Natural Delicacies:

Exploring Environmental Preferences and How They Relate to Human Foraging Behavior

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Abstract

Goal: This project aims to explore the ways in which the qualities of an environment affects foraging behavior of site users. Modern culture has issues with destructive agricultural practices and disconnect with local ecologies. Despite the numerous health, social, and environmental benefits associated with foraging that could correct those issues, it remains a niche interest among a small percent of the population. As a result, I explored how foraging could be made more accessible to the average person using principles of environmental preference psychology. I developed research methods that explored what qualities people did or did not enjoy in a space and how that correlated with foraging behavior.

Methods: Conducting this research consisted of guided walking tours, environmental characteristic surveys, visual landscape assessments, and interviews to gain a comprehensive understanding of how people's environmental preferences affect their foraging behavior across different levels of baseline knowledge and life styles.

Results: Natural and engaging environments were identified as the most appealing for foraging behavior. These types of environments encourage exploration of a space and the activities possible within it. Elements such as vegetation diversity and sensory appeal are significant factors for determining if someone would forage in a space or not. I also found that accessibility of a space is important for people to use it for foraging.

Recommendations: I used the results of the data collected to create a set of guidelines and design suggestions for how to create spaces along various trail typologies that will facilitate foraging behavior, education, and the consumption of wild foods in people's daily lives.

Chapter 1:

Introduction

Before the advent of agriculture, early humans obtained much of the food needed to survive through the foraging of edible plant materials, collecting food where it grew in the natural environment. Even later in history, foraging continued to be an important form of food production, whether that be the main source for many nomadic peoples or supplemental for sedentary societies that primarily relied on agriculture. In Colorado, foraging was once extremely prevalent with the large presence of native tribes–such as the Ute, Cheyenne, and Arapaho–and settlers who learned to live in the rugged environment of the Rockies where farming was not as easy as it was in the plains. By understanding what edible plants could be found in the uncultivated environment they lived in, people were able to eat and survive before the large-scale transportation of food became common practice (Zeppelin 2022, 109).

Now, Western culture is primarily reliant on commercial agriculture and grocery stores. Large-scale monoculture agricultural practices driven by global food demands deplete the soil of important nutrients and expose crops to harmful pesticides that remain present even after harvest (Lovell 2024). Raw materials rarely reach the market in their natural state, instead being extensively processed into snacks and other food products high in sugar. The carbon cost of shipping these products around the world is monumental, being considered one of the greatest sources of CO2 emissions at 3 billion tonnes per year (Tandon 2022). The health cost is also evident, with chronic diseases

Figure 1.1: Illustrations of Some Common Colorado Wild Foods (Purple Coneflower, Giant Goldenrod, and Boulder Raspberry)

and obesity on the rise, as 60% of Americans suffer from some form of chronic disease and 40% of adults struggle with obesity (Trust for America's Health 2024). Organic grocery stores and farmer's markets try to address the issue, but they are often inaccessible to marginalized and impoverished populations–both in terms of cost and location–leaving those already most at-risk to suffer in food deserts. In response to these issues, this project aims to explore how foraging and the localization of food production can be reintroduced into mainstream society.

Similar to how people are disconnected from their food sources, they are disconnected from the natural environment. People–especially those in urban settings–tend to be apathetic to their local environments and lack knowledge about the ecological systems they encounter in their daily lives. Studies show most adults and children struggle to recognize and identify common plants indigenous to where they live, much less show an understanding of the possible culinary or medicinal benefits those plants could have (Robinson 2016). Changes need to be made to people's lifestyles so they become better connected to the land where they reside, ultimately promoting stewardship of the environment and communities that exist there. Foraging could be used to foster that connection.

Despite the potential benefits of foraging in addressing issues with food production and reconnecting people with nature, it faces several challenges within modern society. Edible plants can leach pollutants from places contaminated with industrial run off and pest control chemicals, making them dangerous to consume. Cleaner spaces, like those in protected parks and forests, have regulations limiting or fully preventing the harvesting of plants within their borders. The general lack of knowledge on the subject in the public consciousness also creates issues where people may be unsure about what to harvest or how to do so due to fear of poisoning. This research aims to explore how spaces should be designed and managed to make foraging more accessible to the average person.

Understanding how people interact with and react to spaces they see and move through everyday can allow us to best curate new foraging spaces that are accessible and attractive on a large scale. Paths, walkways, and trails are all important elements in the urban fabric and natural outdoor recreation areas that provide direct access to greenery and landscaping in people's day-to-day lives. Their design and composition has a great effect on how people move through and feel in a space, as evidenced through years of research in the field of environmental preference psychology. However, this theory has yet to be applied to the discipline of foraging. That is the gap in knowledge this project will address. When spaces are designed in such a way that they attract people to use them and then direct those users into interactions with foragable plants, it will become easy for common people to implement foraging into their daily routine and food practices.

By creating an understanding of how trails should be designed to encourage foraging, this research could help guide the shift already becoming prevalent in landscape architecture towards edible landscaping and permaculture. Modern landscape architects are just beginning to explore how edible plants–both obvious and nonconventional–can be used in their designs to increase food accessibility and create an improved connection to nature in urban environments. Additional understanding and guidance for new landscape projects featuring edible landscapes will be crucial to creating spaces that are both successful and engaging for users.

The results of this research will be summarized in a set of guidelines that reflect people's preferences for foraging spaces. These guidelines will direct how new spaces should be designed and existing ones adjusted to encourage foraging behaviors in a variety of populations and give advice on how these spaces should be maintained to ensure plants are plentiful, accessible, and safe to consume. When trails and pathways are designed to allow and encourage interaction with people's surroundings through the incorporation of edible plant matter, a deeper connection to nature can be developed. As a result, the personal and communal benefits of foraging will become more accessible to a wider portion of the population.

This study aims to address the following question: What factors in a designed space will encourage users to engage with and learn about foraging in everyday life? I used the results from guided walking tours, environmental characteristic and visual landscape assessment surveys, and interviews to address this question.

Chapter 2:

Literature Review

This project seeks to understand how the design of trails and pathways can be used to alter human behavior and encourage foraging in people's daily lives. As a result, the literature review covers foraging practices and research into environmental preference psychology. I researched both the history of foraging and its presence in modern society to understand the practice's legacy and why people are beginning to revive foraging practices. The works in environmental preference psychology I reviewed gave insight into people's preferred environments and the best methods for conducting research in this field.

History of Foraging

Foraging has historically been practiced worldwide by numerous peoples and cultures. In the United States and Colorado specifically, indigenous peoples relied on "wild foods"–plants found and foraged in the natural environment–to survive in harsh environments. In the Colorado Front Range–specifically around Denver and Boulder–the Ute, Cheyenne, and Arapaho peoples once lived and fostered a deep connection with the flora and fauna of the environment through reliance on natural resources to survive (Zeppelin 2022). Christopher Morgan and Robert L. Bettinger (2012) found through the exploration of indigenous historical records that the foraging of plant goods was vital to survival in this region where hunting was difficult and often unreliable, displaying a deep understanding of and connection with local ecologies.

Despite the various foraging methods utilized by native groups, displacement and environmental destruction that came as a direct result of European colonization began killing off the practice (Kelly 1999). Agriculture and trade became more widespread, demoting foraging from an important survival strategy to something supplemental to farmed and manufactured food and medicine. During periods of struggle, such as the Great Depression, people would forage to supplement their low food supply with nutritious plants, but the practice never stuck for long. Serge Svizzero (2016) explores this shift in goals, finding that in modern culture, foraging has been demoted even further to simple recreation or supplemental income. The shift from foraging as a necessity to a niche recreational activity reflects a broader societal disconnect and growing apathy towards the natural environment.

Modern Foraging

Recently, urban foraging–the practice of seeking out edible and medicinal herbs in urban and suburban landscapes–has become a rising trend for many people looking to return to natural ways of living. Leonie K. Fischer et al. (2020) explored the practice and found that individuals who forage in the urban environments where they live have a closer relationship with the local ecologies and unique cultures they are a part of. Foraging practices prompt people to have a better understanding of the plants and environments around them which, in turn, encourages better environmental stewardship practices in their

daily lives.

Understanding the kind of people who engage with foraging is critical to grasping its ecological and cultural implications. Iris I. McFarlin (2021) found that foraging is now mostly a niche interest expressed by people already involved in outdoor recreation or environmental sustainability. Social and cultural demographics have been shown to have little effect on whether someone foraged or not, but prior interest in other types of outdoor recreation–hunting, fishing, hiking, wildlife observation–did, with the people who heavily engaged in those types of activities also expressing some amount of interest in foraging (McFarlin 2021).

McFarlin breaks down foraging motivation into four main categories: "self-empowered foragers, multi-motivation foragers, casual foragers, and social foragers." These archetypes refer to people who forage for food, fun, to connect with their culture or the community, or some combination of the three. Looking into public foraging courses with tourism groups, libraries, and private institutions also reveals consistency of motive among participants: to gain a new, interesting perspective on local ecologies and ways to sustainably engage with them (Jong 2018). Participants and teachers expressed a desire for sustainability and ecological connections, urging those interested to consider the environmental, legal, and societal implications of the practice (Jong 2018). Although there are some possible negative ecological consequences of foraging, many people who participate in the practice view it as an important way they practice sustainability in their daily life. Understanding why people forage–to connect with nature, with others, with food sourcing, with their culture–can also be used to best understand environments that facilitate the behavior.

As more people are recognizing the benefits of foraging, potential underexplored risks to ecosystems and biodiversity may emerge (Giraud 2021). While the studies find that many wild food sources are sustainable, some native and "fashionable" plants and mushrooms may require monitoring to ensure foraging does not greatly decrease their numbers (Giraud 2021). Baylen J. Linnekin points out laws and policies that have been put in place to regulate foraging and hopefully prevent overharvesting. He discusses that these over-bearing foraging laws that completely restrict the harvesting of edible plant materials are often rooted in racist and colonial ideals: wanting to erase indigenous practices in colonial America and prevent freed enslaved people from sustaining themselves independently (Linnekin 2018).

Although their roots are in social issues, many modern forging laws are framed as environmental regulations, hoping to prevent overharvesting and environmental destruction. While foraging remains somewhat accessible in protected forests and Bureau of Land Management (BLM) land, most National and State Parks have heavily regulated or banned foraging in response to

that ideology (Robbins 2024). As a result, there is growing advocacy to re-examine how land management and "Leave No Trace" principles should address foraging, especially when it is done sustainability and respectfully (not harvesting all the plants in an area and taking only the amount you need) (Robbins 2024).

The general consensus among researchers suggests that foraging can be sustainable in urban environments when adequately planned for. According to Sardeshpande and Shackleton (2020), shifting the paradigm to view "weeds" as something useful in a culinary or medicinal sense can help with both aesthetics and ecological maintenance needs. Mass-harvesting invasive, edible plants can be useful in preventing them from spreading, a practice that has become known as "invasivorism" (Sardeshpande 2020). Matthew Potteiger (2015) argues that edible landscaping can be used as an important element in green infrastructure to help bring ecology into cities. Shifting urban spaces and culture to utilize foraging in daily life can revitalize cities and better connect people with their local environments. Modern foraging offers numerous benefits to participants and ecologies, and the possible negative effects can be mitigated through proper education, management, and design of the space.

Environmental Preference Psychology

Foraging is a way of people-environment interaction, so developing an understanding of how people are influenced by the spaces they are in will be vital to examining how design can facilitate foraging practices. Environmental preference psychology is the study of what factors in an environment affect how someone perceives and acts in it. Kaplan, Kaplan, and Brown (1989) break down the elements that affect how people react to an environment into four categories: land cover, informational, perceptual, and physical. Specifically, the perceptual category–which consists of the subcategories coherence, complexity, legibility, and mystery–are important in that they explore the qualities that encourage someone to explore a space (Kaplan 1989, 516). The core of this theory asserts that spaces do not necessarily need to be over designed or crowded to be engaging. Rather, they need to utilize areas with small amounts of detail that draw people in and call them to explore, creating a much more engaging space (Kaplan 1989). This is most often achieved through winding paths you can't see the end to or small niches one can explore away from populated areas. Kaplan, Kaplan, and Brown (1989) also argue that diverse, natural vegetation in a space is often preferred over openness. Analyzing these factors in relation to urban trails and pathways can help when it comes to designing foraging spaces.

More important research within environmental preference psychology is by Paul Gobster et al (2007), whose work largely surrounds the roles of aesthetics in ecology and how humans interact with the environment. He defines the "perceptible realm" as the scale at which humans interact with the landscape and

then defines the interactions that occur at this scale as "aesthetic experiences." From this, he argues that the perceived scale, landscape typology, and types of interactions end up determining whether a user's relationship with the space is one of "scenic beauty" or "care and attachment" (Gobster 2007). While he uses this to argue for designing spaces to meet both ecological and aesthetic needs, it could also apply to designing for foraging. The harvest of wild foods and maintenance of their well being is a type of attachment and care one expresses for the landscape, so ensuring designs exist at the right scale and meet specific needs for pleasant, interactive experiences is vital to making a foraging space successful.

One thing to consider is that people's preferred environments may not be ideal foraging environments. According to Zheng, Zhang, and Chen (2011), individuals with less education or education focused in "social" fields prefer neat and manicured landscapes– which often require pesticides to maintain– while people with experience in environmental fields prefer wild, natural landscapes. This, however, is contradicted by Agnes E Van den Berg et al (2003), who found that people tend to perceive natural environments as more beautiful and that viewing them has a greater positive impact on mood and concentration than manicured landscapes (Van den Berg 2003). These findings are also corroborated by the works of Kaplan, Kaplan, and Brown (Kaplan 1989). Trying to balance preferred environments and foraging environments may be difficult if Zheng's findings persist, so we must consider design guidelines that could work in different environmental typologies.

Paths and trails are key environments for outdoor recreation, yet they are often underutilized in landscape design, being viewed as transient spaces rather than destinations. Despite this, they hold a lot of potential for environmental education and developing a connection between people and ecologies. According to Ziaco et al. (2012) and Žoncová et al. (2013), educational trails offer environmentally low-impact ways to connect a variety of people to local environments, providing targeted information about specific ecological or cultural topics to users. Paul H. Gobster et al. (2023) similarly researched interactive trails and found that they are effective tools for influencing human behavior and temperament. Strategies for interactive trails– such as the inclusion of signs to distill information, specific plantings meant to invite curiosity, and a path that is easy to move through–can be applied to design for foraging behavior and education.

Foraging is a unique way that people interact with the world around them with many possible personal, ecological, or cultural consequences if not done properly. It has major historical relevance but has fallen out of use despite the benefits it offers to the modern world. Environmental preference psychology studies the ways in which the qualities and design of an environment affects how people feel and act in it. Despite the field's impact on the design of interactive outdoor spaces such as trails and parks, little research has

been done so far on how an environment can affect foraging behavior. With this research, I aim to fill that gap and apply the principles of environmental preference psychology to the practice of foraging, specifically addressing the question: what environmental characteristics in a space can best facilitate foraging behavior?

Chapter 3:

Research Methods and Data Collection

I conducted this research using a mixed methods approach. The methodologies used included guided walking tours, environmental characteristic surveys (ECS), visual landscape assessments (VLS), and semi-structured interviews. By utilizing these methods, I examined the prompt from both quantitative and qualitative perspectives to paint a clear picture of how the design and composition of an environment can affect people's preference for foraging.

Guided walking tour

I began this study with a limited guided walking tour. The goal of this tour was to examine and record how people react to and act within certain environments. Environmental preference literature suggests that directly observing people in studied environments yields more accurate results than relying on

Figure 3.1: Map of Guided Walking Tour

their reactions to photos and videos, which has the tradition of the field, showing the importance of this research method.

The tour was conducted on Sunday October 27, 2024 starting around 2 pm and lasting around two hours. I recruited a group of seven of my peers–college students and recent graduates (ages 20-24) in design, biology, and business majors–and led a walking tour through Chautauqua park in Boulder, Colorado. The route for this tour was selected as it went through a diverse selection of Colorado environments, and I was able to find many edible plants along it during a preliminary walk through the route a few days prior.

During the walk, we stopped at five stations selected to represent different types of environments–next to the street, in the open plain, in the dense woods, on a rocky mountain side, and in a manicured park. See figure 3.1 for the map of the walking tour. At each station, participants were asked to fill out a worksheet examining their feelings about the space. They were asked to identify what in the space was pleasant or unpleasant, what features in the space they would change if they could, and what elements of the space were attractive to them. Additionally, they were asked to find one or more edible or medicinal plants and explain what attracted them to that plant. Refer to appendix A to see a copy of the worksheet participants were asked to fill out as part of the tour. While participants completed the activity, I examined their behavior and took notes in my journal on how they moved in and interacted with the space.

Once the guided walk was completed, we sat in the park and I held a 15 minute focus group discussing overall thoughts on the path we followed, the spaces we explored, and the experience of foraging both on this trip and in their daily lives. This session was audio recorded. After the trip was completed, the data was compiled, transcribed, and coded for analysis to determine which environmental qualities were mentioned most as having a positive influence on one someone's experience in a space.

Environmental Characteristic Survey

Environmental Characteristic Surveys (ECS) and Visual Landscape Assessment Surveys (VLS) are means of research where participants are shown photographs of environments and asked to rate them in response to certain variables (Kaplan 1989). I included these methods in my research to determine how people react to different typologies of trails and what kind of environments they have preferences for in regard to foraging. Survey modes are often prone to causing various biases in participants' answers due to their relying on the participants' memories and preconceived notions of what the pictured environment may be like. In my own research, I attempted to minimize these biases through the inclusion of the guided walking tour and interviews to cross reference the survey results with the opinions of people who were either in the similar environments or had extensive

Figure 3.2: The 25 Photos Selected for the ECS

experience foraging in them.

To begin, I went out and collected photos of different typologies of trails and pathways: sidewalks in urban and suburban areas, pathways in urban parks, creek paths, wooded hiking trails, open hiking trails, rocky hiking trails, and outdoor gathering spaces with signage and benches. The locations I travelled to for photos included the University of Colorado Boulder campus, Chautauqua Park, Flagstaff Mountain, the University Hill, Bear Creek Path, and Martin Park all in Boulder, as well as the South Platte River Trail in Denver. Photos were taken throughout the month of October. In total, I collected 161 photos for this project.

Control factors such as season and time of day were kept consistent to ensure that respondents' answers were only influenced by the variables I was investigating. All the photo compositions consisted of a trail or walking path as well as the vegetation and environment around it. In taking the photos, I ensured to capture a diverse variety of trails as well as a large variety of vegetation types and conditions. Trail and vegetation conditions were intermixed as well (i.e. well maintained trails against poor vegetation and poor trails against diverse, healthy vegetation) to encompass the many trails and pathways one could interact with in the study area. When creating the surveys for this project, I weaned my collection of photos down to 25 that best displayed a variety of variables that can affect how people react to an environment. See figure 3.2 for the photos I took and used in the survey.

Using the resources discussed in my literature review, I curated a list of seven environmental variables identified within environmental preference psychology research as being important for a site user's experience of a space. The variables were trail condition and accessibility, legibility and safety, engagement, sensory appeal, naturalness, vegetation diversity, and environmental comfort. See table 3.1 for further explanation on each quality's definition and source. The first of my surveys–the Environmental Characteristic Survey–was administered through Qualtrics and asked five respondents to rate the presence of the seven environmental qualities in each of the 25 photos on a scale of 1-5 (1 being the quality was absent and 5 being the environment embodied the quality). A total of 175 questions were included in the survey. See Appendix B for a copy of this survey.

Once the data was collected from the survey, I created a spreadsheet to determine the range and average of environmental characteristics present for each photo. Using this, I was able to best understand the variation in environmental qualities between each photograph. Ultimately, this process helped me best understand which environmental qualities most influence foraging behavior when referenced with the results from the next survey.

Visual Landscape Assessment Surveys

The second survey was a Visual

Table 3.1: Table of Environmental Characteristics Used in the ECS

Variable	Variable Description	Source
Trail Condition and Accessibility	How well-maintained is the path or space? Is it free from obstacles or hazards that could impede movement? How easy is it to access, considering surface quality, steepness, and any potential barriers for users?	Kaplan, Rachel, Stephen Kaplan, and Terry Brown. “Environmental Preference: A Comparison of Four Domain Predictors.” *Environment and Behavior* 21, no. 5 (1989): 509-530.
Legibility and Safety	How clear and easy is the path to follow? Can you see far ahead down the path? Is the intended route obvious, or are there forks, turns, or diversions that make navigation unclear? Are there any unexpected surprises or hidden hazards that could pose a risk to users?	Kaplan, Rachel, Stephen Kaplan, and Terry Brown. “Environmental Preference: A Comparison of Four Domain Predictors.” *Environment and Behavior* 21, no. 5 (1989): 509-530.
Engagement	Does this space feel like a place to quickly pass through, or is it inviting enough for you to stop, sit, and spend time interacting with the environment?	Gobster, Paul H., Linda E. Kruger, Courtnet L. Schultz, and John. R. Henderson. “Key Characteristics of Forest Therapy Trails: A Guided, Integrative Approach.” *Forests* 186, no. 14 (2023): 1-36.
Sensory Appeal	Does the space evoke a pleasing sensory experience? Consider visual harmony, the implied sounds of the environment (like rustling leaves or water), and any cues that suggest pleasant or unpleasant smells.	Tabatabaie, Sara, Jill S. Litt, and Brian H. F. Muller. "Sidewalks, Trees, and Shade Matter: A Visual Landscape Assessment Approach to Understanding People's Preferences for Walking." *Urban Forestry & Urban Greening* 84 (2023): 1-9.
Naturalness	Does the vegetation appear natural and untamed, resembling a wild ecosystem, or does it look carefully maintained, like a manicured garden?	Van den Berg, Anges E., Sander L. Koole, and Nickie Y. van der Wulp. “Environmental Preference and Restoration: (How) are They Related?” *Journal of Environmental Psychology* 23 (2003): 135-146.
Vegetation Diversity	Is there a wide variety of plant types, colors, and textures, or does one type of plant dominate the landscape (monoculture)?	Van den Berg, Anges E., Sander L. Koole, and Nickie Y. van der Wulp. “Environmental Preference and Restoration: (How) are They Related?” *Journal of Environmental Psychology* 23 (2003): 135-146.
Environmental Comfort	How comfortable does the space appear in terms of environmental factors like sun exposure, availability of shade, and the presence of wind or shelter from it?	Tabatabaie, Sara, Jill S. Litt, and Brian H. F. Muller. "Sidewalks, Trees, and Shade Matter: A Visual Landscape Assessment Approach to Understanding People's Preferences for Walking." *Urban Forestry & Urban Greening* 84 (2023): 1-9.

Landscape Assessment that asked a larger participant pool to rate the 25 photos on overall appeal for foraging. The purpose was to identify which spaces were most appealing for foraging so that I could cross-reference these findings with the ECS data to determine which environmental qualities had the greatest influence on foraging preferences. I developed the survey using Qualtrics and sent it out for responses in early February of 2025. I started the survey with 10 standard demographic questions asking the participants about their identity, their health, their physical activity, and their foraging experience. Then, participants were simply asked to rate each of the 25 photos on a scale of 1-5 (least appealing to most appealing) for its overall appeal for foraging. In total, the surveys consisted of 35 questions. Participants were asked to assume each depicted environment had edible herbs, fruits, or grasses within the composition even if they couldn't identify any edible plants. See Appendix C for a copy of the survey.

Respondents were selected and recruited in Boulder and surrounding areas. I limited the sample to adults. Groups from the University consisting of the Environmental Center and American Society of Landscape Architects Student Chapter were contacted to distribute the survey to their employees and students. A flyer for a link to the survey was hung in the Boulder Public Library to attract a larger, public response. Overall, I received 26 responses.

After receiving the responses, I used the statistical analysis software SAS to analyze the data and understand the correlation between the foraging rank of areas and their environmental characteristics. I also analyzed the correlation between respondent's demographic factors and their self-rated level of foraging knowledge. Ultimately, the findings from this survey and the prior one allowed me to create a list of which environmental qualities were most important to encouraging foraging behavior, which is the most important element in the development of the design guidelines.

Interviews

I interviewed four people in order to gain an understanding of how and why people forage in this region. In tandem with the surveys, the interviews were able to illustrate previous findings and provide insight to the underlying reasons behind patterns established in foraging preference. The interviews consisted of three questions:

1. How did you become interested in foraging and how did you educate yourself on the subject?
2. What types of plants or foods do you typically forage for, and how do you decide what to collect in a given environment?
3. What kind of environments do you often forage in and why is that? Which place is your favorite? Can you describe them to me?

These questions were crafted to give insight into how people forage, why they became interested in the field, what they forage, and what kind of environments they

tend to forage in. I encouraged participants to talk as much as they wanted about each question. Occasionally, I provided prompts for further explanation, but they were largely left to elaborate on their experiences on their own.

The four interviewees chosen were all adults living in and around the Colorado Front Range who had some experience with foraging, ranging from a self-taught novice to people considered experts who lead foraging companies or classes. Interviews were conducted through video calls over Zoom and lasted between fifteen and thirty minutes. I provided participants with a questionnaire and a consent form, see appendix D for copies of them. I was taking notes throughout the interview, as well as recording the audio which was later transcribed using Zoom's built in functions. After I completed the interviews, I reviewed the transcripts and my notes, and coded the text. I used colors to sort through key ideas brought up in the interviews and identify any repeating themes found between them.

In the end, all of the data I collected using these methods will be used to develop a set of design guidelines that can be applied in landscape architecture to best encourage human foraging behavior. The diversity of methods I used helps ensure the data accurately represents what different people look for in foraging environments. Therefore, the guidelines are best suited to create comfortable and engaging environments where people feel safe and able to harvest wild foods.

Chapter 4:

Results

The data used for this research was collected using the guided walking tour, surveys, and interviews described in the prior section. First, I will be discussing the results of the guided walking tour, examining what environmental typologies participants identified as preferring and how they foraged in each space. Next, I will discuss the findings of the surveys and the correlations revealed through statistical analysis. Finally, I will review the interviews and examine what experienced and novice foragers look for when they go out to harvest wild foods.

4.1 - Guided Walking Tour

I conducted a guided walking tour to examine how people reacted to different environments while they were in them. Through use of conversations with tour participants and the worksheets they filled out over the course of the tour, I compiled table 4.1 to rank each station based on the average preference expressed. Included in the table are key words participants brought up multiple times in reference to each station, exemplifying the perceived qualities of the space.

Answers and reactions indicated participants' preference for spaces with dense and varied plant life, as well as spaces that promote a sense of safety through proximity to human-made amenities.

Naturalness

Station 3–the wooded path–was identified as the station participants enjoyed the most. It appears to users as a natural ecosystem, being what most people would think of when asked to identify a biodiverse environment. The plant life here was very diverse, and the high concentration of trees was brought up multiple times as a factor people liked in the space. This was also the station where participants had the easiest time locating plants they could identify.

Station 1 and 5, in contrast, were manicured landscapes and ranked lower as a result. These spaces had curated plantings and large swaths of lawn, which all participants called out as lacking biodiversity. A few people brought up pollution as a concern in these spaces, feeling the plants there might absorb runoff from the road or pesticide from management, and identifying more litter there than in other stations on the tour. Most of the designed plantings in these spaces consisted of native plants, but because they were not in a natural setting, they had little effect on participant's expressed preferences for the station.

The rocky environment–station 4 –was generally disliked by most participants despite being very natural. Participants complained of lack of trees and other plants in the area, as well as the exposure to the sun on the mountainside. The numerous rocks formed niches where many participants feared animals such as snakes or spiders could be hiding, creating a sense of danger and contributed to participant's general dislike of the space. This shows that natural, diverse vegetation–not just simple "naturalness"–is the important element when determining if

Table 4.1: Table of Findings from the Guided Walking Tour

Station Number	Photo	Ranking	Keywords
Station 1		5	Noisy, Dangerous, Dirty
Station 2		3	Boring, Open, Exposed
Station 3		1	Biodiverse, Accessible, Comfortable
Station 4		4	Steep, Unsafe, Barren
Station 5		2	Safety, Nostalgia, Monoculture

people would feel comfortable in an outdoor space or not.

Participants' backgrounds showed some influence on which spaces they liked or disliked. For station 2, the four participants with educational backgrounds in biology and landscape architecture indicated a higher preference for the space and were able to identify much more biodiversity and ecological systems than the three participants with backgrounds in architecture and business. In general, greater varieties in color, size, and

species were all positive indicators in whether someone–especially a lay person without foraging or ecological experience–enjoyed a space or not.

Engagement

While station 5–the manicured park–lacked the qualities of a "natural" space, it contained a variety of elements that welcome human interaction with picnic tables, benches, and play structures. This space was also well populated with many groups engaging in recreation during the weekend, but open enough that it was quiet and participants were able to find secluded areas to experience the space. As a result, all participants ended up indicating a high preference for it, citing feelings of nostalgia and safety facilitated by the presence of human designed elements and other people in the space.

Station 3 also contained some designed elements, with a well defined path and some fences placed along it. The path was partially responsible for participants' enjoyment of the space. Although it was not paved, it was well designated and maintained with few obstacles such as roots or rocks posing tripping hazards. The slight slope also made walking easy. Participants remarked on how easy it was to move through and access the space. I observed participants easily finding places to sit on fallen logs or at the base of trees as well, acting comfortable during their time there. This contrasts to their time at station 4, where participants expressed concerns about the difficulty of accessing and moving through the space, as it required an ascent along a path with many trip hazards. Once there, the space itself posed challenges, requiring participants to climb stone steps or scramble over loose boulders to navigate. Path quality was an important determining factor if people felt comfortable spending prolonged time in a space.

At station 1, participants all complained of loud noises from the cars and feeling unsafe being near a heavily travelled road. Although there were amenities like benches in the space, the uncomfortable surrounding environment discouraged people from thoroughly interacting with it. No participant indicated a liking of the space or a desire to spend time in it interacting with the plants.

Based on the observations from this section and the one before, highly preferred spaces need to offer both natural elements and amenities designed for humans to use. Station 4 was too natural and made participants feel uncomfortable while station 1 was too developed which caused participants to dislike it. Stations 3 and 5 were able to strike an effective balance between naturalness and engagement, making them highly preferred. When a space made people feel more comfortable, they were more willing to explore it and engage with the vegetation in it. Multiple participants mentioned man-made elements in a space such as benches, tables, and play structure as possible indicators of "safe" plants to eat, believing designers wouldn't attract children to toxic plants. As a result, participants were consistently drawn to plants near built amenities and defined

paths rather than going off trail to find things in more natural environments. At no point did participants go more than five feet off the trail unless I prompted them to.

Education and Plant Preference

Along the tour, participants were also asked to identify edible plants in each station. The plants they found were consistently flowering and berry-bearing plants, far more than grasses or leafy perennials. Additionally, I introduced participants to some invasive foragables around the site, telling them how to harvest the plant and what its use was. At each subsequent station, at least one person would find that plant and identify it on their worksheet. This was done entirely without prompting. At the end, we walked through a labeled garden featuring plants native to the area and signs identifying their species. Participants independently searched for these plants out in nearby vegetation to identify them and try any parts they were told were edible. Overall, they seemed eager to apply identification skills to what they were seeing, showing the value of integrating education into foraging spaces.

4.2 - Surveys

Demographic Results

A total of 26 people responded to the Visual Landscape Assessment Survey. See table 4.2 for a complete summary of survey demographic results. Respondents were evenly distributed across all genders, although a slight majority were female. The majority of respondents were white and between the ages of eighteen and twenty four, but I received responses from all age groups. Respondents were, on average, fairly educated, with all having at least a high school degree and many with some college completed, a college degree, or a graduate degree. Total income was well distributed but tended to be higher, which could be a result of many college students still reporting their parent's income. Respondents largely lived in suburban environments but rural and urban environments were also represented. Most people self-reported their general health to be excellent, very good, or good, and no one said they were in poor health. Respondents reported an average of 11.69 hours of physical activity per week. Most engaged in 1-15 hours, while some exceeded 20 hours, often due to physically demanding jobs. The self-reported physical activity data might be susceptible to bias due to social desirability and may not be representative of a yearly average as it was collected in the winter.

Most respondents were aware of foraging but had little to no direct experience with it, having either never participated or only tried it once or twice. A few people were completely unfamiliar with the subject or had extensive experience with it.

Through statistical analysis, I tried to identify the factors that may influence an individual's foraging knowledge. I conducted a correlation analysis between the foraging knowledge and demographics factors using SAS studio. See table 4.3 for the results of the analysis.

Table 4.2: Table of Demographic Data from the VLS

Gender Identity	
Male	8
Female	11
Non-Binary	7

Age	
18-24	19
25-44	3
45-64	3
65+	1

Ethnicity	
White	24
Hispanic	1
Other	1

Schooling	
High School Graduate	4
Some College/Associate's Degree	10
College Degree	7
Graduate Degree	5

Income	
<$25,000	6
$25,000-$49,999	5
$50,000-$74,999	1
$75,000-$99,999	3
$100,000-149,999	6
>$150,000	5

Residence	
Rural	3
Suburban	17
Urban	6

General Health	
Excellent	2
Very Good	10
Good	12
Fair	2

Physical Activity	
1-5	11
6-10	7
11-15	2
20-25	4
26+	2

Eating Habits	
Rarely	2
<1 Time a Day	7
1 Time a Day	3
2 Times a Day	12
3 Times a Day	1
4+ Times a Day	1

Foraging Familiarity	
Never Heard Of	2
Heard Of, Never Done	15
Done a Few Times	7
Done Regularly	1
Expert	1

Table 4.3: Table of Demographic Correlations

	Male	Female	Non-Binary	Age	White	Non-White	Schooling	Income	Urban	Suburban	Rural	Physical Activity	Health	Eating Habits
Correlation with Foraging Knowledge	-0.4069	0.393	-0.07184	0.40338	0.30561	-0.30561	0.569	0.02414	0.41005	-0.2456	-0.03361	0.00759	-0.28586	0.51714
Confidence T-Value	0.0393	0.047	0.7273	0.041	0.1289	0.1289	0.0024	0.9068	0.0375	0.2265	0.8705	0.9707	0.1569	0.0068

How do demographic factors affect knowledge of foraging?

Eating habits and educational attainments have the strongest positive correlation with someone's foraging knowledge; the healthier someone ate or the higher the level of education a respondent completed, the higher they ranked their own experience and knowledge of foraging. Age and urban residency also showed a positive correlation with foraging, though to a lesser extent than the previously mentioned variables. People identifying as female were shown to be more knowledgeable on foraging than people of other genders. This suggests that an interest in and care for healthy eating and the consumption of fruits, vegetables, and leafy greens, as well as higher level of education are the biggest indicator that someone may have an interest in and knowledge of foraging.

How do environmental characteristics affect the choice of areas for foraging?

Using the results from both the Environmental Characteristic Surveys and the Visual Landscape Assessments, I analyzed the correlation between environmental characteristics in a space and its favorability for foraging. See table 4.4 for the environmental characteristic and foraging preference data used in this analysis. The analysis was conducted using SAS Studio and analyzed the correlation between the ranking each environment received for foraging and the environmental characteristics of that space. See table 4.5 for a summary of the results.

Engagement, sensory appeal, naturalness, vegetation diversity and the environmental comfort of a space all showed positive correlation with people's ranking of the space for foraging. Of these factors, naturalness and sensory appeal had the highest correlation values, and environmental comfort was the lowest. Both trail condition and accessibility and legibility and safety were negatively correlated with the foraging ranking. These results suggest that the most preferred foraging spaces resemble natural environments and offer safe, direct engagement through diverse vegetation and sensory-rich elements. In contrast, spaces that are highly designed or maintained by humans were shown to discourage foraging behavior.

These results suggest that each environmental factor identified in the Environmental Characteristic Survey has a significant impact on human foraging behavior in a given space. For each correlation between a given factor and the foraging ranking, the confidence value was over 95%–with many being almost 99%–indicating that each factor affected whether people would want to forage in that space or not. The variables with the highest level of confidence are engagement,

Table 4.4: Table of Results from ECS and VLS

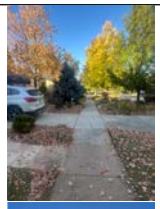
		Trail Condition and Accessibility	Legibility and Safety	Engagement	Sensory Appeal	Naturalness	Vegetation Diversity	Environmental Comfort	Foragablility
Photo 1		4.8	4.8	2	3	1.5	2.2	3	1.7
Photo 2		2.8	4.2	4	4.6	4.4	3	3.4	3.4
Photo 3		3.8	3	4	4.2	4.6	4	4	3.7
Photo 4		3.8	4.2	2.4	1.5	1.4	1.8	1.6	1.3
Photo 5		5	4.5	3.8	3.8	3.6	3.8	4.5	2.7
Photo 6		5	4.2	3.8	3.6	3.6	3.6	3.8	3.1
Photo 7		4.6	4.8	2.8	2.8	2.2	2.2	3	2.0
Photo 8		3.6	4.2	4.2	4.4	4	4	4	3.4
Photo 9		3.8	3.6	3	3.8	3.8	2.8	3.6	3.6

Photo 10		4	3.8	4	4.2	4.2	3.8	4.2	3.8
Photo 11		4	4.25	3.6	4.4	4.4	4.4	3.8	3.7
Photo 12		3.2	3.2	3.6	3.6	4.2	4	4.2	3.7
Photo 13		5	4.5	2.2	2.6	2	2	2.2	2.7
Photo 14		2.8	2.8	3.4	4	4.4	4	3.4	3.5
Photo 15		2.8	2.6	3.6	4.2	4.2	3.4	4.2	4.0
Photo 16		4.8	4.6	2.6	3.2	2	2.8	3.2	2.3
Photo 17		2.6	2.2	2	3	3.75	3.2	3	2.2
Photo 18		5	5	3	3	2.2	2.2	3	2.1

Photo 19		4.75	4.2	1.8	2	2.2	2.6	2.2	1.8
Photo 20		5	4.75	2.4	2.8	2.6	2.4	2.25	1.9
Photo 21		2.2	2.2	4.75	4.25	4.8	4.2	3.4	4.0
Photo 22		4.75	4.5	2.25	3.2	2	2.6	3.4	1.9
Photo 23		4	4	4	4.2	4	3.8	4.2	3.7
Photo 24		2.8	2.2	3.25	3.4	4.4	4.4	3	3.5
Photo 25		5	5	3	3	2.8	3	3.6	1.8

Table 4.5: Table of Foragability Correlations

	Trail Condition and Accessibility	Legibility and Safety	Engagement	Sensory Appeal	Naturalness	Vegetation Diversity	Environmental Comfort
Correlation with Foragability	-0.61286	-0.61286	0.8115	0.86028	0.90255	0.8021	0.68569
Confidence T-Value	0.0011	0.0012	<0.001	<0.001	<0.001	<0.001	0.0002

Table 4.6: Table of Interview Themes and Quotes

Themes	Sub Characteristics	Quotes
Development of Interest	Family History	"I know my grandma lived through the great depression on a lot of forage. She taught me a good dandelion salad recipe..."
	Finances	"I was going through kind of a rough time, financially."
	Existing love of plants	"I've always been interested in plants, you know I've always been really interested in herbs..."
		"I have had a long standing interest in wild plants, and I think a lot of that has to do with growing up in a rural environment."
	Love of Nature	"And also I just love it like, I love being outside."
	Free Education	"Instagram was a big component for me."
		"Oh, I've only been using free resources."
	Expanding Knowledge Through Expensive Means	"So I started buying books. And also going to events, was a big thing, so I would go to like little foraging events around Boulder."
		"Then I took a bunch of classes, some weekend seminars, and then I decided to get serious, and went back to get certified."
What People Forage	Good Tasting	"I look for younger plants, cause they're less bitter."
		"I don't think about it as much like because there's always ways that you can alter it through at home ... There's ways that you can make it delicious, no matter what."
	Seasonality	"The warmer season stuff comes out. Then I'm going to follow that I'm going to go to the fields of grasses and see if the cheatgrass is seeding yet. See if the rice grass is seeding yet. Go see if the acorns have dropped yet, and so that's really going to dictate where I show up, and why."
		"It just depends on the time of year."
	Easy to Identify	"Oh, I feel much more comfortable walking around, seeing like obvious fruit or I know, just like herbs and things like that people can grow, and it feels much more accessible to me now."
		"...less effort."
	Invasive Plants	"I mostly go for invasive stuff like amaranths, and Lamb's quarter dandelions as well."
		"BLM and the National Forest, they don't have any problem with you harvesting nettles or dandelions, or mullein, or some of the other yellow dock, you know."
		"I have invasive weeds, but I just keep a really strong eye on them, and you know I mean you can manage them."
Where to Forage	Accessibility	"Most accessibility is huge. I mostly go for stuff that's either in my backyard or along like little ditches..."
		"So if I go on walks in my neighborhood, I'm much more inclined to be like, oh, I wonder what that's gonna be, or there's like a peach tree on that corner. I wonder if I could grab one or things like that?"
	Private Property and Lawns	"I like my backyard. Have gotten edible plants out of some friends yards as well"
		"Backyards, secluded from the road, primarily, like, residential places."
		"...we have an acre here. We also have some property in southern Colorado."
	Biodiversity	"So the forest. For sure. I find there's more biodiversity, there's more complexity. The soil is healthier."
	Natural Spaces	"But yeah, I prefer public lands. National Forest is the easiest one to do. Obviously, you're not going to be foraging on conservation spaces, state parks."
		"Get out to the wild places like BLM land"
	Isolation	"I don't like to see other people. I'm out there because it also just makes me feel a little bit more concerned about over harvest, so I'll go off. I'll go off to different parts that are less trailblazed, I guess."
	Away from Pollutants	"I don't really prefer to forage in urban settings, because I do worry about say, like the pollution coming off of exhaust"
		"Is it downhill from an agricultural site, or a golf course, or anything like that? Because anywhere where it's been sprayed, or next to a road, you're going to get toxins."
		"It hasn't been sprayed, or it's not next to a highway or something"

sensory appeal, naturalness, and vegetation diversity, suggesting that they have the highest impact on someone's willingness to forage in a space.

4.3 - Interviews

I conducted four interviews with experienced foragers–two I considered to be experts due to their extensive education and professional experience in the field and two considered to be mid-skilled, casual foragers. See table 4.6 for some quotes and their related themes from these interviews.

Development of Interest

In terms of developing an interest in foraging, all participants indicated a lifelong fascination with or curiosity of plants and their edible qualities. While the motives behind this interest varied—from herbal to culinary to medicinal—a shared love of the outdoors and plant life in general provided a pathway for these individuals to explore foraging. All mentioned using books, internet resources, social media, and classes as educational sources they sought out to learn about the subject. Mid-skilled foragers mainly stuck to free or cheap resources for their learning while the experts ended up using more expensive books, courses, or educational programs to further their knowledge.

Participants also indicated that the realization that wild plants could be edible was a shock to them when they were younger, with one mid-skilled forager saying: "… there (was) a big disconnect–in my head–that you could eat something that (you) just (find) growing." Another participant–one of the experts–mentioned a similar revelation impacting their life, especially regarding nuisance plants–such as weeds or invasive plants–and the ability to integrate foraging into outdoor recreational activities, saying: "And most of these plants that are considered weeds are something that you're walking by every single day in an urban setting, and that just really shifted my worldview. … And then, oh, why don't I expand this to when I'm outside and foraging or outside and hiking…" These perspectives suggest that introducing people to more plants in their daily lives and their possible edible qualities can help increase public interest in foraging.

What People Forage

When it came to where, what, and how these people foraged, concepts regarding taste, seasonality, ecology, legal issues, and pollution came up in their answers. Everyone understood that seasonal growing conditions would affect what plants would be available and where they would be available. Experts were much more concerned with it, however, as they said they were unable to answer the question "what do you like to forage" as it varied so much with the seasons. Seasonality also plays a big part in what plants taste like, and mid-skilled foragers indicated usually seeking out younger plants because "they're less bitter." Everyone interviewed stated they preferred flavor over other medicinal or nutritional qualities in the plants they harvested (bitterer plants tend to be more nutritious). However, expert foragers noted

that preparation methods such as cooking and making teas could make bitter or unpleasant-tasting plants more palatable.

Talk about eating mainly "invasive" plants was brought up as a main way interviewees tried to make their foraging practices sustainable. Both experts and mid-skilled foragers talked about seeking out plants considered to be invasive or non-native in the region such as amaranth, garlic mustard, cheatgrass, nettles, mullen, or dandelions as the main things they foraged. One expert strongly believed that foraging these kinds of plants–whether on public or private land–was the best way to manage them as total removal is likely impossible at this point. Being able to properly identify plants and their ecological roles can become an important part of foraging and ensuring people harvest wild foods respectfully. This logic helped the interviewed foragers feel better about the legality and ethics of their practice, knowing many places restrict the harvest of wild plants due to fear of over harvesting but would not care if you were removing harmful plants. General fears of overharvesting were also brought up by interviewees. They discussed additional methods such as never harvesting more than half of what they found, avoiding endangered or rare species, and keeping key plant habitats a secret as ways they prevented overharvesting in their own practice and in the community.

Where to Forage

Experts displayed a better understanding of what environmental conditions to look for to find certain edible plants and how the qualities of a landscape would affect what was available. They each indicated biodiversity as one of the major environmental factors they looked for when they were foraging, with one saying: "If there's ample biodiversity, you're going to find forageable material. And you're also not going to have to worry as much about over harvest. So if there's biodiversity, then that's going to be a place that I go." This aligns with the results from the surveys which indicated vegetation diversity had a positive correlation with the "forageability" of a space.

The biggest split between expert foragers and mid-skill foragers was in the environments they tended to forage in. Mid-skill foragers were mainly urban foragers, seeking plants to harvest in yards of friends and family and in roadside urban plantings. Accessibility was indicated as one of the most important factors in where and what they decided to forage. They sought out spaces they could easily access in their daily lives and plants they could easily identify and eat such as leafy greens, berries, or cultivated fruit trees. These people rarely went to "natural spaces" to forage. In contrast, expert foragers sought out remote spaces to do most of their foraging. They hiked deep into BLM land or into protected forests to harvest away from the crowds, with one expert saying: "I don't like to see other people. I'm out there because it also just makes me feel a little bit less concerned about over harvest, so I'll go off. I'll go off to different parts that are less trailblazed…" They were also more

willing to harvest difficult plants that required preparation to eat such as stinging nettles or thistle.

Pollution was a major factor that affected everyone's foraging behavior, but there was also a difference between how mid-skilled foragers and expert foragers expressed those concerns. Mid-skilled foragers were only concerned with possible pesticide spraying on harvested plants. Experts, on the other hand, were aware of all the other possible pollution sources that could contaminate a plant such as run-off from roads, mines, and other properties or air pollution. One expert said, in regards to considering if a plant was safe to consume or not: "Is it downhill from an agricultural site, or a golf course, or anything like that? Because anywhere where it's been sprayed, or next to a road, you're going to get toxins." In contrast, one mid-skilled forager said: "I hadn't thought about road run-off." The increased fear of pollution is a main reason why expert foragers prefer to not harvest in urban settings. Making sure any foraging space is safe and clean needs to be a consideration when trying to increase interest in the activity to the general public.

Differences in foraging skill level has a big influence on how people perceive the environments that they forage in. In general, ensuring a space is accessible and the plants in it are easy to identify and eat helps novice and mid-skilled foragers participate in the practice more. Making sure a space is biodiverse, the edible plant life is plentiful, and that it is clean of pollutants, however, are more nuanced issues that mainly experts are aware of but are important for ensuring the usability of the space is sustainable in the long run.

Chapter 5:

Discussion

This study utilized a mixed methods research approach, allowing me to explore people's foraging preferences through various mediums and determine what environmental qualities most often affect a person's foraging behavior. Together, the data collected suggests that natural-looking environments with sensory appealing elements are the most attractive for human foraging behavior.

During the walking tour, participants indicated the highest preferences for spaces with diverse vegetation and some amount of human designed elements, such as defined trails, fences, or benches. This aligns with prior research done by Van den Berg (2003) and Kaplan & Kaplan (1989), which both indicate natural environments have positive impacts on mood and performance, but also emphasize that a feeling of safety is required to make someone truly comfortable in a space. The presence of human designed elements helps create that sense of safety, helping with wayfinding and indicating safe spaces to be in. Another finding from this tour aligned with Zheng's (2011) research, indicating that participants with environmentally focused educational backgrounds showed a stronger preference for natural spaces and a lower preference for designed elements.

The guided walking tour gave insights to people's overall environmental preferences but, generally, participants had limited experience with foraging and were unable to easily identify the wild edible foods present at the five tour stops. However, their lack of baseline knowledge helped indicate the importance of education in design for foraging, as all participants were responsive to signage and direct feedback pertaining to plant identification and harvesting in a space. This aligns with the findings of Ziaco (2012) and Žoncová (2013) which indicate educational trails as important tools for connecting people with natural environments, especially when they include signage or routes that align with natural features of interest.

The statistical analysis revealed naturalness and sensory appeal as the most important environmental characteristics for a preferred foraging space. Naturalness aligns with the findings from the guided walking tour; people tend to prefer spaces that resemble biodiverse, natural ecosystems. Also, people usually would assume natural spaces with diverse vegetation would have a higher likelihood of having wild foods, and also a higher diversity of things to harvest, even if they had little knowledge in regards to plant identification.

Based on the survey results, spaces with a high rating for sensory appeal are more likely to attract foragers because they invite people to stay there for a longer time. People are more likely to stay longer in a space where they feel comfortable, increasing their chances of exploring elements within it, such as the vegetation. Similarly, engagement and environmental comfort contribute to the creation of ideal foraging spaces.

The qualities that negatively impacted foraging preference in a space were trail condition, accessibility, legibility, and safety.

This is likely due to the high-scoring images in those categories depicting sidewalks in urban settings, such as parks or urban trails. The environments these trails were in lacked the naturalness and diversity previously indicated as highly preferred in a foraging space. Maintained landscapes could also lead participants to expect the presence of pollutants and chemicals, such as runoff and pesticides, making the plants seem unfit for harvest. Pollution has been identified in much research as the main risk of urban foraging (Zeppelin 2022), so people could assume–whether through knowledge of foraging practices or intuitively–that maintained spaces wouldn't be the best for foraging activity.

Demographic results of the surveys gave some insight into what qualities and circumstances of a person can lead to interest in foraging. Overall, there were not many factors that had a significant correlation with foraging experience. Respondents who indicated eating many fruits, vegetables, and leafy greens showed–on average–more experience with foraging. This makes sense, as wild foods are known to be medicinal and nutrient dense, so people with an established interest in healthy foods like fruits, vegetables, and leafy greens would be more inclined to explore them. A higher level of completed education was also associated with more knowledge of foraging, but this may come as a result of multiple people who completed graduate research and certificates related to foraging being asked to take the survey while the rest of respondents were mainly current undergraduate students. Overall, factors such as gender, race, or income had little significant effect on a person's foraging experience, corroborating earlier research on the subject (McFarlin 2021).

Interviews helped indicate differences that exist between the foraging behavior of individuals with a moderate amount of experience in the field and those with extensive foraging experience–the main one being the desired accessibility of foraging spaces and goods. Novice foragers sought out accessible spaces such as lawns or urban plantings while experienced foragers would prefer to go to remote, off trail spaces when collecting wild foods. Experts cited concerns for biodiversity and overharvesting, as well as a general preference for natural places in their reasons for why they sought out those kinds of spaces, which aligns with earlier findings. However, when people haven't made foraging a major part of their lives, preferences for naturalness take a back seat to what is easy to find in their local environments.

Preferences regarding naturalness and accessibility seem to conflict with each other: why do the survey results indicate naturalness as one of the most important qualities for a space to be conducive to foraging when the interviews mark accessibility as vital for determining where the average person forages? This can be explained by the nature of the survey. Participants were asked to imagine ideal conditions when determining if they would forage in a given environment. Not having to physically be in or access this

environment allowed them to only consider what ideal foraging in a space would look like. Most people have an image of foraging as a rugged, outdoor activity done in remote locations rather than as an everyday urban practice (Zeunert 2018). A space that felt more natural–more rugged–seemed best fit for what respondents likely perceived foraging to be, leading to them rating it higher. These are environments that people in urban settings need to go out of their way to access, however, as natural spaces like the ones pictured in the survey are not a part of the average urban landscape. Instead, it consists of many sidewalks and roadside plantings, which is what an urban forager must work with to find accessible wild food without traveling far to reach ideal, remote locations. This disconnect between what is available and what is preferred is partially responsible for why so few people practice foraging in cities and towns. Creating spaces to bridge that gap is vital to expanding foraging's impact on food production.

Limitations

The changing seasons and limited time frame for this research presented a challenge, limiting the amount of fieldwork I was able to complete. I completed much of the research for this project during the late autumn into the winter: times of the year when little foraging is able to happen. As a result, some research methods were not as rigorous as I would have wanted, and I was unable to do much fieldwork for this project.

Ideally, more than one guided walking tour should have been conducted to eliminate bias and skewed data. Conducting more guided tours at different times of year, at different locations, with different groups of people would help gain a better understanding of how people react to and forage in a space and what factors influence that behavior. The tour I did hold was done right before the first frost, exemplifying the limitation of the seasons mentioned before. Tours having a greater focus on foraging in a space and conducted with experienced foragers would have been a great benefit to this project and should be explored in any future iterations. The findings from the single tour conducted already provided an interesting perspective into foraging behavior, so a more diverse sample would have been of even greater value.

Visual Landscape Assessments–while known to be the standard for exploring people's environmental preferences–hold limitations in that they do not place participants in the environments of study. Experiencing a place first hand can have a great effect on how someone perceives a location. Future research should prioritize studying people in the given environments to better understand these interactions. I began the effort in this project with the guided walking tour, but ultimately more should be done

More time would have allowed for a more in-depth analysis of the Visual Landscape Assessments. I was only able to find basic correlations between a small number of factors in an environment and

how people perceive a space to be conducive to foraging. While this information proved useful in the project, deeper analysis with more factors and more cross referencing with people's various preferences could have provided stronger indications on what people prefer in a space. Results then could have been more conclusive on what the guidelines should look like.

The relative small reach of the surveys likely limited the impact of some data. While all the environmental characteristics were shown to be significant, the small sample size made it difficult to find patterns in the correlation of demographic factors and foraging knowledge. A clearer picture could have been painted with more respondents. A similar sentiment is true of the interviews. Expanding the interview pool to include more people across different levels of foraging knowledge could have provided more insight into what makes a space attractive to foragers. Including children in this research should also be done in future iterations of this study. As foraging practices can be impactful on the futures of younger generations and children can provide unique insight to how people learn to forage, understanding how children forage is important, but the time limitations and unique approaches necessary to study children made it so I could not include them in this study.

Chapter 6:

Conclusion and Recommendations

As discussed earlier, there has been little overlap between the fields of foraging and environmental preference psychology up until now. As environmental and food production issues become more prevalent in our world, ensuring there are ways of localizing food production and diversifying crops eaten will become vital for the survival of our species. Making sure the spaces people encounter everyday are able to meet these needs will become an important responsibility designers must be able to meet.

Urban foraging is becoming a widespread practice for a large variety of people in ways humanity hasn't seen in a long time. Encouraging people to do this–to directly engage with nature through all of their senses and find ways to connect with local ecologies–should be a top priority for anyone who concerns themselves with the relationship between humanity and nature. How researchers and designers explore and facilitate this needs to be further developed and elaborated on to ensure a solution is reached where local production of wild foods becomes sustainable for all parties involved. Responding to cultural and ecological needs should be at the center of that. The ideas that I discussed in this research are only the start of that facilitation.

Recommendations

Using the data collected and described in this paper, I have developed a set of guidelines that should be used when designing public spaces where one would want to encourage foraging behavior in the site users. They are as follows:

1. Vegetation in the space should be diverse with appealing colors and textures
2. The space should be designed in such a way that it resembles natural systems indigenous to the area; plants should be allowed to seed freely and maintenance of the space should be kept to a minimum
3. Amenities such as tables and benches should be placed at constant and frequent intervals to allow people to freely and safely stop whenever they desire
4. Educational signage or pamphlets should be accessible to all site users to help draw attention to important plants or areas within the site
5. Small spaces should be created off the main trail for people to explore with more freedom to interact with the natural environment and away from man made noise and foot traffic

When these guidelines are integrated into designs, people are encouraged to explore the natural world around them with a new kind of curiosity. They respond to both kinds of needs required to get people interested in foraging: the need to create organic interest in the subject that most people may lack and the need to create spaces people will feel safe foraging in. Each guideline responds to those factors in different ways, but they all come together to create an ideal foraging environment.

Figure 6.1: Collage of Diverse Vegetation Design

Vegetation in the space should be diverse with appealing colors and textures

Collections of diverse vegetation have been shown in this researchW to be capable of drawing people in to explore what plants may be in an area. When designing the plantscapes on a site, ensuring a variety of colors and textures are used will help draw the eyes of site users and invoke a sense of curiosity that could lead to interactions with the plants. Particularly, ensuring the edible plants included in the site are bright colors could help potential foragers find and identify them. People are going to be drawn towards colorful fruits and berries before greens as they are easier to spot and identify, so designing with those plants specifically can help draw people to foraging more. Figure 6.1 Provides an example of what a space

designed to fit this need could look like. The diverse vegetation planted directly along the trail entices people to interact with it and forage for wild foods.

The space should be designed in such a way that it resembles natural systems indigenous to the area; plants should be allowed to seed freely and maintenance of the space should be kept to a minimum

Using native plants in a space is the best thing a designer can do to support and

Figure 6.2: Collage of Natural Systems Design

recreate natural systems. Allowing seeds to spread as they would naturally also helps create an environment people associate with natural ecologies. When you allow plants to spread like this, intensive maintenance in the space should be avoided. Not only would it retract from the natural elements of a space, but fewer maintenance practices create better opportunities for foraging. Firstly, not using pesticides or herbicides prevents pollutants from entering the ecosystem and helps keep wild food safe to eat. Additionally, the consumption of non-native, invasive plants is a key practice for avoiding over harvesting in foraging. While you shouldn't cultivate these plants, allowing them to exist in a space–as long as they are not damaging any other plants or natural systems–provides opportunities for people to forage in a more sustainable way. Additionally, encouraging people to harvest those kinds of plants will help control their spread without any extra labor or chemicals, introducing concepts of stewardship to the space and giving foraging ecological benefits as well. Figure 6.2 imagines what this may end up looking like, creating a space where both native and non-native plants grow without human intervention. The created space is dynamic, and draws people in as a result.

Amenities such as tables and benches should be placed at constant and frequent intervals to allow people to freely and safely stop whenever they desire

Built amenities–like furniture, play structures, or signage–in a site are vital to ensuring the space is welcoming and accessible. There are already guidelines that exist to manage the placement and design of seatings in landscape sites and these should be followed even on trails outside of the urban setting. Very rarely are people encouraged to stop and rest in natural spaces within their day-to-day lives, so the creation of spaces which allow that becomes vital for encouraging a connection between people and local environments. When allowed to stop and slow down, people notice more about the world around them, which will encourage them to explore and interact with it. The collected data shows that people already prefer spaces that provide seats and tables to rest and gather. These spaces prompt stopping and relaxation, so an increase in their amount and improvement of their quality will only further encourage appreciation of and participation in a site's environment, and therefore foraging.

Educational signage or pamphlets should be accessible to all site users to help draw attention to important plants or areas within the site

While some argue that signs are often left unread in a space due to a general apathy towards the knowledge they contain, my research indicates that when people–especially foraging novices–are in a space for the expressed purpose of foraging, they seek out as many indicators as they can to see what is edible and what is not. This often relies on the presence of manmade amenities like benches, tables, playsets, and signs to be that indicator. In addition to plant variety and

Figure 6.3: Collage of Amenities and Signage

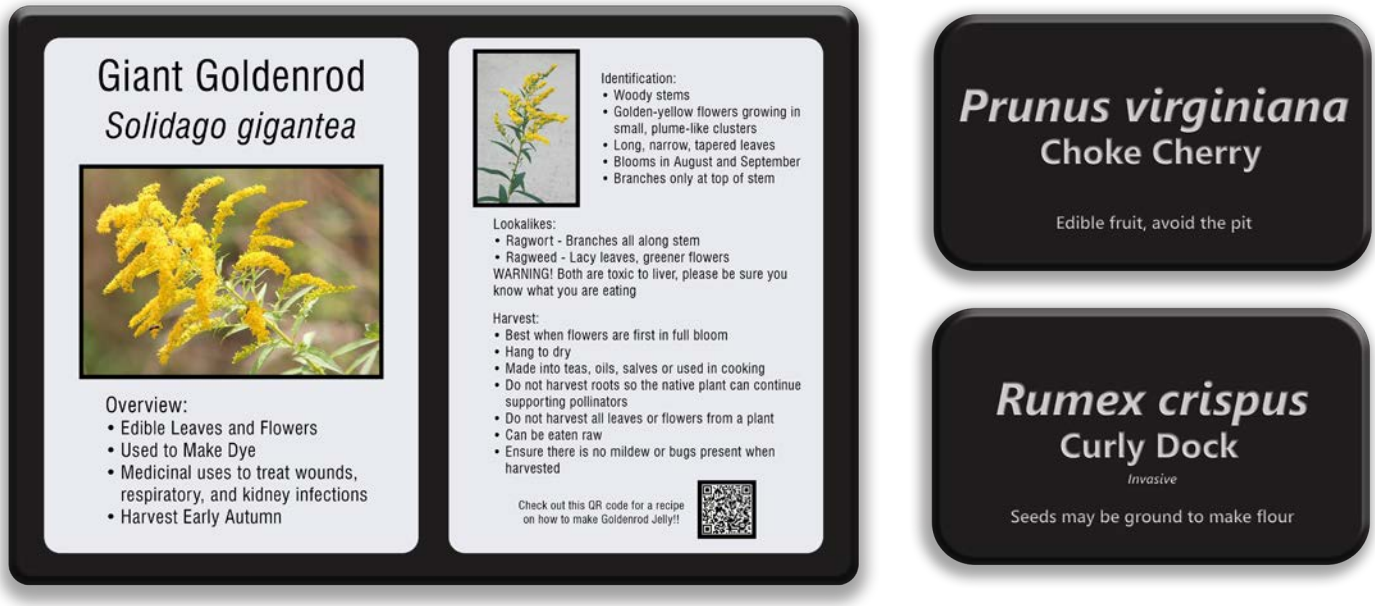


Figure 6.4: Proposed Sign Designs

additional seating spaces enticing people into a space, informative signage can be a design element that attracts people to foraging while they are visiting a space. Figure 6.3 provides an imagining of what a space design with this and the two prior recommendations may look like. The mix of diverse vegetation, amenities that invite someone to stay in a place, and signage that draws site users to specific plants creates an engaging space where people feel welcomed to forage, even on their daily walks or commutes.

The signage included in a design can vary in complexity and still be successful in how it distills information. Ensure to follow professional educational sign design guidelines for these signs. A combination of large, information dense signs and little plaques can be used in a design to best communicate the forgeability of a space. Big signs can be used to discuss a specific planting area filled with edibles or call attention to prominent edible species in an area. Information regarding identification, harvesting, and preparation can be included on the sign to easily educate visitors on how to ethically forage and what to do with what they collect. Small signs can call out specific plants in a larger planting that aren't as important to the region. Simply knowing what they are called and if they are edible should be enough to better inform people about foragables they can find in their daily lives. See figure 6.4 for an example of what these signs could look like.

Small spaces should be created off the main trail for people to explore with more freedom to interact with the natural environment and away from man made noise and foot traffic

While the common environmental belief is that people should stay on designated trails while in the forest, a desire to explore

and stray from a well traveled path is often prevalent in foragers, and necessary to avoid over harvesting. Foraging should respect the natural environments in which it occurs, but it is rare to find safe-to-eat wild food along heavily trafficked pathways. In response to this, designs should stray from a clear, straight, paved path through an area and instead create branching nodes for site users to explore. This allows a site to exist between a well traveled environment safe for most people to be in and an experience closer to the natural state of the world: the kind of space people routinely indicated as what they sought out when they wanted to go foraging. See figure 6.5 for an example of what one of these branching, small spaces could look like. Providing a simple deviation from the main path allows site users to customize their experience in a space. As a result, they feel more comfortable exploring it and searching for plants to forage.

These spaces fundamentally affect the

Figure 6.5: Collage of Engaging Small Spaces

footprint of a site and should incorporate the factors discussed in the guidelines above. They should facilitate people wanting to pass through on a quicker route but also those who want to sit and stay with benches and tables. The nature they pass through should be wild and diverse to simulate the natural systems many people desperately want to see and interact with but provide comfort and protection from unbearable elements like direct sun and wind. Integration of educational signs should work in tandem with other built amenities to create a space that draws people in and encourages them to stay and directly interact with the environment around them. In spaces such as these, people are safe but away from the sights and sounds they often complain about in their daily, busy lives. Serving as an accessible escape, here, people can have a chance to engage with foraging in a way that doesn't disrupt their normal schedule. Here, people can integrate foraging into their everyday practices no matter who they are.

Final Thoughts

Evidently, the creation of spaces people want to stay in is vital to encouraging foraging behavior within a site. Foraging is one of the most direct ways people engage with the environment around them so spaces that are conducive to exploration are critical for permitting people to harvest wild foods in a built design. The knowledge acquired here can begin to revolutionize the field of landscape architecture and how we design with edible plants. Moving into the future, ensuring all spaces we design (even the transient ones) are welcoming and accessible to all people can help bridge the gap between humanity and the natural world. When people begin to recognize the vast amount of edible flora they coexist with in their local environment, humanity can start to heal its broken relationship with nature and reconnect with traditional wisdoms that helped us survive generations ago.

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Appendix A

Environmental Preference and Foraging Research: Guided Chautauqua Hike
Sunday October 27, 2024
Name, Age, Pronouns, Academic Background:

Activity: During the hike, we will stop along 5 stations. At each, please record–with words and/or simple drawings–how the space is making you feel. What in it makes you feel pleasant v. unpleasant? What would you change in the space? What features are most attractive to you? Additionally, try to find and record at least one plant in the space that has edible or medicinal properties. What attracted you to this plant (think about both physical attributes but also the accessibility within the space)? You may take pictures during this time as well.

Station 1 (Streetscape)–

Station 2 (Open Field)–

Station 3 (Wooded)–

Station 4 (Rocks)–

Station 5 (Manicured Park)–

Appendix B

This survey is being conducted as part of the requirements for an Honors Thesis in the CU Boulder Program in Environmental Design. It aims to understand how landscape features around trails and natural pathways influence foraging behaviors in site users. The results of this survey will be cross referenced with results from a broader survey to determine which elements in a landscape are most important to foraging behavior.

You will be asked to rate a total of 25 photos in response to 7 qualities on a scale of 1-5 (1 being does not display the quality at all and 5 being embodies the given quality). Please review the definition of each quality below before you start the survey.

Variable Description

Trail Condition and Accessibility - How well-maintained is the path or space? Is it free from obstacles or hazards that could impede movement? How easy is it to access, considering surface quality, steepness, and any potential barriers for users?

Legibility and Safety - How clear and easy is the path to follow? Can you see far ahead down the path? Is the intended route obvious, or are there forks, turns, or diversions that make navigation unclear? Are there any unexpected surprises or hidden hazards that could pose a risk to users?

Engagement - Does this space feel like a place to quickly pass through, or is it inviting enough for you to stop, sit, and spend time interacting with the environment?

Sensory Appeal - Does the space evoke a pleasing sensory experience? Consider visual harmony, the implied sounds of the environment (like rustling leaves or water), and any cues that suggest pleasant or unpleasant smells.

Naturalness - Does the vegetation appear natural and untamed, resembling a wild ecosystem, or does it look carefully maintained, like a manicured garden?

Vegetation Diversity - Is there a wide variety of plant types, colors, and textures, or does one type of plant dominate the landscape (monoculture)?

Environmental Comfort - How comfortable does the space appear in terms of environmental factors like sun exposure, availability of shade, and the presence of wind or shelter from it?

The survey will take you about 20 minutes to complete. Please read and answer the questions carefully.
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Thank you for your time and participation!!

AJ Jelonnek
University of Colorado Boulder
Program in Environmental Design

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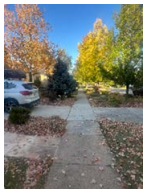

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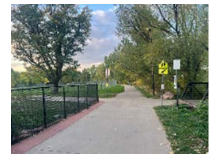

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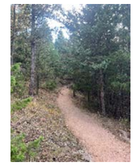

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Rate the Following Photo on a Scale of 1-5 Based on the Given Criteria

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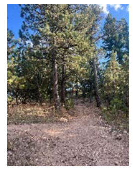

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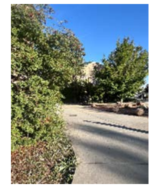

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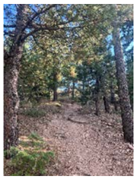

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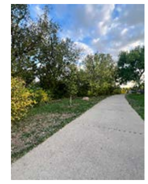

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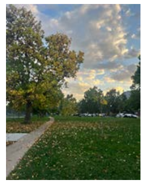

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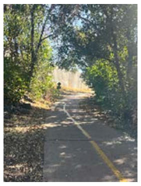

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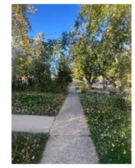

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Appendix C

This survey is being conducted as part of the requirements for an Honors Thesis within the CU Boulder Program in Environmental Design. The purpose of this survey is to examine what elements around trails and natural pathways affect foraging behavior in site users. The questionnaire includes two sections. In the first part, you will answer 10 demographic questions. In the second part, you will rate 25 photos based on how likely you would be to forage in the given environment knowing there are edible herbs, berries, fruits, or grasses in the area. It will take about 20 minutes to complete the survey. I am committed to maintaining the confidentiality of your answers. No name will be collected as part of your responses. The aggregated results of this survey will be reported as some findings of this project. Please read the questions and answer them carefully. I appreciate your participation in this activity. Thank you!!
AJ Jelonnek University of Colorado Boulder Program in Environmental Design

Demographic Questions

Which closest matches your gender identity?
- Male (1)
- Female (2)
- Non-binary (3)

What is your age?
- 18-24 (1)
- 25-44 (2)
- 45-64 (3)
- 65+ (4)

What is your ethnicity?
- African American (1)
- Hispanic/Latino (2)
- White (3)
- Native American (4)
- Asian/Pacific Islander (5)
- Other (6)

What level of schooling have you completed?
- No schooling completed (1)
- Some of grades 1-12 (2)
- High School Graduate (3)
- Some college/Associate's degree (4)
- College degree (5)
- Graduate degree (6)

What was your total household income during the past 12 months?
- Less than $25,000 (1)
- $25,000-$49,999 (2)
- $50,000-$74,999 (3)
- $75,000-$99,999 (4)
- $100,000-$149,999 (5)
- $150,000 or more (6)

What is Your Environment of Residence?
- Rural (1)
- Suburban (2)
- Urban (3)

How would you describe your general health?
- Excellent (1)
- Very good (2)
- Good (3)
- Fair (4)
- Poor (5)

Hours of physical activity in the past 7 days (walking, cycling, running, gardening, recreational activities or sports):

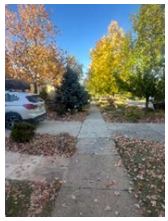
_____

How many times a day do you eat vegetables, fruits, or leafy greens?
- I rarely eat them (1)
- Less than 1 time a day (a few times a week) (2)
- 1 time a day (3)
- 2 times a day (4)
- 3 times a day (5)
- 4 or more times a day (6)

How familiar are you with foraging?
- I've never heard of or participated in foraging (1)
- I've heard of it but never tried it (2)
- I've tried a few times (3)
- I do it somewhat regularly and am fairly knowledgeable (4)
- I consider myself an expert at foraging (5)

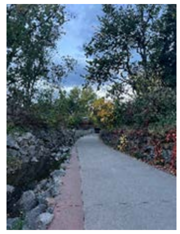
Photos

You will be shown a total of 25 photos. Imagine it is late summer, about 75 degrees out at 1 pm and sunny. Also, assume edible fruits, herbs, and grasses can be found within 10 feet on either side of the pictured path. Rank each photo based on how likely you would be to forage in the given environment.



- Would not forage here (1)
- Probably wouldn't forage here (2)
- Might forage here (3)
- Probably would forage here (4)
- Would definitely forage her (5)

Would not forage here (1)
Probably wouldn't forage here (2)
Might forage here (3)
Probably would forage here (4)
Would definitely forage here (5)



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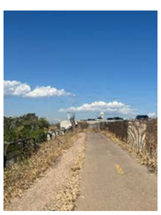

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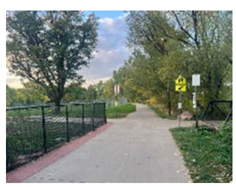

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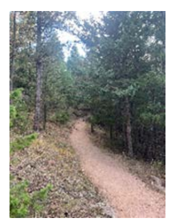

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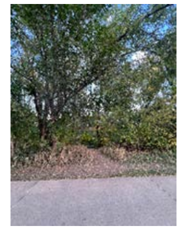

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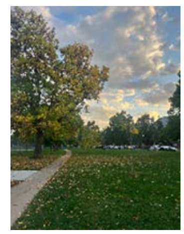

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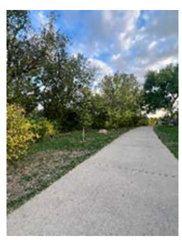

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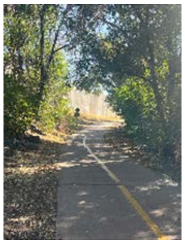

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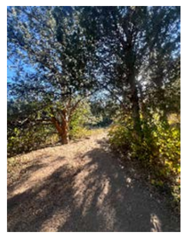
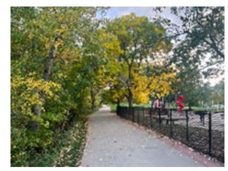
Would not forage here (1)
Probably wouldn't forage here (2)
Might forage here (3)
Probably would forage here (4)
Would definitely forage here (5)



Would not forage here (1)
Probably wouldn't forage here (2)
Might forage here (3)
Probably would forage here (4)
Would definitely forage here (5)



Would not forage here (1)
Probably wouldn't forage here (2)
Might forage here (3)
Probably would forage here (4)
Would definitely forage here (5)

Appendix D

Consent to Participate in Interviews

You have been asked to participate in an interview held by AJ Jelonnek, Undergrad Honors Thesis, Environmental Design Program, University of Colorado, Boulder. The purpose of this study is to try and understand how features in an environment affect foraging behavior in different people. The information learned in the interview will be used to create landscape design guidelines for pathways to encourage more people to forage in their daily lives.

The interview session will last for 30-45 minutes. The interview will include three questions. You can find them in the questionnaire also attached to the email. There are no right or wrong answers to the interview questions, we want to hear many different viewpoints.

You can choose whether or not to participate in the interview and stop at any time. Although the interview will be video recorded, your responses will remain anonymous and no names will be mentioned in the report. The recorded video will be transcribed and used by the research team for the purpose of this research and will not be shared with other people other than the study group or be presented at any occasions. Some direct quotes may be used if they pertain directly to the research, although they will be used anonymously.

The results of this study will be used as data for thesis research about foraging and environmental preference by AJ Jelonnek. These results may later be presented to the community.

If you have any questions, concerns or complaints about the interview, you can email AJ Jelonnek at amje6954@colorado.edu.

You need to state your consent at the beginning of the interview.

The Purpose of this Research

This research is being conducted by AJ Jelonnek as part of the requirements for an Honors Thesis in the University of Colorado Boulder Program in Environmental Design. It is meant to explore how people's preferences for various environments affect their behaviors regarding foraging. Ultimately, the data collected will be used to create a set of guidelines to direct the design of trails and pathways to facilitate and encourage foraging behavior in the average person. The information gathered from this interview will provide insight to what experienced foragers look for in foraging spaces and how the natural environment affects their behavior. Results from the interview will be analyzed and synthesized along with data collected from walking tours and Visual Landscape Assessments to create the aforementioned guidelines.

The Content of the Interview

The interview will last approximately 30 minutes. You will be asked three questions, they are as follows:

1. How did you become interested in foraging and how did you educate yourself on the subject?
2. What types of plants or foods do you typically forage for, and how do you decide what to collect in a given environment?
3. What kind of environments do you often forage in and why is that? Which place is your favorite? Can you describe them to me?

Please elaborate on your answer to each question as much as you feel comfortable doing so. Most of the interview will consist of your answers to these questions with little input from the interviewer unless you request clarification or prompting questions. Please indicate if any questions make you uncomfortable and you would like to skip them. There is no right or wrong answer to these questions and all responses will be recorded and accounted for in the data.

Verbal consent will be requested at the start of the interview. See the attached *Consent to Participate* document for more specifics on how the data will be collected and used.