

Native Plant Nursery Plan

2022

Abstract

Native plants are plants that have evolved in the specific region or ecosystem that they naturally occur in. As the ecological basis for other native insects, birds, and mammals, native plants constitute a large contributor to California's diversity. Potential benefits of native plants include reduced irrigation, increased soil health, biodiversity restoration, and incorporation of indigenous voices. On the University of California, Los Angeles (UCLA) campus, sustainability goals of 100% local water by 2050 and cutting potable water use by 36% by 2025 would be significantly supported by more resilient landscaping. While previous native plant initiatives on campus focus on planting efforts, our goal is to provide UCLA with its own store of native plants by establishing a native plant nursery. Our project research question is, What is the process for establishing and maintaining a native plant nursery on campus? To address this, our two primary variables of study include (1) interviews and (2) a plant growth experiment. Our primary findings include two potential sites for the nursery, a recommended nursery setup, and a joint staff and student maintenance plan, as well as recommendations for incorporating equity, diversity, and inclusion (EDI) and educational programs.

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SAR NURSERY
2022

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Introduction

California's Mediterranean environment makes it a hotspot for diversity, boasting more species of plants and animals than any other state. However, urbanization over the past century, including conversion of land to farmland, residential areas, and commercial properties, have led to a human-dominated landscape that no longer promotes the balanced ecosystems that California's residents and economy depend on.

Native plants are plants that have evolved in the specific region or ecosystem that they naturally occur in. As the ecological basis for other native insects, birds, and mammals, native plants constitute a large contributor to California's diversity (Audubon, n.d.). While threats to native plants include primarily predation from invasive animals and competition from invasive plants in natural landscapes, in urban landscapes, their absence is largely due to a lack of planting. California's urban and residential areas boast acres of manicured lawns and nonnative ornamental plants. Not only do these plants prevent landscapes from attaining their potential biodiversity, they are not well-suited to California's landscape and require excess irrigation and fertilization. Native plant restoration in urban landscapes aids in water conservation, increased biodiversity, and urban cooling, working towards the environmental goals of sustainability.

In restoring natural landscapes, the prioritization of Indigenous voices addresses another facet of sustainability – equity, diversity, and inclusion (EDI). From native plants, we can learn about the sacredness, beauty, and history of California's wildlife, and from their Indigenous stewards, we can obtain the knowledge and skills needed to secure a more sustainable future for all inhabitants of this land through native plant cultivation (Jewell, 2017).

On the University of California, Los Angeles (UCLA) campus, sustainability goals of 100% local water by 2050 and cutting potable water use by 36% by 2025 would be significantly supported by more resilient landscaping (Gold et al., 2015). This leads into the premise of our project – the establishment of a native plant nursery at UCLA. While previous SAR initiatives, like the 2010 Native and Drought Tolerant Plants Team and the 2017 Sage Hill Biodiversity Restoration team focused on planting efforts, our goal is to provide UCLA with its own store of native plants by providing a plan that includes what the native plant nursery will look like and succession planning (Bernet et al., 2010; Hossain et al., 2017). Our project research question is, What is the process for establishing and maintaining a native plant nursery on campus? To address this, our two primary variables of study include (1) interviews and (2) a plant growth experiment.

Audubon. (n. d.). *Why native plants matter*.

Bernet, R., Tsou, S., Chan, B., Dunham, S., & Huang, S. (2010). Native and Drought Tolerant Plants. *Sustainability Action Research*.

Hossain, A., Liu, J., Adachi, J., Patel, K., Kirsch, P., Wu, T., & Catangay, V. (2017). Biodiversity Restoration: Giving Sage Hill a Physical, Educational, and Digital Presence. *Sustainability Action Research*.

Gold, M., Rauser, C., Herzog, M., & Lueders, J. (2015). Sustainable LA grand challenge five-year work plan. University of California.

Jewell, J. (2017, November 9). Indigenous plantsman Nick Hummingbird: How plants teach US place, history, respect. *Cultivating Place*.



Methodology

Informational Interviews

We conducted informational interviews throughout Winter 2022 with the aim of broadening our knowledge in the propagation, gardening, and ecology of native plants. We also aimed to probe into the development history and challenges encountered by more mature native plant nurseries. We then continued conducting interviews throughout Spring 2022 with the intent of determining UCLA-specific recommendations and administrative procedures. Throughout both quarters, we placed special emphasis on outreach to indigenous experts on how best to take care of our plants as well as incorporate equity, diversity, and inclusion (EDI) into our suggestions. A list of interviewees are available in Appendix A.

Interviews were primarily conducted online using a semi-structured format, such that we posed ‘key questions’ relating directly to our nursery proposal but also allowed for flexibility should the interviewees prefer to extend the scope to include other topics. It was important to account for the bias generated by the background and likely priorities of each interviewee. For example, the Theodore Payne Foundation Director may prioritize wholestarter plants because their production is the Foundation’s specialization, whereas Professor Allison Lipman of the UCLA Ecology and Evolutionary Biology (EEB) Department may prioritize using seeds and local variants to achieve biodiversity.

Plant Growth Trial

Throughout Winter 2022, we focused on collecting a list of potential native plants, confirming methods for monitoring them, collecting measurements of our trial site, and searching for materials that we required for the trial. We began our preparations for our plant trial by requesting a list of possible native plants from the Facilities Management team that they thought would be suitable to thrive in UCLA’s environment. The plants included in the list were the Coffee berry (*Frangula californica*), Cleveland sage (*Salvia clevelandii*), Pacific wax myrtle (*Myrica californica*), Lemonade berry (*Rhus integrifolia*), and California lilacs (*Ceanothus*). From here, our initial list was adjusted based on the feedback we received from other outside resources such as our informational interviews. For example, after our interview with Evan Meyer, we decided to add the Narrowleaf milkweed (*Asclepias fascicularis*) and the California poppy (*Eschscholzia californica*) onto our list. We were also advised by Dr. Lipman to select for species native to Los Angeles, and she suggested the Purple sage (*Salvia leucophylla*), an LA native, instead of *Salvia clevelandii*, a San Diego native. Finally, the team was able to narrow down the list enough to a number of native plants that would be able to provide the best results taking into account all the factors previously mentioned. This allowed us to visit the Theodore Payne Foundation to acquire our plant seeds based on availability. We ultimately acquired the following:

- Purple Sage (*Salvia leucophylla*)
- Black Sage (*Salvia mellifera*)
- Narrowleaf Milkweed (*Asclepias fascicularis*)
- California Poppy (*Eschscholzia californica*)

We planted a pinch of each plants’ seeds in four 3 by 2 cell starter trays, for a total of six cells per plant. We also used soil purchased from the Theodore Payne Foundation. The plants were located at the Sunset Canyon Recreation Center in a greenhouse at the Jane B. Semel Healthy Campus Initiative (HCI) community garden. The plants were watered weekly and as needed, and plant height observations were recorded every other day for the tallest plant. Plant growth trial data were recorded on a Google Spreadsheet and included the height of the tallest plant per cell, temperature, weather, and soil conditions, and watering schedule.

Images



Purple Sage (Image: Calscape)



Black Sage (Image: Calscape)



Narrowleaf Milkweed (Image: Calscape)



California Poppy (Image: Calscape)



Jane B. Semel Community Garden



Plant Growth Trial Greenhouse

Results

Informational Interviews

Interviews with selected stakeholders, experts and leaders in native plant cultivation facilities and others provided answers to several critical questions pertaining to the species of native plants that are compatible and suitable for growth in the nursery, the decision to use seeds or cuttings in setting up the nursery, the best practices to adopt, potential locations for the nursery, and ideas for programming that meaningfully integrated EDI values. A total of 11 interviews were conducted. For brevity's sake we have highlighted **six key interviews and their insights**, that serve to highlight guiding practices for establishing the first edition of the nursery, as well as potential pathways for future expansion. More detailed versions of these six interviews are in Appendix B.

General Nursery and Plant Growth Advice



Evan Meyer
Theodore Payne Foundation Executive Director

Our goals in interviewing Evan Meyer were to discuss recommendations for developing a nursery, maintenance and resource requirements, and indigenous cultivation practices. As this was one of our first interviews, his input was very helpful in understanding the basic tips we needed to know before growing plants in our plant growth trial. We applied many of the following tips in our plant growth trial.

During the process of plant propagation, Evan recommended growing the plants from seeds in liners (2-inch cells/plots) when conducting plant trials, before bumping them up to using larger pots as this is more cost-effective. He proposed beginning trials with the California poppy and Narrowleaf milkweed as both are fast-growing annual plants. He also suggested integrating several maintenance 'best practices', such as a light shade cloth to provide filtered sunlight to plants, and preemptively setting up protective measures against pests and animals that may consume the plants. Evan also shared several indigenous plant expert contacts we could reach out to to facilitate the incorporation of indigenous cultivation expertise in nursery planning, such as the American Indian Studies Center and Chia Cafe.



Dr. Alison Lipman
UCLA Ecology & Evolutionary Biology Department Faculty Member

Our goals in interviewing Dr. Alison Lipman were to obtain information about propagating plants and suggestions for our nursery from an ecological perspective. This interview provided our team with more guidance on how to design our plant growth trial, including the emphasis on seeds and plant species native to the Los Angeles region.

Dr. Lipman suggested establishing irrigation and sterilization protocols during maintenance, and strongly encouraged the use of locally sourced seeds as many nurseries obtain seeds from wholesale sellers, the latter of which are not necessarily appropriate or adapted to Los Angeles climate conditions. Moreover, she recommended using seeds over cuttings as seeds are able to increase plant diversity (while cuttings are genetically identical to their parent plants). Dr. Lipman similarly encouraged integration of protective measures, such as using cages or having plants lifted up and off the ground. One avenue for sourcing seeds naturally would be student-organized collection of seeds from existing conservation projects, such as on Sage Hill. However, she cautioned that organic seed collection exercises would also require the drying and processing of the seeds before they can be stored.



Andrea Salazar
UC Berkeley Indigenous Community Learning Garden, Founding Member

Our goals in interviewing Andrea Salazar, a transfer undergraduate student involved in UC Berkeley's Indigenous Community Learning Garden (ICLG), were to learn about how their Garden incorporates indigenous cultivation practices and how we could do the same for our nursery. Andrea is the current lead in organizing activities related to the Garden.

As the ICLG is a student-led garden project, its considerations and challenges would be dissimilar from the UCLA native plant nursery. Andrea shared about multiple programming options that integrated indigenous cultivation principles, such as checking with the Native American Department on campus for plant selection and propagation method suggestions. Andrea also proposed adopting a more fluid and experimental approach to programming, such as allowing students to harvest and consume the plants and allowing professors to organize ecology and other related classes in the garden.



Dr. James Bassett
UCLA Institute of Environment & Sustainability, Faculty Member and Master Gardener

Our goal for this interview with Dr. James Bassett was to have another professional perspective to help us navigate through the many possibilities of the nursery's purpose, design, and outlook.

James recommended using cuttings over seeds as the genetic diversity of seeds are less able to account for how 'local' or well-adapted the plants will be to the Los Angeles climate. He proposed using plants such as Showy milkweed and Yucca, in addition to recommending using companion planting-type planning that allows for different species of native plants to grow together and form an ecosystem.

Campus-Specific Location Recommendations



Bonny Bentzin
Deputy Chief Sustainability Officer at UCLA

Bonny Bentzin suggested a location near the Chancellor's Residence as a potential location for the new nursery. The space is located west of the Chancellor's residence, specifically the Chancellor's propagation garden, which is fenced. Bonny pointed out that the location had the benefit of being isolated from the rest of campus, allowing for control of who accesses the nursery. Bonny's vision for the nursery is to have the space terraced and leveled for tables on which native plants would be grown in pots. A recommendation is to select a few native plant species to focus on properly managing their growth. Other features of the nursery include an automated drip irrigation system, storage space, and sections with shade protection. Bonny also proposed an initial outline of a trading system that involves partnering with neighboring organizations, specializing in growing certain native plants best suited for each location, and trading plants based on a value system among the different organizations.

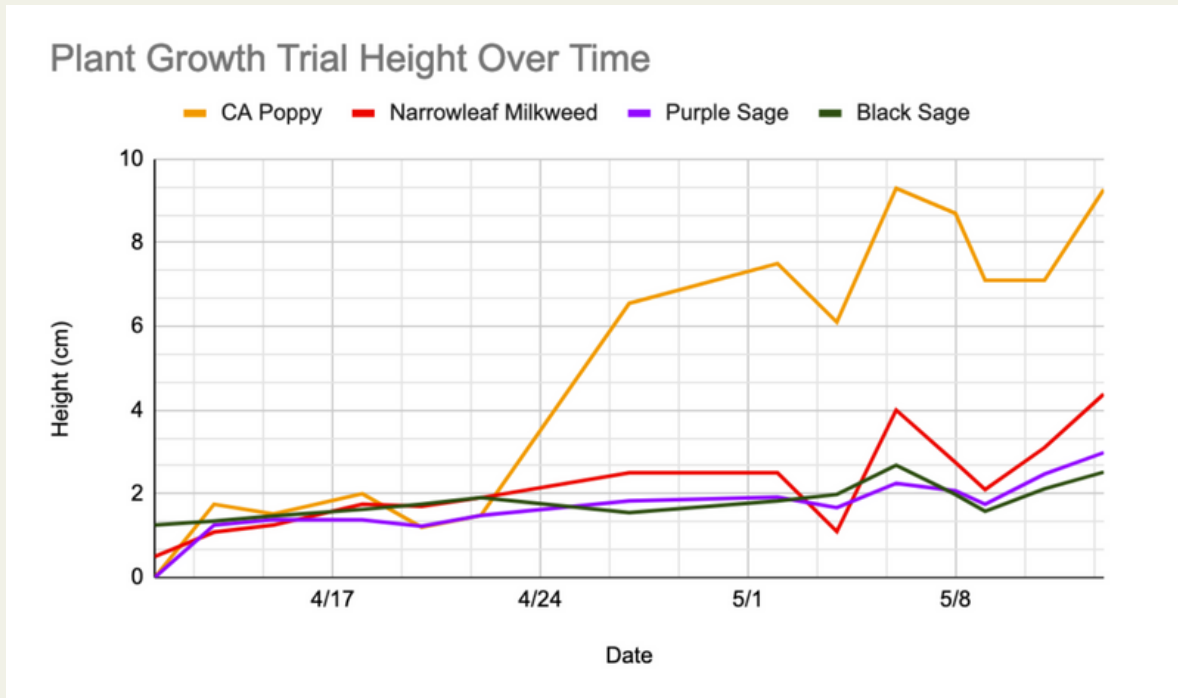


Cully Nordby
Associate Director of the UCLA Institute of the Environment and Sustainability (IoES)

The goal of this interview with Cully Nordby was to determine if there was another location for transplanting our plants from our plant growth trial. Cully mentioned that a space south of Sage Hill was being looked into for a nursery location, but that it was affiliated with UCLA Housing instead of Facilities Management. As Sage Hill promotes student engagement and undergraduate research, Cully was open to having plants from our plant growth trial be moved to this location. However, she advised to check with the interests of Facilities Management for usage of the native plants and getting permission before doing so. Ultimately, this location is an option for holding native plants when Facilities Management does not have a location ready for transplanting native plants.

Results

Plant Growth Trial



Here, we used our plant growth trial data to create a line graph depicting change in plant height over time. We took the average of all the cells per plant per observation date and tracked the height in centimeters over time. Photos of our plant growth trial depict the plant growth over the duration of our trial and are found in Appendix C.

We drew several conclusions from this graph, the first being that our data corroborated our informational interview data in that native plants grow best in the spring with accelerated growth in the summer. We noticed a steady uptick in growth as the weather got warmer, with the California poppy growing the fastest and most drastically. Another finding was that all our specimens grew from seed. This was to be expected as we hand-selected species that we thought would propagate well from seeds, as opposed to cuttings. Additionally, some fluctuations in the data could have been due to the fact that some plants died and some cells did not have seeds that sprouted. As we measured the tallest plant per cell, this could have led to discrepancies in the data since the tallest plant was not always the same plant each time we collected observations.

Regarding plant performance, the California poppy showed the most rapid growth in the latter half of the trial. In the early stages of the trial, the poppy did not show much progress in many of the cells and had more empty cells than the other three species. The plants that displayed the most consistent growth were the narrowleaf milkweed and the purple sage. For both species, they had numerous sprouts in almost all of the six cells throughout the trial period that stood upright and had the least number of wilting sprouts. The black sage followed a similar pattern, but with a noticeably fewer number of sprouts. Leaves for the narrowleaf milkweed were the most noticeable change over the trial period. The results from our trial offer information about the growth patterns of these four species and which species tend to have successful growth.

Recommendations

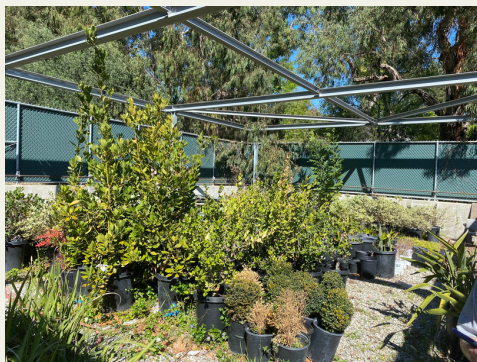
Facilities Management expressed that the nursery would be used for landscaping replacing nonnative plants on campus. There is also a need for a space to develop and hold the plants, which could be fulfilled by building a stock section within the nursery. In addition to the interests of Facilities Management for landscaping, there is mutual interest in having student involvement be a part of the nursery's utilization. This vision includes participation of student volunteers and organizations for taking care of the plants in the nursery. One proposed idea was to organize workshops related to the nursery to promote student engagement. These workshops could include making cup planters out of newspapers or measuring plant growth.

Location

Two potential nursery locations were identified: the Facilities Yard and a plot near the Chancellor's Residence. The Facilities Yard, located near the top of the Hill, currently stores extra plants waiting to be transplanted. The plot near the Chancellor's Residence is located at North Campus and is unused. Below is a comparison of each location.

Facilities Yard

- Currently houses potted plants, which would make the transition and maintenance easier.
- Developed space could be used differently.
- Limited student access due to gates requiring Facilities Management permission.



Plot near the Chancellor's Residence

- Roughly 20 feet by 90 feet for the entry space and 12 feet by 141 feet for the inland space.
- Otherwise unused space.
- Undeveloped land allows for catered designs but has administrative hoops.
- Sloped land would need to be terraced, and the fire road to the west would need to be preserved.
- Private, but greater student access.



Setup

The nursery should consist of raised pots and a canopy cover. The team considered the use of a greenhouse but decided against it due to the time commitment, clearance hurdles, and cost. Effectively, this nursery should function to raise and store seeds, cuttings, and saplings until they are ready to be transplanted on campus. To achieve this, we recommend the following components.

1. Canopy

Depending on the chosen location, a shade structure is recommended due to the light sensitivity of young plants. At the Facilities Yard, a shade structure is already provided. At the plot near the Chancellor's Residence, the area is already shaded by trees, but because the land has to be terraced, poles could concurrently be installed to support a canopy.



Channel Islands Nursery

2. Tables

These tables will raise the pots for ease of access and working. The tables should be spaced far enough apart (~4-5 feet) to accommodate walking space, wheelbarrows, and wheelchairs. Unused tables currently owned by UCLA can be reclaimed for this purpose.

3. Pots

These pots will hold the growing plants. Currently, there are numerous pots of varying sizes being stored at the Facilities Yard that can be used for this purpose. They should be cleaned and sterilized prior to use, and quality soil should be purchased.

4. Shed

An on-site shed is recommended for tool storage and seed storage and preparation.



Trinity County Nursery

5. Irrigation

Automated irrigation is recommended for both locations for ease of maintenance. At the Facilities Yard, a simple watering timer system could be set up with the one spigot available. At the plot near the Chancellor's Residence, a more complicated drip irrigation system could be set up during the leveling of the land.

6. Ramps

For both locations, ramps are recommended for accessibility. This is more pertinent for the plot near the Chancellor's Residence, where the tables will be terraced.

7. Scarecrow

In addition to the essential components of the nursery, our team also recommends the installation of a scarecrow or windchimes to prevent herbivory.

8. Camera

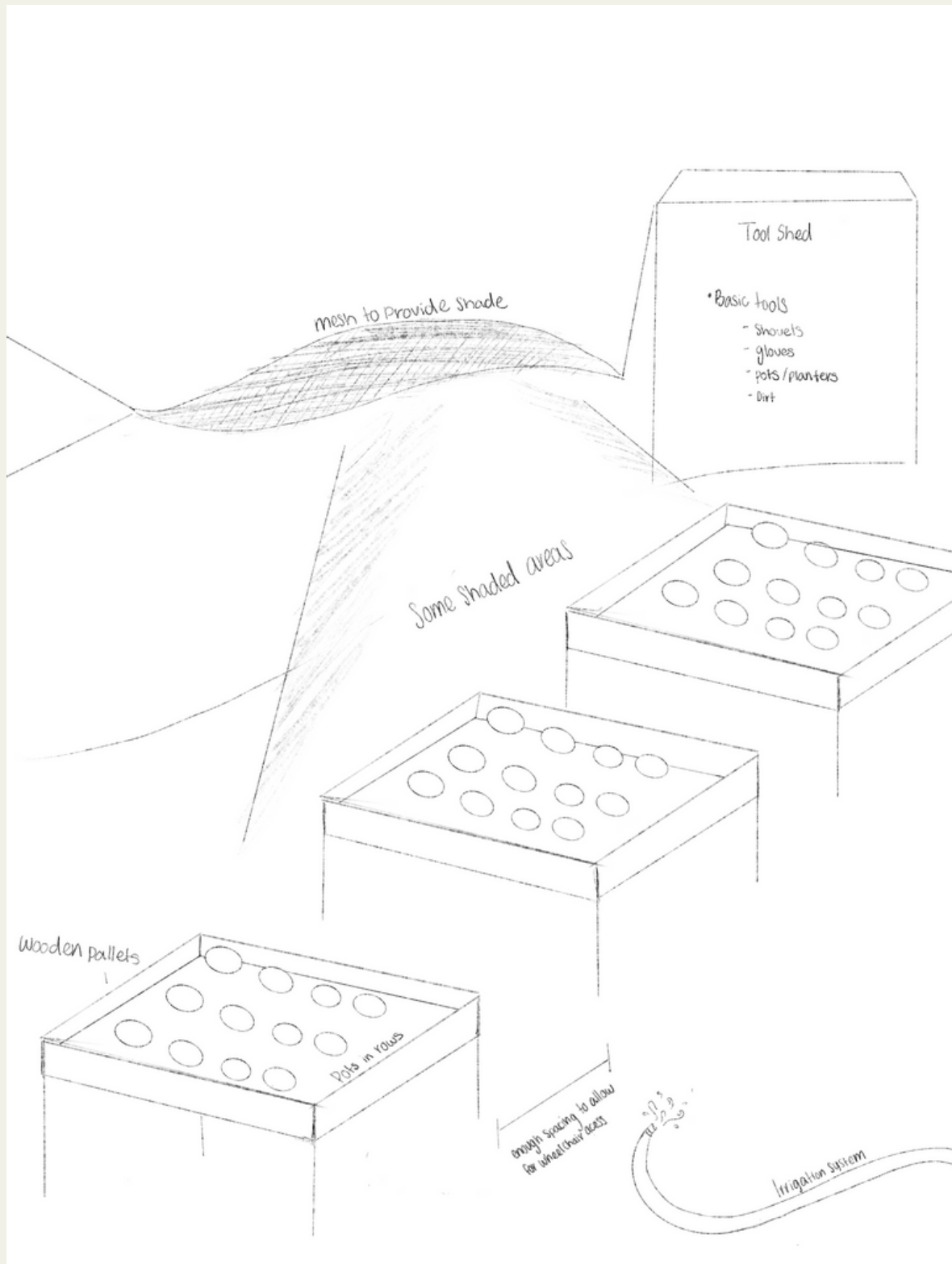
At the plot near the Chancellor's Residence, a camera should be installed for surveillance.



Drip Irrigation in Pots Setup



Sketch



Logistics

There are many permissions required before Facilities Management can operate on a space. Permission would be required from the campus architect, Peter Hendrickson, and UCLA Capital Programs to decide if a proposed space is available and acceptable for the construction of the nursery. Capital Programs is in charge of what gets built on the campus grounds. Permission would be required from Environmental Health and Safety (EHS) and the Fire Marshall to discuss location safety hazards, access to fire lanes, and erosion control if leveling the land. If using space near the Chancellor's residence, permission would also have to be required from the Chancellor's Office. After all permissions have been granted, Facilities Management can then begin to construct the nursery.

Funding sources would have to be determined for the conversion of the land into a nursery. One source for initial funding mentioned was The Green Initiative Fund (TGIF), which funds student projects related to sustainability. However, there have been suggestions that TGIF should not fund any of the construction costs of the nursery. Instead, TGIF could fund the training supplies required for involved members of the nursery. Facilities Management could also attempt to find funding sources through a cost-benefit analysis that demonstrates how growing plants at the nursery saves financial resource.

Maintenance

A proposed plan is to have the maintenance of the nursery and care of the plants be a hybrid effort between Facilities Management and students. In this vision, Facilities Management staff would take care of the plants and the nursery during available shifts and student volunteers and organizations would take care of the plants when they are available. Student organizations could include the Ecological Restoration Association (ERA) and it is highly encouraged for Native American student organizations to be involved at the nursery to promote indigenous plants and cultivation practices. With this plan, there would need to be coordination between Facilities and students to arrange schedules to ensure that the plants receive consistent attention.

Thus, a suggestion is to appoint a Facilities Management staff member and/or a student representative to be responsible for taking care of the plants and the nursery. All other Facilities Management staff members and student volunteers and organizations would still be welcome to assist at the nursery. The appointment of a fixed position lessens the difficulties related to communication between Facilities Management and students for coordinating schedules. It is also more reliable to have someone focused and dedicated to taking care of the nursery instead of staff and students taking care during their own free time. This position would be in charge of taking care of the nursery, creating a consistent schedule for taking care of the plants, and organizing schedules to integrate the participation of student volunteers and organizations. During summer months, there are less Facilities Management staff members and students available, so the appointment of this position would ensure that plants receive care during summer months as well. This position would preferably be a paid position, with funding sources to be looked into in future steps.

Regarding plant care, the most important condition is to keep a consistent schedule for watering and checking in with the plants. Thus, schedules need to be clearly laid out for watering and check-in sessions. Watering could be automated with drip irrigation, but the check-in sessions are still necessary to ensure that the plants are growing properly. A recommendation is to have plant rotation cycles so that plant growth is optimized. In this strategy, different plant species would be selected and grown at their optimal growth season periods. Before the summer months, plants that do not require much water in their early stages would be selected instead of plants that require frequent care and watering.

As for the debate between seeds and cuttings, there has been a growing interest in mixing both depending on the plant species. Some species grow well from seeds while others excel from cuttings. Seeds and cuttings each have their own benefits and risks, so it may be worthwhile to test both kinds at the nursery.

Facilities Management has also notified our team that currently, there is no space to transplant native plants. However, it is expected that spaces will become available with growing initiatives to replace nonnative plants on campus with native replacements. For our current plants grown from our plant growth trial, one possible holding location is a section of land south of Sage Hill mentioned by Cully Nordby.

Challenges

Some challenges we faced this year included outreach to local native plant experts, automation of watering, measurement of plant height, and access to the Facilities yard.

Firstly, we attempted to reach out to local native plant experts in order to conduct our informational interviews and to gather knowledge about the species of plants we wanted to propagate. Outreach was difficult, as not every contact responded to our cold emails, and we were not able to set up meetings with everyone due to lack of time. We found that some strategies resulted in more successful outreach, such as leveraging mutual connections to reach out to new contacts (effectively having our mutual connection provide us with a reference). This resulted in a higher success rate in setting up informational interviews.

Additional challenging aspects of our project were in relation to our native plant growth trial. For instance, watering was not automated so we checked on the plants every other day to ensure the soil was moist. Since only hoses were available, we had to water the plants manually. Normally, at the scale at which we were working (6 cells per plant species, and only four species total), the lack of automation would not be a problem. However, at a larger scale, such as when the nursery is in full bloom, this would be a potential issue because it would require lots of staff and student effort to maintain the plants.

Another difficulty we faced during the plant growth trial was measurement of plant height. We found that there were inconsistencies in our data because we only measured the tallest plant per cell and sometimes, the tallest plant would die and thus the data would show that the plant height in the cell shrunk even if other plants grew. We also did not measure the germination rate as some cells had more sprouts than others, which may have caused some fluctuations in the data.

A last obstacle of our plant growth trial was that access to the Facilities yard was limited. We had to ask the Facilities Management staff for the key to enter the yard every time, which was not realistic given that we were checking in on the plants every other day. Hence, we pivoted to using the Sunset Recreation Amphitheater area where the Jane b. semel Healthy Campus Initiative (HCI) Community Garden is located, as we were able to access the area as needed during opening hours. We also stored our extra seeds, soil, and materials in the Jane b semel HCI Community Garden shed.

All in all, although we faced several challenges over the course of our project, such as difficulty with outreach and with our native plant growth trial, we were ultimately able to overcome them through perseverance and creativity.

Future Work

We see immense potential for future SAR teams carrying out the next phases of this project and have identified the following areas for these teams to focus their attention on. Firstly, one vital lesson the 2022 Native Plant Nursery Team has learned is that in order to standardize any sort of plant growth trial, it is imperative to plant an equal amount of seeds in each plot or cell to be able to accurately calculate the proportion of seed germination. This is something we did not do with our growth trial this quarter, but we highly recommend it for any future growth trials that SAR teams carry out in the future. This way, the SAR teams can use this data to draw stronger conclusions about plant growth when writing their deliverables for UCLA staff working on the project—specifically in estimating the germination rate of seeds or cuttings of various species.

A second unforeseen difficulty we ran into when conducting our growth trial was that some plants from the list of recommendations we gathered after our informational interviews were not available, or at least not available in the then-preferred seed form, at Theodore Payne Foundation's Nursery. While they had a fairly robust seed library to shop from, we only walked away with three different species from our targeted list of eight native varieties (five from Facilities Management's list, two from Evan Meyer, and one from Dr. Lipman). We added black sage seeds to our list after finding them at Theodore Payne Foundation to see how it would grow compared to the purple sage from our list. We suggest that future SAR teams look elsewhere to purchase seeds that are not available at Theodore Payne. It was also recommended by Dr. Lipman of UCLA's EEB Department that SAR tries to collect native plant seeds endemic to the greater Los Angeles, and one partner for us to work with on this endeavor could be the Ecological Restoration Association (ERA) at UCLA. Regardless of the point of contact, it will be important going forward to identify and work with seed representatives and propagation experts.

While interviewing Bonny Bentzin about next steps for this project, she suggested, "It would be more logical to start growing a small number of plant species (around three) and focus on properly growing those species. A suggestion for the next step is to determine what these species should be (what plants would grow best at UCLA)." With this piece of advice in mind, we would advise future SAR teams to be selective in which plant species they cultivate and to focus on only a few species. It will be especially crucial to devote all resources and efforts to just a select handful of plant varieties in the very early stages of the nursery's operations to ensure maximum growth.

Additionally, we would also advise future teams to attempt to grow certain species from cuttings rather than exclusively working with seeds like this year's team did with the growth trial. There are several benefits to propagating native plants using cuttings that we did not explore during this phase of the nursery project. For instance, when working with a cutting, the new plant will be genetically identical to the parent plant. Thus, if there is a specifically desired feature or special characteristic of that parent plant, the new plant grown from the cutting will have the same trait. Likewise, if the parent plant is female, for example, the new plant will also be female. Plants grown from seed will often be different from the parent plant and from each other, which might not be desirable depending on the circumstances. Another benefit of planting from cuttings is that it avoids some of the difficulties of propagating by seed. Using cuttings, you can propagate a young tree that hasn't begun to flower and produce seed. When planting seeds, you can encounter problems with germination, as it can take as long as a few years for a seedling to appear in some cases. A new plant grown from a cutting will often mature at a faster rate and begin to flower sooner than a plant grown from a seed. With the short duration of each SAR program, this could be an effective strategy in producing enough plants within a limited timeframe. That being said, not all plants will grow well from cuttings, and for some plants it's entirely impossible to propagate them this way, so this will need to be taken on a case by case basis.

Future Work

One area of focus that we hope to see addressed by future SAR teams is an emphasis on Indigenous plant cultivation and cultural uses, which could be developed through suggestions taken from UC Berkeley's Indigenous Community Learning Garden. Beyond merely acknowledging the fact that UCLA exists on Tongva land, there is a critical need to meaningfully reckon with the history of dispossession that has led to this present-day context. We recommend future teams consider adopting both educational and hands-on student-centered programming, such as hosting workshops on the multipurpose uses of native plants, looking up and publishing indigenous plant-based recipes and encouraging collaboration with the UCLA American Indian Studies Center. Trainings on integrating indigenous cultivation principles could potentially be carried out with the team deployed to maintain the nursery, such as recognizing that all of us are *Kuyaam* (the Tongva word for 'guests', according to Sepulveda (2018)) on this land and prioritizing the use-value of land as a public commons essential to sustaining human life, instead of its exchange-value as a commodity. Additionally, we suggest to future SAR teams that they explore ground cultivation, as potted cultivation is a non-native practice, though we realize that both methods will likely need to be implemented depending on which plant varieties are grown.

With regard to the logistics of the project's development, we foresee the plot of unused land near the Chancellor's Residence being a viable location for the site of the nursery. We conducted a brief survey of the space this quarter. With some landscaping to terrace the plot, which is on a slight slope, removing unwanted weeds and dead trees, and installing a barrier to better separate the nursery from the Chancellor's property, the site would be transformed and could then be developed into a working nursery. One of the top priorities would be to first ensure the feasibility of developing the nursery at this location. We want to show due respect Chancellor Block and his home, and we would not want the nursery to impose on his privacy or safety. If given approval to create the nursery here, security cameras would likely need to be installed on-site to monitor the space and ensure that it remains a peaceful and professional environment.

Finally, we hope future SAR teams will consider implementing a native plant trade system between the UCLA native plant nursery and other Los Angeles-based nurseries, as well as with individuals or communities that are cultivating native plants. We envision the creation of a circular native plant economy in which growers can exchange seeds, cuttings, and whole plants with one another. A value system would be assigned so that each exchange is fair and considers the respective amounts of labor and resources required to grow or harvest different plant species. This system would allow the University to bring in locally-sourced native plants that would be hard to grow in the nursery, as some plants can only grow under specific conditions that may not be possible to replicate on campus grounds. Moreover, this practice would allow UCLA to form partnerships within the greater Los Angeles community, therefore promoting sustainability on a broader scale by getting more people involved in native plant propagation and conservation in urban and suburban environments.

Sepulveda, C. (2018). "Our Sacred Waters: Theorizing Kuuyam as a Decolonial Possibility." *Indigenous Peoples and the Politics of Water*, 7(1).

Appendix A

Interviewees & Contacts

A.1: List of Interviewees

- Stephanie Landregan
Director of Landscape Architecture Program, UCLA Extension
- Justin Wisor
Director of Custodial and Grounds, Facilities Management
- Evan Meyer
Theodore Payne Foundation Executive Director
- Dr. Alison Lipman
UCLA Ecology & Evolutionary Biology Department Faculty Member
- Andrea Salazar
UC Berkeley Indigenous Community Learning Garden, Founding Member
- Dr. James Bassett
UCLA Institute of Environment & Sustainability, Faculty Member and Master Gardener
- Bonny Bentzin
Deputy Chief Sustainability Officer at UCLA
- Cully Nordby
Associate Director of UCLA Institute of Environment & Sustainability
- David King
Garden Master of the Learning Garden in West Los Angeles
- Greg Luna
Senior Superintendent, Grounds, Facilities Management
- Chris Woo
Grounds, Facilities Management

A.2: Contacts, for Future Reference

- Ecological Restoration Association (ERA) at UCLA
- DIG Garden at UCLA
- California Native Plant Society
- Hahamongna Nursery
- American Indian Studies Center
- Kuruvungna Springs
- Chia Cafe
- Theodore Payne Foundation plant propagation and seed experts

Appendix B

Detailed Summaries of Informational Interviews

B.1: Evan Meyer

Plant Propagation and Selection

- Measure dimensions of the space
- Remove weeds and clear the space
- Determine purpose of growing specific plant species to determine how to utilize the space
- Start growing by seeds
- Proposed narrowleaf milkweed and California poppy as two great options to start growing
 - Recommended growing plants that grow well in the summer, fast growing annuals, perennials
 - California poppy - fast growing annual plant
 - Narrowleaf milkweed - grows well in the summer, attracts monarch butterflies
- Standardize the soil used for all of the plants
- Grow the plants in plant liners (small 2 inch cells/plots) to start off a small trial
 - Bump them up into larger pots after growth
 - More cost effective
- Can purchase seeds and soil at Theodore Payne Foundation, suggested a site visit

Plant Maintenance

- Ensure that tools are properly cleaned after use to prevent introduction of fungus or disease
- Be aware of pests, animals - can set up protection for the plants
- Be consistent with watering - want surface to dry before watering again
 - If possible, use an automated irrigation system for watering plants; if not, manual watering suffices
- Light shade cloth could be used to provide shade and filtered sunlight
- Draft a schedule among team members to regularly check up on the plants for watering, maintenance
- Label plants for record keeping
- Once plants have grown and are ready for transplantation, best practice would be to move them to a desired location immediately

Incorporating EDI in Nursery Planning

- Recommended reading books about indigenous cultivation practices
- Emphasized understanding the relationship with the plant and growing from the ground
 - Potted plant cultivation is a colonial practice
- Contacts:
 - American Indian Studies Center
 - Chia Cafe
 - Kuruvungna Springs

Appendix B

B.2: Dr. Alison Lipman

Plant Propagation, Selection & Maintenance

- Need irrigation, sterilization protocol (getting new soil, sterility of plant pots)
 - Be careful of disease
- Strongly encouraged the use of locally sourced seeds as most nurseries get seeds from wholesale sellers, which are not necessarily appropriate to the Los Angeles climate
 - Locally sourced plants will be well adapted the LA's climate
- Favored using seeds instead of cuttings because seeds maintain plant diversity while cuttings are clones of other plants and do not have diversity
- Protection for seeds: Cages, have plants lifted up off the ground
- Introduced the CalScape website to identify locally appropriate species in Los Angeles instead of using California native plants favoring other locations.
 - Using the website, recommended *Salvia leucophylla* (native to LA) as a better option than the original list's *Salvia clevelandii* (native to San Diego)
- Supported the idea of having several people working full-time at the nursery
 - Can grow a large number of plants
 - Reduces risk of neglecting plants

Student Participation in Restoration

- Proposed student involvement in seed collection and seed propagation.
 - Learn about the whole cycle of restoration.
 - Detailed suggestions for student collection of seeds, such as getting a permit, collecting at existing conservation projects (Sage Hill/Stone Canyon), drying and processing seeds before storing them, and setting up an inventory.
- There may be student groups interested in being involved long-term.
 - Ecological Restoration Association (ERA) works on restoration at Stone Canyon Creek
 - Sage Hill could be another restoration project of interest

Appendix B

B.3: Andrea Salazar

Background on UC Berkeley's ICLG

- Located at Walnut St. & Virginia St., Berkeley CA
- The Indigenous Community Learning Garden is not managed by UC Berkeley's Facilities Management or Landscaping departments. It's maintained primarily by a student-led group in collaboration with the Native American Students Department and Professor Elizabeth Hoover (who conducts some classes at the site).
- Some of the challenges in obtaining the land for the Garden
 - Having to renew an application for the land every year
 - Liability concerns
 - Continuity in student leadership

Plant Selection

- Use indigenous native plants from the area and native plants that are significant to those working in the Garden
- Always ask staff, faculty, and students for input before deciding on the crops or methods that they want to include
- Suggested we check with the Native American Department on campus for indigenous native plant selection
- Recommends Calflora and Calscape: websites that give a range of plants and background info on where they do best, superimposed on a map.

Research & Learning Opportunities

- Their plant selection, cultivation, and land organization approaches are more fluid and experimental as they are based on the interests of students involved
 - For example, they will look up recipes for indigenous foods for ideas and ask for student feedback during workshops
- To ground the 'learning' aspect of the garden, they have a feedback mechanism to understand what students gain when they participate in garden activities
- Brief overview of the kinds of activities organized
 - Office Hours at the Garden by key figures, such as Andrea (1 hour, weekly)
 - Garden Work Day for maintenance (2 hours, twice monthly)
 - Workshops (ad hoc)
 - They are also open to people harvesting food from the garden, eating it and cooking it in communal workshops, meditating, and relaxing in the garden.

Incorporating EDI in Nursery Programming

Indigenous stewardship principles that they center their practices around:

- Forming a relationship with the land before asking anything of it
- Centering indigenous students and the indigenous community and serving these groups through the garden: Preference for reaching out to indigenous groups on campus and getting them involved to ensure a continuity to interest in maintaining the garden
- Recommends reading indigenous literature and even indigenous cookbooks to inspire ideas to grow various plants
- Organize workshops to see how enthusiastic people are about draft selections
- If students have access to seedlings from their tribes, let them know they are welcome to bring them to the nursery.

Appendix B

B.4: Dr. James Bassett

Plant Propagation, Selection and Maintenance

- Recommended cuttings over seeds, on account of the genetic diversity of seeds that we are less able to account for (e.g. they may not be as 'local' or 'native' to us)
- Made several plant recommendations
 - Showy milkweed
 - Native buckwheat
 - Yucca
- "Soil" on campus is not necessarily native
 - Do a soil test - how close is its makeup to native soil?
- Some plants prefer to grow together and form an ecosystem
 - Think about companion planting for natives
 - Recreate companions from nature
- Native plants, once established, will not really need that much attention
 - However, as part of the growing process a lot of water may be required (for example, milkweed seedlings require 2 gallons of water)



Appendix B

B.5: Bonny Bentzin

Location details

- The space is located west of the Chancellor's residence, specifically the Chancellor's propagation garden, which is fenced. One benefit of this location is that it is isolated from the rest of campus, allowing for control of who accesses the nursery. A rough estimate of the size of the space was about 20 feet by 90 feet for the entry space and 12 feet by 141 feet for the more inland space.

Vision of the nursery

- One vision for this space is to terrace and create leveled grounds to place tables. There would be a need to remove weeds and mowing to clean the space.
- Plants would be grown in pots on top of these tables instead of the ground, so testing of soil composition is not necessary. Invest in quality soil to use for the pots.
- A recommendation is to install an automated drip irrigation system for consistent watering.
- Create a section with shade using a shade cloth to provide a protected location for plants sensitive to sunlight.
- There should be a shed for storing seeds, plants, tools, and other supplies.
- Tables should have about 4-5 feet space between them for walking access. If possible, ramps could be developed for wheelchair accessibility.
- One proposed plant species to grow in the nursery is the elderberry.
- A mix of seeds and cuttings should be used depending on the plant species.
- It would be more logical to start growing a small number of plant species (around three) and focus on properly growing those species. A suggestion for the next step is to determine what these species should be (what plants would grow best at UCLA).
- An intriguing suggestion was to assign plant species trading values and to partner with other organizations in growing and trading different plant species. The benefit of this system would be that plants would be grown in their most suitable environment and ensure the highest growth success rate.

Logistics regarding space for nursery

- Chancellor's Office approval would be needed to determine if space is available for use.
- A camera may be set up for surveillance of the area for the privacy of the Chancellor.
- The fire road to the west of the location should be kept clear.

Construction, Maintenance, and Funding of nursery

- Facilities Management and Grounds would have to be involved in construction and maintenance of the nursery because students are not always available.
- There is a need for campus to create a paid position or coordinator who would work on landscaping projects. This position would help in taking care of plants and maintenance of the nursery, especially during the summer when Facilities Management has a shortage of staff members.
- TGIF should not be funding the construction of the nursery. However, TGIF could fund the training required for involved members.

Appendix B

B.6: Dr. Cully Nordby

Sage Hill as possible location for transplanting our native plants

- Under IoES, designated as an education space for undergraduate teaching and research
- Space just south of sage hill - “boneyard”, space also looking for nursery, in collaboration with Housing
- Possible location if Facilities Management does not have a set location, but need Facilities approval
- Separate from Facilities Management
- Sage hill envisions student engagement



Appendix C

Photos of Plant Growth Trial



April 3, 2022



April 8, 2022



April 11, 2022



April 15, 2022



April 22, 2022



April 24, 2022



May 6, 2022



May 8, 2022



May 13, 2022



SAR NURSERY 2022

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