to produce these signs was highly rewarding, since we saw the students become involved in an important movement to preserve UCLA's last native ecosystem.

Members of the Biodiversity team alongside Dr. Gillespie went on to present the findings as well as the Signage Templates to the Sage Hill Task Force, in which we made sure that the signage is aligned with UCLA requirements. The discussion of signage on Sage Hill to inform the public of its presence went well. Members of the Sage Hill Task Force have kindly offered to help polish our signs with proofing before we produce them. The signage is currently in development and the plan is to have solid signage by Fall of 2016.

The challenges that we encountered when designing the signage was using maneuvering around the signage regulations provided by the Sage Hill Task force. There were extremely specific requirements for signage such as font, color, size, and content, so that was definitely an obstacle. We wanted to make sure we knew all of the requirements before proceeding with the designs. We requested an overview from the Sage Hill Task force and the Architect of UCLA, in which they describe all the requirements necessary in creating proper signage. Once we got ahold of this overview, we were able to begin the designs and start inputting content. Another issue was

getting ahold of everyone in the Forest ecosystems team since everyone has such busy schedules. It was difficult to set aside time to discuss the designs and have everyone be incorporated in the creations. Through the use of the App "Groupme", we were able to get ahold of the Forest Ecosystems Signage Team and discuss their involvement with the project. It made it much more easy to contact and have everyone be a part of the process. Overall, once we were aware of the requirements, it was easy to create readable signage that served the purpose of informing visitors.

VI. ECOSYSTEM AND POLLINATOR LESSON: KRIEGER DAYCARE CENTER

METHODS

Another aspect of the outreach part of our project was collaborating with the Krieger Child Care Center to teach the children about California native ecosystems and pollinators. After deciding that we wanted to help educate the children at Krieger about the ecosystem in their backyard, Sage Hill, we began this project by contacting Moises Roman, the director of the center. After meeting with him and establishing that we had a mutual interest in doing a program together, he put us in contact with Cynthia and Saira, the teachers of the penguin class, which consists of four- and five-year-old children. After having two meetings with Cynthia, we formulated a lesson plan, focusing on California native ecosystems, including the flora and fauna of these ecosystems, as well as on pollinators and their roles in ecosystems as well as food production. We focused our discussion about pollinators on the monarch butterfly, an endangered species of butterfly commonly found in California. On the day we came in to give our lesson, we split up the children into three groups of 6-8. Four members of our team acted as teachers, and either individually or in pairs gave our lesson to small groups of children using printouts of powerpoint

slides as well as plants as props. Once we finished the lesson on California ecosystems and pollinators, we rotated the groups between three stations with different activities at each station. Each of the stations involved an interactive activity with the kids. One of the activities was designed to teach children about the life cycles of monarch butterflies. At this station, two members of our team explained the life cycle of monarch butterflies to the children and then had them do a coloring activity in which they colored in a printout of the monarch butterfly life cycle. The second activity was a station where another team member attempted to engage the children in a discussion on why monarch butterflies are endangered, and what we can do to help them. At this station, we also explained the migration patterns of monarch butterflies and tried to get the kids to think critically about how people can affect animals. At our final station, we moved the caterpillars from their temporary holding cups onto milkweed plants within large butterfly cages. As we did this, we had the children articulate their predictions for the caterpillars and write them down in their science journals. Originally, we had planned to return and do a second lesson and release the butterflies with Krieger once the caterpillars completed their metamorphosis. However, all of our caterpillars unfortunately perished before forming chrysalises, possibly the result of a highly contagious virus that caterpillars raised in captivity are prone to. Despite the untimely death of the caterpillars, we are still going forward with our second lesson, which is currently scheduled for June 7th. Our second lesson will focus on involving the children with the ongoing restoration process on Sage Hill, as we will be planting various native flowering plants with the kids. This will still tie in with our previous lesson on pollinators, as we will explain that the flowers produce by the plants will provide habitat for native pollinators.

RESULTS

By teaching young kids about California native ecosystems and pollinators, we helped get them connected with the natural world around them. Additionally, we have helped raise community awareness and involvement with Sage Hill by getting the Krieger Child Care Center involved. We are hoping that by getting the community more involved with Sage Hill, more groups will have a vested interest in preserving and restoring Sage Hill. We also all got experience with best methods in planning and teaching sustainability-focused lesson plans to a class of young children. The lesson plans we formulated could be worked with and improved upon in order to continue working with the Krieger Child Care Center.

During our project with the Krieger Child Care Center, our main difficulties stemmed from the inability of the four- and five-year-old children to focus as well as the deaths of all of our caterpillars. We did our best to keep the kids engaged during our short presentations and activities by making them as interactive as possible, but they still got distracted, especially during the less interactive parts of our lessons. Our main challenge, however, was having to change our plans in response to the the deaths of our caterpillars. About one week after our first lesson, we went back to the Krieger Child Care Center in order to provide care for the caterpillars after receiving a concerned email from Cynthia. Upon inspecting all of the caterpillars, we realized that they had all died, and decided to remove the caterpillars and their cages from the classroom. After some research and examination of our dead caterpillars, we learned that the caterpillars were most likely infected by nuclear polyhedrosis virus, or NPV. This is a virus that is commonly referred to as “Black Death,” and leads to caterpillars turning black and liquefying. It is a highly contagious disease, and most likely spread throughout our

caterpillars. Due to this unfortunate turn of events, we were forced to reformulate our lesson plan for the second lesson. Originally, we had planned on releasing the butterflies and planting milkweed with the children so that they could help provide their newly hatched butterflies with habitat. However, with the death of our caterpillars, we decided to shift our focus from monarch butterflies and milkweed plants to ecosystem restoration and pollinators as a whole. We went to various native nurseries and purchased a variety of native flowering plants instead of milkweed plants, and went back to the Krieger Child Care Center and planted these plants with the children.

VII. CAMPUS SURVEY: HOW DOES THE UCLA COMMUNITY FEEL ABOUT SAGE HILL?

SURVEY

As it was our task to bring ideas about how Sage Hill could be restored and utilized, we decided to reach out to the greater student body. As students are those with the most contact to Sage Hill, their thoughts and opinions are very important in its future. We decided to design and distribute a survey to the UCLA campus community with the intention of getting a better understanding of the extent to which people were familiar with Sage Hill, and what they wanted to see done with it.

In order to produce and conduct this survey, we first looked at a similar survey that had been distributed among the campus community by last year's Biodiversity team. This survey served as a starting off point for us, and provided ideas for what kinds of questions we could ask. By consulting with Nathaniel, who worked on on the survey last year, we learned what questions worked and which ones did not, and were able to move forward in designing the new survey.

Several faculty members also contributed to the development. SAR faculty advisors Professors Cully and Maida submitted questions to us that they specifically wanted to be asked. We also consulted with survey expert Allison Kanny on the nature of the questions in order to ensure the survey's validity in measuring accurate responses. We sent her a draft of the survey and received feedback related to visual layout, phrasing of questions, the survey introduction, and general clarity.

The final survey ended up consisting of 17 questions, and includes a landing page with a picture of Sage Hill and a small introductory paragraph. Fifteen of the questions are multiple choice, and two are short answer, (Figure C). The questions ask the respondent to identify their affiliation with UCLA and how they came to hear about the survey, their knowledge of Sage Hill, satisfaction with campus biodiversity, knowledge of and interest in California native species, and what they believe the best use for the land would be.

In order to circulate the survey, we began by first sending it out to each of the biodiversity team members' community groups and then reached out through Facebook, Groupme, and campus meetings. We also sent the survey to a wide number of departmental listservs and encouraged Dr. Gillespie to send it to his faculty networks. The most effective method for distribution ended up being through tabling at Earth Day and Ecochella. We had a virtual reality headset at our table that allowed visitors to see our project for themselves with a tour of Sage Hill, and then asked them to take the survey afterwards. We gave out Sage Hill pins as incentive for those who completed the survey.

RESULTS

The survey was circulated between 5th week and 8th week, and garnered 256 responses from UCLA students, staff, and faculty. About 90% of the respondents were undergraduate students, 3.5% were graduate students, and 2.3% were faculty members, (Figure H). Responses illustrate that about 50% of respondents have heard of Sage Hill prior to taking the survey, which was a higher number than we anticipated, and indicates that Sage Hill is not an unknown asset to our campus, (Figure I). When asked about their satisfaction with campus biodiversity, 75% of respondents said they were not satisfied, or they were not sure, (Figure J). This is a particularly interesting statistic, because it illustrates that the majority of respondents, regardless of whether or not they have been to Sage Hill, feel disconnected from biodiversity and nature on campus. Furthermore, it illustrates that there is also a lack of awareness on campus about biodiversity, and what that could look like in an urban setting, which is an opportunity for education.

When asked about usage and access to Sage Hill, 65.6% of respondents thought that it should be open to the campus for both recreation and research purposes. An additional 13.7% of respondents thought it should be accessible solely for research purposes, and 15.2% thought that it should be available solely for recreational purposes. Only 3.9% of respondents thought that it should be open to development by the university, (Figure L). Faculty also responded that they would benefit from having access to Sage Hill for educational purposes, with 68.5% of faculty respondents saying yes, they would like access to Sage Hill for research or teaching purposes, (Figure M).

As is illustrated by the fact that 84% of respondents said they agreed that native habitat should be protected from development on the UCLA campus, and from the responses explained above, there is a significant consensus among the UCLA community that Sage Hill is a valuable asset as a natural area, and should be protected and restored as such, (Figure K).

VIII. CHALLENGES

Though we have faced many challenges this year, we have ultimately been able to find ways to overcome our obstacles. When we first set out on trying to create a project on Sage Hill, our team was a bit overwhelmed by what could be done and how we could achieve our goals. We started the quarter off with a general literature review to see past restoration projects that have dealt with coastal sage brush or urban greenspaces. Finding similar projects to ours combined with the suggestions of experienced faculty gave us the basis we needed to come up with a concrete plan.

Once we imagined our experimental design, we struggled in finding local nurseries that were explicit with their inventory and were still selling our desired species for the season. After a couple weeks of emails and calls, we were able to get in contact with the Grow Native Nursery at Rancho Santa Ana. For our upcoming planting days, we plan on returning to Grow Native for our purchases.

We also struggled with coordinating the busy schedules of our six different members. In some of the busiest weeks it was hard to find times when we could get the full people-power of our large team. In the spring, we immediately compiled our schedules. Moreover, each team member in the spring led his or her own mini-project, giving them a more hands-on experience.

IX. CONCLUSION

In the last two quarters, our team conducted restoration research, began applying those results, and started outreach programs to increase awareness about Sage Hill and campus biodiversity. We were able to reach out to students and faculty across the campus to involve them in this process, resulting in a more interdisciplinary project. We also presented our research at UCLA Poster Day and AAAS Pacific Division Conference in San Diego.

With the results from our restoration research, we presented our findings for the Sage Hill Task Force, a faculty committee concerned with the future development plans and usage of Sage Hill. We recommended future studies and future restoration methods. Specifically, we suggest that future teams conduct longer studies, look at higher trophic levels, and use different assemblages of native plants. We also suggest that future teams could look at Stone Canyon Creek on the north side of campus near the Anderson School of Management. This area is a riparian ecosystem and could present another opportunity for ecosystem restoration. In terms of our campus survey, we found that students are very interested in native biodiversity and the availability of green spaces like Sage Hill on the UCLA campus. We suggest that future teams work with facilities and other faculty to ensure the protection and future access to these spaces.

X. APPENDIX

Figure A. Informative Signage for Sage Hill (Vegetation)

Figure B. Informative Signage for Sage Hill (Birds)

Figure C. Survey

Sage Hill Survey

This survey will take no longer than 3 minutes to complete. All answers are anonymous.

Sage Hill is a four-acre plot of land behind Hitch Suites that is currently undeveloped. It is a hilly area, with an assortment of grass cover, shrubbery, and trees. Sage Hill used to be a well-established coastal sage scrub ecosystem. You can see what some of the current vegetation looks like in the image below.

Sage Hill is valuable real estate, so UCLA is trying to figure out what to do with it.

We want to know how you would like to see the land be used. Tell us what you think!

Northwest corner of Sage Hill

NEXT

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Sage Hill Survey

* Required

What is your affiliation with UCLA? *

- ○ Undergraduate student
- ○ Graduate Student
- ○ Faculty
- ○ Staff
- ○ Other :

How did you hear about this survey? *

- ○ In person at Earth Day
- ○ In person at Ecochella
- ○ UCLA Listserv
- ○ Other :

If you heard about this survey from a Listserv, which one was it?

Your answer

Before today, had you ever heard of Sage Hill? *

- ○ Yes
- ○ No

Have you ever been to Sage Hill? *

- Yes
- No

Do you know anyone that has ever been to Sage Hill? *

- Yes
- No

If you answered yes to either of the above, what was the purpose for the visit?

- Education
- Enjoying Nature (i.e. walking, bird watching)
- Solitude
- "Recreational" Activities
- Other :

Are you satisfied with the amount of biodiversity (the plants and animals) you see on campus? *

- Yes
- No
- Not sure

Why or why not? *

Your answer

How important is it to you to have California native plant and animal species on the UCLA campus? *

- Not important
- Somewhat unimportant
- Neutral
- Somewhat important
- Very important

Could you name one or more types of native California plants? *

- Yes
- No

Would you be interested in learning about the ecosystem and biodiversity on Sage Hill? *

- Yes
- No
- Maybe

If you answered yes, would you be interested in taking a tour of Sage Hill? *

- Yes
- No

What do you believe is the best use for a 4-acre piece of land on campus? *

- Reserved for student research and education
- Open to all students for recreation and other activities
- Mixed use (open for student research and recreation)
- Development for campus use (i.e. student housing)
- Other :

For Faculty: If Sage Hill was available for research or teaching, would you use it?

- Yes
- No

How important are native habitats such as Sage Hill to your experience here at UCLA? *

- Not important
- Somewhat unimportant
- Neutral
- Somewhat important
- Very important

To what extent do you agree with the following statement: I believe that native habitat should be protected from development on the UCLA campus. *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

BACK SUBMIT

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Figure D. Students at Krieger Daycare Center learning about the monarch butterfly life history.

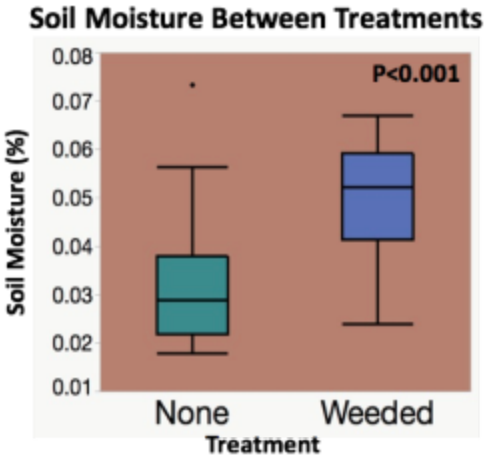

Figure E. Difference between soil moisture with weeding treatments (P<0.001).

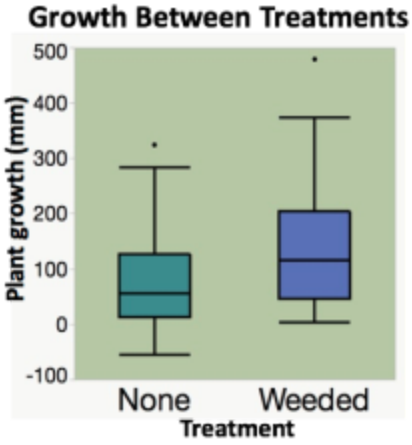

Figure F. Difference in growth in plants between weeding treatments (P=0.003).

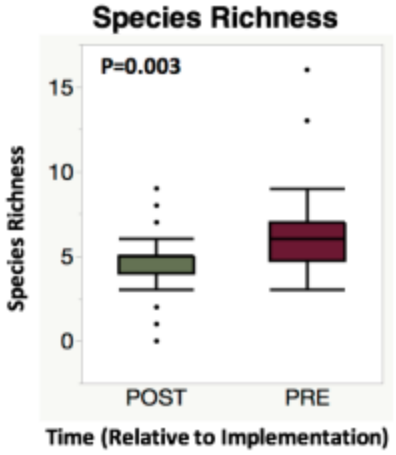

Figure G. Difference in invertebrate species richness before and after experiment (P=0.003).

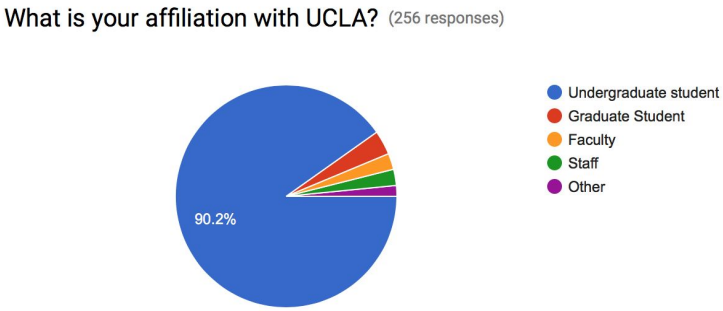

Figure H.

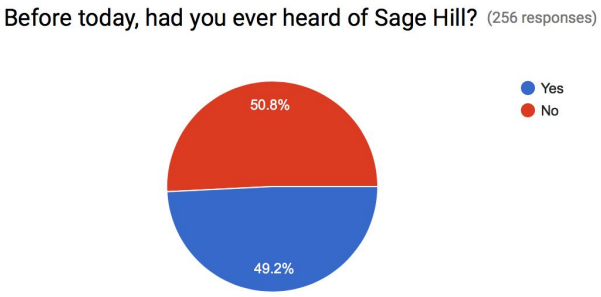

Figure I.

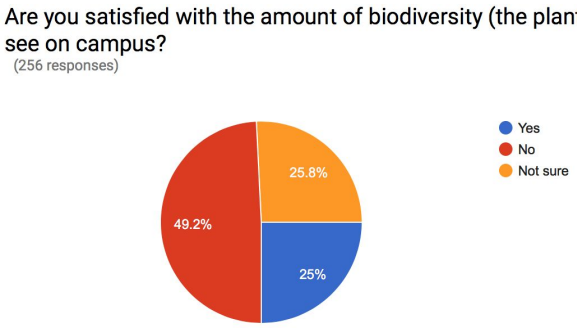

Figure J.

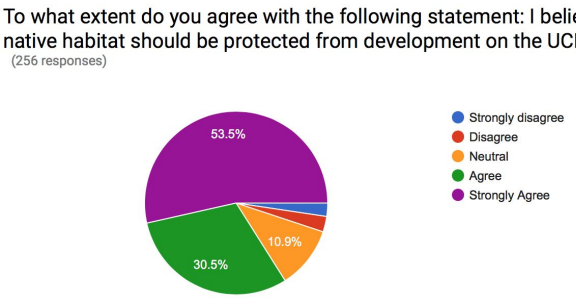

Figure K.

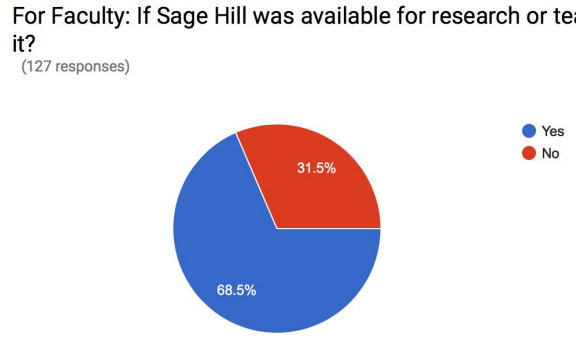

Figure L.

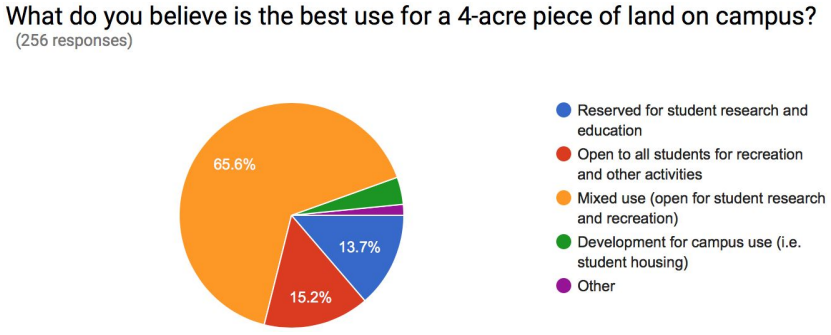

Figure M.

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