LANDSCAPE PERFORMANCE SERIES
presented by the Landscape Architecture Foundation

Dune Peninsula at Point Defiance Park
Methods

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This investigation was conducted as part of the Landscape Architecture Foundation's 2022 *Case Study Investigation* (CSI) program. CSI matches faculty-student research teams with design practitioners to document the benefits of exemplary high-performing landscape projects. Teams develop methods to quantify environmental, social, and economic benefits and produce Case Study Briefs for LAF's *Landscape Performance Series*.

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The full case study can be found at: https://landscapeperformance.org/case-study-briefs/dune-peninsula

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Acknowledgements

We recognize that Dune Peninsula Park is in the unceded territory of the Coast Salish people. In particular, the site is situated on the traditional lands of the Puyallup Tribe. We acknowledge the histories of dispossession and forced removal and reflect on this history in ways that honor the memory of those dispossessed and keep us committed to the cause of social justice for indigenous populations.

We would also like to recognize Site Workshop for their time, energy, and commitment to this case study. Clayton Beaudoin provided his insight and openness to sharing his 'between the lines' knowledge of the site, the project history, and how the process of design and construction unfolded. Jordan West Monez for her contributions offering background about the site and her ongoing willingness to collect information, find answers, and join team meetings.

We acknowledge and thank MetroParks Tacoma for their support. Ross Wilton was generous with his knowledge, allowed us access to the site to conduct our studies and advertise our survey, and was helpful to the project all around. Anne Winters helped with the distribution of the survey via MetroParks Tacoma's social media. This work would have been impossible without them.

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We appreciate the support of the Landscape Architecture Foundation in funding and promoting this kind of research and want to extend a special acknowledgement to Megan Barnes for all her feedback and support.

Research Overview & Strategies

The research team set out to examine a new public park that was one portion of a larger project to remediate an EPA Superfund site, build multi-modal connectivity, and create a new mixed-use neighborhood. All these projects happening in tandem impact the overall outcomes of site performance, and therefore also influence our study findings.

We used a variety of methods to examine the design features and analyze the performance aspects of the projects, including on-site analysis, digital surveys, and predictive-proxy metrics. We looked at how some different research approaches and metrics offer different perspectives

of similar findings, and how visual design choices may impact the performance of a study survey. All unattributed photos were taken by team members.

Predictive-Proxy Metrics:

We propose two new approaches as tools that are relatively quick and easy to utilize. They are designed to be accessible to a wider range of users than more time-intensive research methods requiring specialized expertise, while also being grounded in the theories and findings of those same kinds of more time-intensive specialized expert research and further reinforced by studies like this one. This effort is in recognition of how the strict time constraints experienced by many professional designers slow the transition of knowledge from the research world into practice. These two approaches focus conceptually on designing for meaningful interaction patterns with nature, and happiness. The hope is that these kinds of tools may help professionals shaping the built environment get closer to their place-making goals faster.

Survey Strategies:

Online surveys were offered to park users. Requests for participation were distributed via MetroParks Tacoma's social media (Facebook and email list) and three A-frame signs were set up along the park path side. MetroParks Tacoma is the public agency that manages and maintains all the public parks in Tacoma, Washington. Results collected between June 22, 2022 and July 31, 2022 are included in this report. Responses were anonymous. The surveys were offered into two parts. We kept the first survey short to encourage participation, but knowing we wanted to find out more if we could, we provided the option to 'share a little more' at the ending 'Thank you' page. The short survey had 6 questions, took an average of 2 minutes to complete, and had a completion rate of 95%. The extended survey had 18 questions, with 4 possible follow-up questions, clustered under five themes: Access, Use & Usability, Connection, Identity, and Happiness. It took respondents an average of 8 minutes to complete and had a completion rate of 89%. Out of the 578 respondents to the first survey 266 (46%) went on to complete the second.

Very intentional graphics were an important part of our methodology, both in the survey announcement posters and in the survey itself.

We aimed to convey a simple and welcoming message in the posters. A bright focal point highlighting a friendly greeting 'Hi!' drew the eye and invited participants in visually. A special serif font (Adobe Devanagari) was chosen for the 'Hi!' for both its legibility and for the positive emotive character perceived by team members. The main text reads 'Enjoying your visit to Dune Peninsula Park? Tell us all about it!' in a sans-serif font (Calibri light Italic) chosen for legibility. We indicated approximately how long it would take, 'takes only about 2 minutes,' and included a very large QR code for people to scan with their mobile devices. Slightly smaller sans-serif text (Calibri light) described the project's partners and purpose and indicated where one could find the final report when published. The full poster included all the logos of our

partners in this study at the base, leading with our local partner MetroParks Tacoma, highlighting local involvement and support. Adobe Illustrator was used to make the layout.

Figure 1. A-Frame installed at Dune Peninsula Park uses bold & friendly graphics to draw attention and encourage participation.

The surveys were laptop- and mobile-friendly and included graphic illustration on most questions. Multiple-choice questions paired descriptive icons or photos with common words to help make it more accessible to a wider range of users. It was also intended to make the experience a little more fun and engaging, encouraging high completion rates.

The images in the multiple-choice questions were randomized to appear in a different order every time, with one exception for a question inquiring about how the park feels, opting to keep the graphics in a logical order. Yes/no or short answer questions also included photos or similarly styled illustrations to help frame the question for the users. For short answer questions there was an option to speak one's answer instead of typing it. We used the SurveySparrow platform to create the surveys because of the capabilities it provided. The Noun Project was used to source some of the illustrative material, which was then edited and added to by the team.

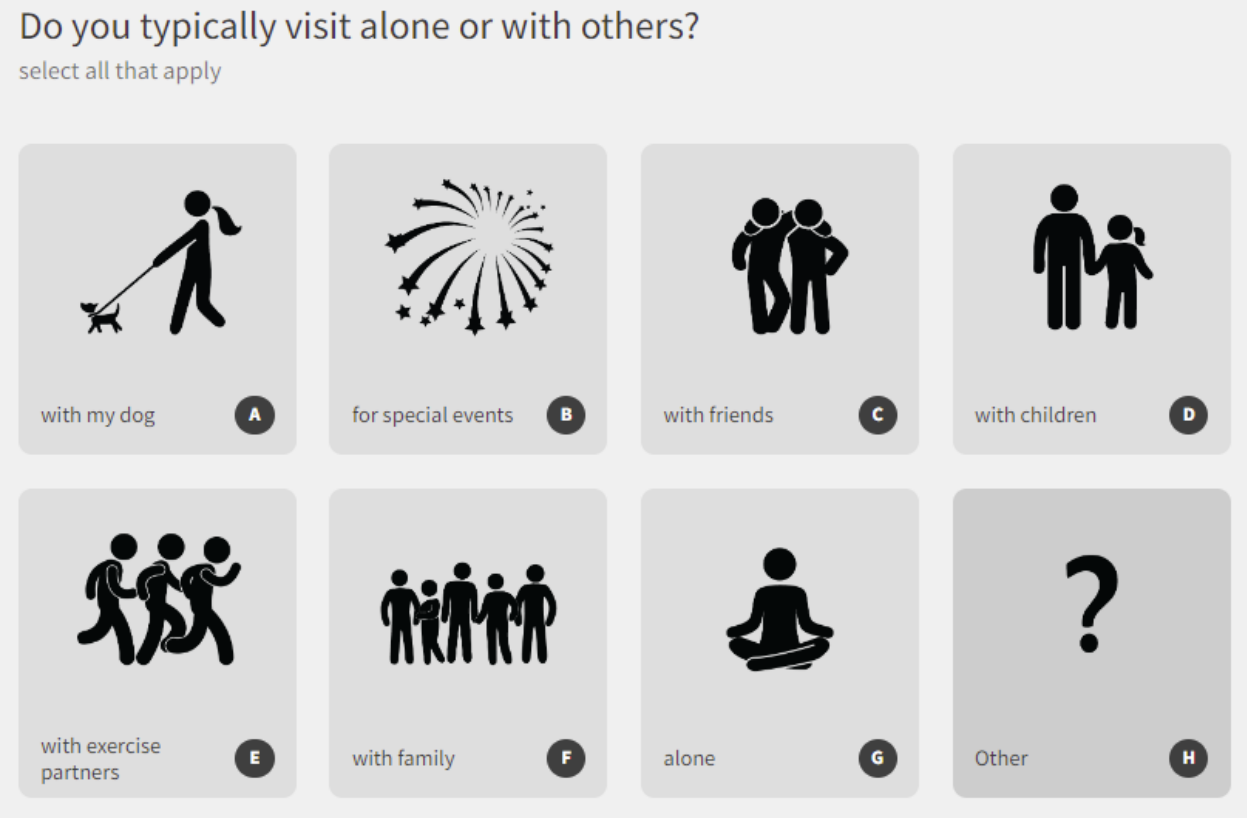

Figure 2. Descriptive graphic illustrations or photos were paired words in the multiple-choice questions.

This survey design approach was inspired by the graphic-focused survey design work of Maria Beltran Rodriquez in her study of convivial behavior in Superkilen Park in Copenhagen, Denmark. Although we did not try to track how much of a difference our efforts towards very intentional graphic design choices and extensive survey illustrations made in our response and completion rates as compared to other possible approaches, the response and completion rates for our project seemed surprisingly good to us. Considering how time and staffing constraints may recommend more passive collection choices like the ones used here, the effectiveness of these kinds of techniques are worth studying further.

Survey Strategies Sources:

Rodriguez, Maria Beltran. 2020. “The People’s Park: A study of the relationship between design and convivial behavior in Superkilen.” https://doi.org/10.13016/afli-qvpu.

“Build Better Experiences, the Right Way.” n.d. SurveySparrow. Accessed August 6, 2022. https://surveysparrow.com/.

“Noun Project: Free Icons & Stock Photos for Everything.” n.d. Accessed August 6, 2022. https://thenounproject.com/.

Survey Strategies Limitations:

- Being an online-only survey accessed by QR code at the park site, some park users were likely excluded due to lack of access to technology.

- The relatively short window of time of survey collection captures experiences from only one season.

- Because the poster invited park users into the survey by asking “Enjoying your visit to Dune Peninsula Park?” the positive language may have influenced selection bias. No research design was implemented to reduce selection bias or seek specific demographic inclusion.

- We could not include features with this survey that may have been more inclusive to park visitors who are blind because the survey platforms available to us did not support blind or low vision-friendly features and we were limited on time and resources to create our own.

The research project is managed by the *Case Study Investigation* (CSI) program and modeled on the *Landscape Performance Series* (LPS) formatting, with funding support from a Landscape Architecture Foundation (LAF) grant.

Environmental Benefits

- ***Saves an estimated 300,000 gallons of water and $3,800 annually in irrigation costs for 5 acres of prairie, as compared to other local parks with more traditional park landscaping.***

Background:

Landscape design typical in Tacoma MetroParks requires more water, fertilizer, and active maintenance than the native prairie plants utilized on site. After prairie plants are established in the first year, native prairie should require no additional watering.

Figure 3. Native Puget Sound prairie requires little to no water once established, leading cost savings in water use.

Method:

We were not able to get exact cost or water usage data from MetroParks for Dune Peninsula Parks, or the system overall since 2019. Instead the team made estimates based on currently available data.

According to past MetroParks Tacoma published data from 2014, other parks with more typical landscape design (and typically more non-native plant material) in MetroParks Tacoma system use between approximately 300 and 700 CCF (hundred cubic feet) of water per acre annually. Using a value on the conservative end of 400 CCF of water per acre annually as a comparison, we estimated water savings for the 5 acres of prairie planted at Dune Peninsula Park to be 2,057 CCF per year. Using currently published 2022 large volume commercial water rates in Tacoma, WA of $1.85 per CCF, we estimated water cost savings to be about $3,805 for the year 2022. Adjusting for inflation, and assuming a water budget of 200 CCF for 2019 to help establish the initial plants, that amounts to approximately $13,191 for the first four years of water use costs at the park.

Calculations:

400 CCF (typical park water use annually) x 748 (conversion from hundred cubic feet) = 299,200 gallons annually

Cost per CCF of water * 400 CCF of water per acre annual of a typical park * 5.14 acres of prairie at Dune Peninsula Park = expected annual savings in 2022 dollars. An online inflation calculator was used to determine figures for 2019 through 2021. A ½ year budget of water was estimated for 2019. Those figures were summed to get $13,191 saved in water use costs for the

first four years at the park, since the park uses no irrigation.

Sources:

"Chapter 2 MetroParks Tacoma Environmental Sustainability Plan." 2015. Tacoma, WA: MetroParks Tacoma. https://www.metroparkstacoma.org/search/Master Plan 2015/.

"Commercial Water Customers." n.d. *Tacoma Public Utilities* (blog). Accessed June 22, 2022. https://www.mytpu.org/payment-billing/rate-information/water-rates/commercial-water-customers/.

"Inflation Calculator | Find US Dollar's Value from 1913-2022." n.d. Accessed June 22, 2022. https://www.usinflationcalculator.com/.

"Metro Parks Employs Latest Technology to Conserve Irrigation Water." 2018. *Metro Parks Tacoma* (blog). January 10, 2018. https://www.metroparkstacoma.org/metro-parks-employs-latest-technology-to-conserve-irrigation-water/.

Noland, Sara, and Laurel Carver. n.d. "FOR WESTERN WASHINGTON," 116.

Limitations:

- Direct data from MetroParks, if available, would have offered a more accurate number for water cost savings.

Ecological Restoration Through Installation of Native Prairie Landscapes

- ***Achieves a plant species richness score of 29 and a moderate level of plant species diversity (scoring 2.42 of a maximum 3.63 or approximately 67%) as sampled in the site's prairie. The prairie's plant community also represents a relatively stable functional diversity of community-weighted competitor (21%), stress-tolerator (35%), and ruderal (40%) plant strategies.***

Background:

Prairies are one of the rarest ecosystems in Washington. Once common in the South Puget Sound region, habitats such as prairies and oak woodlands are now almost gone, with just 3% of original prairies remaining. They were created by glaciers 15,000 years ago, which left behind gravelly soils. Prairie vegetation is dominated by a variety of grasses and wildflowers with few trees.

Prior to settlement by non-indigenous people in Washington, prairie habitat covered an estimated 180,000 acres of Western Washington. In the ensuing years, large areas of prairie

were converted to farmland and development. Most of that prairie is now gone and much of what is left is degraded. Prairies support a variety of plants and animals – some of which are listed as threatened or endangered under the federal Endangered Species Act. This rare ecosystem is home to many of Washington's most imperiled species.

Limited by time and resources, the research team elected to employ a transect-quadrat methodology to identify the plants that contribute to the overall plant community at Dune Peninsula Park. The one-time survey examined 43 quadrats along 3 transects with each quadrat representing 100 points of data. Subsequent evaluation of the data revealed an overall plant species richness of 29 with a moderate level of species diversity and a relatively stable functional diversity.

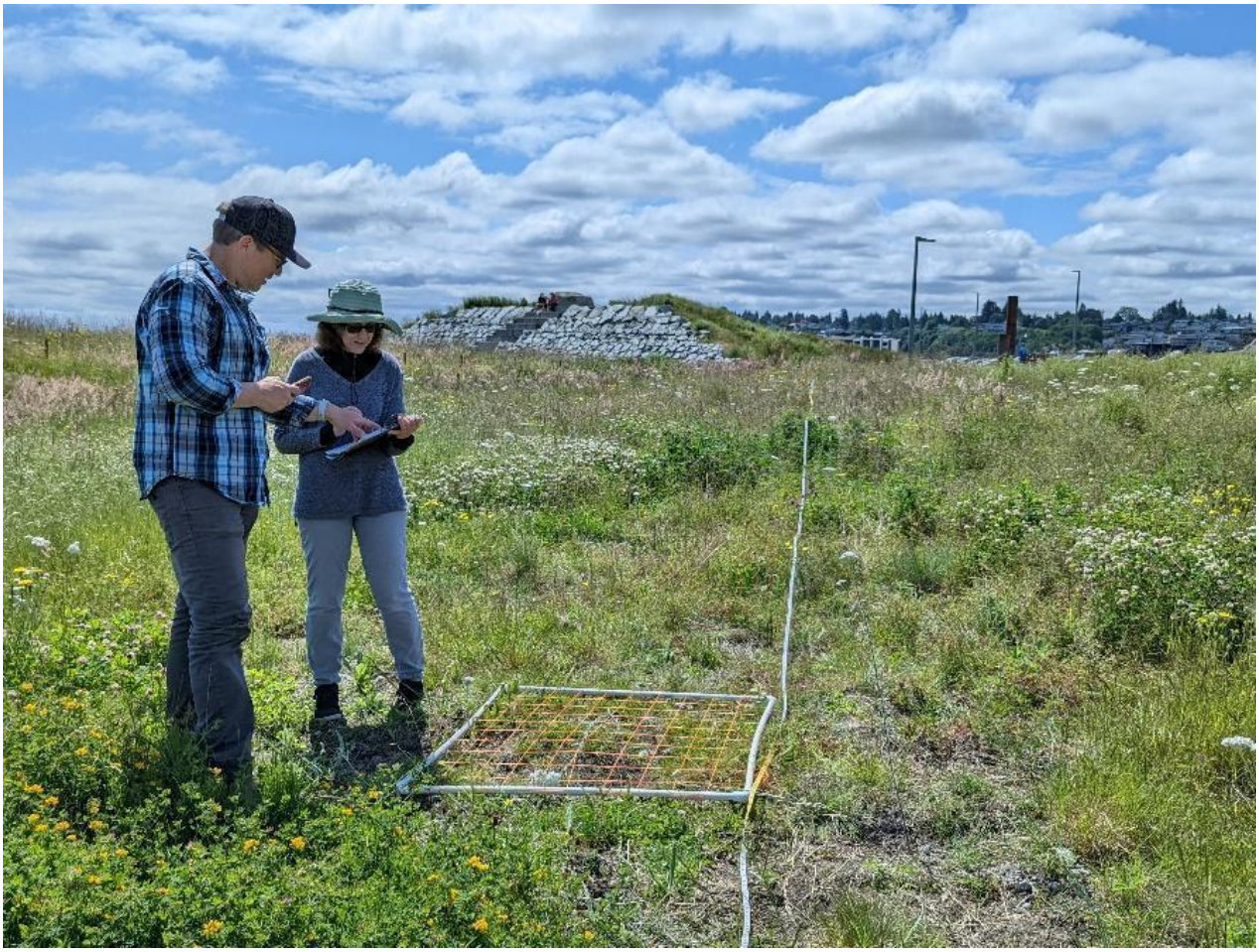

Figure 4. Research team using 1 meter-squared measuring device for plant identification by quadrat, with the extended measuring tape showing the transect taken.

Methods:

Data Collection:

To perform plant identification and assess community composition of the prairie habitat, the research team conducted a field assessment on June 20, 2022. Using a transect-quadrat methodology, three transects (A, B, and C) were established in three distinct prairie locations on site. The length of the individual transects was determined by the size of the prairie location and quadrats were established at 5-meter intervals for detailed plant assessment along each transect with 10, 14, and 19 quadrats respectively.

The quadrats were 1-m^2 divided into 100 sub-quadrats and used the same measuring device composed of an outer square of ½-in PVC subdivided into 100 sub-quadrats (10X10) with string. For each sub-quadrat the dominant basal (ground plane) plant was recorded. Plants were identified in each quadrant by the same field observer and confirmed using the application *Picture This*. Plant identification data was recorded by a second field observer using a 100-square grid for each quadrat. As new plants were identified, a code was generated and used consistently for any subsequent identifications. All data was collected by hand on field sheets and translated into Microsoft Excel for analysis.

Data Analysis:

The data collected is a representative sample of 43 m^2, approximately 1% of the planted and sown prairie area at Dune Peninsula Park. As there had been no previous data collection on species presence in the prairie locations, the data represents a snapshot in time taken approximately 4 years since initial planting. To develop a baseline for better understanding the plant community we focused the analysis on better understanding the species endemism, diversity, composition, and functional characteristics of the plant community.

Species endemism (native vs. introduced) was assessed using the USDA Plants database (https://plants.usda.gov/home). For plants not referenced in the USDA database, we referred to the lists provided by the Washington Native Plant Society (https://www.wnps.org/) or the Northwest Native Plant List for Pierce County (here).

Species diversity was calculated using the Shannon Diversity Index (also known as the Shannon-Weiner Index). A simple online calculator (www.omnicalculator.com) was used to conduct the calculation for each transect and the total plots assessed. Through this process, species richness (the total number of species identified) and species evenness (how similar the abundances of different species are in the community) were calculated.

While the Shannon Diversity Index provides insight into the taxonomic diversity (composition) of the plant community, it does not evaluate the functional diversity of the community—the components of a community that influence how an ecosystem operates, or functions. For plant communities a common method is to use competitor, stress-tolerator, ruderal (CSR) theory, which draws on the wide geographic and phylogenetic coverage of available species values of leaf area, leaf dry matter content, and specific leaf area (Li and Shipley, 2017).

Figure 5. Images taken during plant identification. Top two rows native: Slender Cinquefoil, Common Yarrow, Common Rush, Common Velvet Grass, Red Fescue, Common Woolly Sunflower. Bottom two rows introduced: Smooth Swamp Aster, Narrowleaf Plantain, Red Clover, Perennial Ryegrass, Birdsfoot Trefoil, Lentil Vetch.

These species measures represent interspecific variation in plant size and conservative vs. acquisitive resource economics. In other words, the biomass of an individual plant of a particular species and the economy of energy each plant utilizes for establishment, growth, and reproduction. To assign CSR traits or strategies for species identified in our assessment we used a field-portable list of CSR strategies from Pierce et al. (2017). Using this resource, we identified CSR strategies for 21 of the 29 species, though the relative abundance of the species we were unable to identify was less than 2% of the total. The community weighted mean of CSR strategies was calculated to determine the functional diversity of the plant community.

Calculations:

The table in Appendix A contains all the plant data collected for determining species richness, plant community diversity, and functional diversity.

Species Richness:

The sum (Σ) of plants identified. The total number of species identified across the 4,300 sub-quadrats was 29.

Species Diversity:

The equation provided below was used to calculate the compositional index of plant community diversity. The index considers the number of species living in a habitat (richness) and their relative abundance (evenness). The calculation produced a result of 2.42 of a maximum diversity of 3.63 (or approximately 67%) which translates to a moderate level of compositional diversity.

Denoted as H, this index is calculated as $H = -\Sigma p_i * \ln(p_i)$
where:

- Σ: A Greek symbol that means 'sum'
- ln: Natural log

- p*i*: The relative proportion of an individual species in relation to the entire plant community assessed

    - For example, the common rush (*Juncus effusus*) was identified in 336 of 4300 sub-quadrats assessed. Thus, p*i* = 336 / 4300 or 0.08. In other words, *Juncus effusus* was the dominant plant in 8% of the sub-quadrats assessed.

The following steps are used to calculate the Shannon diversity index:

1. **Calculate the relative proportion** (p*i*) of each species - divide the number of individuals in a species by the total number of individuals in the community.
2. For each species, **multiply the proportion by the logarithm of the proportion**.

3. **Sum** all the numbers from step 2.
4. **Multiply** the sum **by -1**.

Species Endemism:

> The relative proportion (p*i*) of sub-quadrats assessed containing species endemic to the region. Approximately 50% of the sub-quadrats assessed contained endemic species, 47% contained introduced species, and 3% bare ground.

Functional Diversity:

> Assessing the functional diversity of a plant community is an established method providing greater detail to the compositional diversity index by enabling ecologists to assess the functional traits (CSR: competitor, stress tolerance, and ruderal) more clearly for each species in an assessed plant community. We identified CSR traits for 21 of the 29 species identified in the field survey. These 21 species proportionally represented 98% of the sub-quadrats. The community weighted mean of the functional traits for the plant community assessed resulted in 21% competitor, 35% stress tolerant, and 40% ruderal traits. The similarity of percentages reveals a relatively stable functional diversity of the plant community.

Denoted as FD, this index is calculated as $FD = \Sigma C(p_i)$

where:

- Σ: A Greek symbol that means 'sum'
- C: Competitor trait; replace with S for stress tolerant and R for ruderal
- p*i*: The relative proportion of an individual species in relation to the entire plant community assessed

The following steps are used to calculate the community weighted mean of functional diversity

1. **Calculate the relative proportion** (p*i*) of each species - divide the number of individuals in a species by the total number of individuals in the community.
2. For each species, **multiply the proportion by the functional trait percentages (CSR)**
3. **Sum** all the numbers from each functional trait from step 2.

<u>Sources:</u>

Li, Yuanzhi, and Bill Shipley. 2017. 'An Experimental Test of CSR Theory Using a Globally Calibrated Ordination Method.' *PLOS ONE* 12 (4): e0175404. https://doi.org/10.1371/journal.pone.0175404.

Pierce, Simon, Daniel Negreiros, Bruno E. L. Cerabolini, Jens Kattge, Sandra Díaz, Michael Kleyer, Bill Shipley, et al. 2017. 'A Global Method for Calculating Plant CSR Ecological Strategies Applied across Biomes World-Wide.' *Functional Ecology* 31 (2): 444–57.

https://doi.org/10.1111/1365-2435.12722.

'Westside Prairie.' n.d. Washington Department of Fish & Wildlife. Accessed May 1, 2022. https://wdfw.wa.gov/species-habitats/ecosystems/westside-prairie.

Limitations:

- This assessment represents a snapshot of the plant community and would be strengthened by seasonal or annual assessments over a set period to determine trends in plant community changes.

- The single assessment was conducted during summer (June 20). South Puget Sound prairies generally reveal the greatest diversity during the equinox seasons (autumn and spring). Continued research should be conducted during these seasons.

- The overall area of assessment for this project is limited to approximately 1% of the prairie habitat area on site. This was due to limitations of researcher time and availability. A greater understanding of community composition would be achievable with a greater area (total number of quadrats) being assessed.

- Species richness represents a stand-alone number of species identified during the field assessment. Available information of species richness at the time of installation (actual species planted and composition of seed mixes) was not available.

- While CSR data was available for many of the identified species it was not available for all, thus the functional community characteristics are not fully assessed. This said the species without CSR data represented a small (<2%) relative abundance of the total.

Avian Habitat

- ***Provides habitat for 207 bird species as observed from 2017 to 2022. 85% of the bird species observed on-site have also been observed within a nearby, high-quality established prairie habitat.***

Background:

Native prairie grasslands are a highly endangered yet critical habitat in the Puget Sound Lowlands supporting many native species of mammals, birds, and insects. Prior to Euro-American settlement these habitats were prevalent throughout the region but have been severely degraded or lost through conversions to agriculture or development. Today, only 2% of grassland prairies remain, and many of the populations of animal and insect species they support have become regionally extinct or are threatened.

Building on recent efforts to expand and rehabilitate prairie habitats in the region, the design for Dune Peninsula at Point Defiance Park created roughly 5 acres, or 2 hectares, of prairie habitat. This was atop an engineered cap enclosing the degraded and highly polluted site of the previous ASARCO smelter slag heap that forms a peninsula from the urban waterfront of Tacoma into Commencement Bay and Puget Sound. This reintroduction of habitat offers the opportunity to support critical stages of the life cycle of many avian and insect species despite being located along an urban waterfront and isolated from other prairie habitats.

Limited by time and resources, the research team elected to conduct a comparative study of bird sightings between Dune Peninsula Park and Mima Mounds Area Preserve, a 256-hectare natural area that supports some of the highest-quality oak woodland and prairie grasslands remaining in the region located approximately 50 miles southeast of Dune Peninsula. Using citizen reporting of bird sightings between 2017 and 2022, the Dune Peninsula sightings were found to have an 85% overlap with the prairie and woodland species found at Mima Mounds Area Preserve, a much larger and more established prairie area.

Figure 6. Evidence of birds' presence in the Dune Peninsula Park planted prairie spotted by the team while doing plant analysis; Eggs, Swallow, & Northern Flicker.

Method:

The method used to evaluate bird sightings at Dune Peninsula was conducted as a simple comparison of eBird data that evaluated the commonality of species identified at the park with those identified at Mima Mounds Area Preserve between 2017 and 2022. One of the largest global biodiversity-related science projects, eBird (ebird.org) hosts publicly available citizen science data, managed by the Cornell Lab of Ornithology. To conduct this search, we accessed the eBird database restricting our search to 'Mima Mounds' and 'Point Defiance Park - Dune Peninsula & Wilson Way' for the 5-year time frame. The search identified all reporting of birds for these locations during the period, and the data was downloaded in Microsoft Excel. After evaluation of the full data set, we decided to only include birds identified to the species level for the analysis, resulting in 117 species for Mima Mounds and 207 for Point Defiance Park - Dune Peninsula & Wilson Way. The species lists were then compared for commonality resulting in an 85% (100 species) overlap between the sites.

Calculations:

See Appendix B for eBird data.

Sources:

"eBird" An Online Database of Bird Distribution and Abundance [Web Application]. Cornell Lab of Ornithology, Ithaca, New York." Accessed June 30, 2022. https://ebird.org/ebird/.

Limitations:

- Time, resources, and level of expertise limited this evaluation of avian species richness relying solely on data collected by others.

- This comparative assessment between sites is not a robust evaluation as it simply uses species richness as the primary measure without more deeply determining taxonomic diversity of species or an explicit evaluation of rare or threatened species in the region.

- There are inherent flaws in utilizing citizen science data that include but are not limited to the experience and expertise of the individual collecting data and the frequency and timing of site evaluations.

Social Benefits

Physical Activity: A Social Determinant of Health

- ***Promotes physical activity, with 94% of 578 surveyed visitors reporting engaging in at least 1 of 12 different physically active uses in the park.***

Background:

Physical activity is a social determinant of health and engaging in regular moderate to vigorous physical activity outdoors improves physical and mental health. Better understanding the park use and its potential health promoting benefits for users of all ages and abilities provides an additional layer of value for the park.

Figure 7. Examples of uses observed on site visits: cycling with family, scootering, roller skating, reading, eating & socializing, taking photos, wheelchair rolling & cycle surrey, interacting with art that facilitates views, walking with a group including adapted ambulation.

Method:

The survey asked, ‘What do you enjoy doing in Dune Peninsula Park?’ and provided 26 options paired with illustrative icons, as well as offering an opportunity to write in one’s own activity. The uses were selected based on the stated intentions of the design, typical park uses, and observations made on site of activities at Dune Peninsula Park. Respondents were prompted to ‘select all that apply'. 578 people responded to this question.

Figure 8. Illustrated activities provided 23 options selected after observations made on site visit, and the question provided the opportunity to add one's own. The most selected was 'enjoying views' and the least selected was 'rolling' paired with a wheelchair icon.

The breakdown of responses showed every option provided was selected a minimum of 5 times, with the most selected response being 'enjoying views' paired with an illustration of a

person seated and looking at a horizon, and the least selected response was ‘rolling’ paired with a wheelchair icon. One respondent that selected ‘rolling’ also selected ‘skateboarding’ indicating that they were likely interpreting it more broadly than just rolling in a wheelchair.

Thirteen respondents who opted to add their own activities wrote in:

- Looking for whales
- Riding the scooters
- Sitting on a memorial bench in memory of my family members
- Kite flying
- Birding / Bird watching
- Learning about history of the area
- Sledding
- Enjoying the public art/sculptures
- Movies
- Whale watching!
- We often park here and walk over to the playground on the Point Ruston side. The parking lot is close without being as crowded as PR.
- Playing music

Calculations:

A simple count determined the number of unique recreational uses identified in the survey. The 12 uses identified as physically active included: riding scooters, kite flying, sledding, walking, skating, playing, rolling, skateboarding, dancing, cycling, walking the dog, and running.

Percent of respondents reporting engaging in physically active uses is calculated as:

$$\%PA = \Sigma QR / \Sigma RRPA$$

where:

- Σ: Greek symbol that means ‘sum’
- %PA: percent Physically Active question respondents
- QR: total Question Respondents
- RR: Respondents Reporting one or more Physically Active uses

Determination of relative frequency of selected uses was graphed in the following bar chart using Excel with corresponding counts provided by SurveySparrow below. Percentages of respondents selecting each use is calculated as:

$$\%RS = \Sigma QR / \Sigma RRE$$

where:

- Σ: Greek symbol that means ‘sum’

- %RS: percent Respondents Selecting use
- QR: total Question Respondents
- RRE: Respondents Reporting Each use

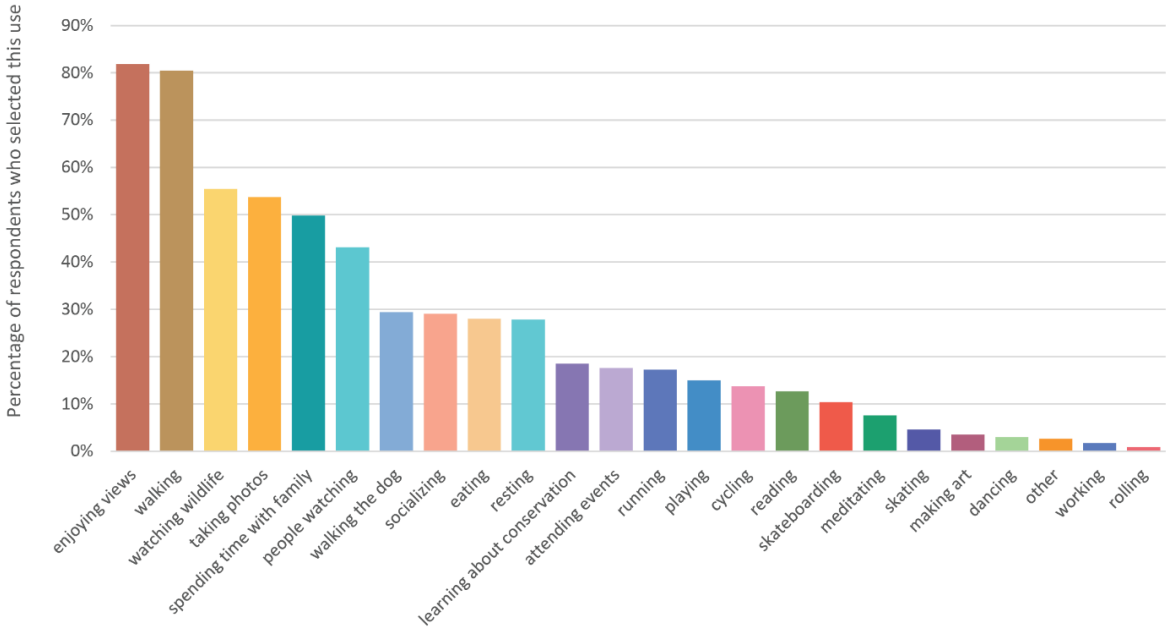

Figure 9. Relative frequency of selected uses, with 82% selecting enjoying views, and 1% rolling (paired with wheelchair icon). Of note is the 2nd lowest 'working' at 2%, indicating people are generally choosing not to work while at Dune Peninsula Park.

37 unique recreational park uses were reported by 578 surveyed visitors.

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Bratman, Gregory N., Christopher B. Anderson, Marc G. Berman, Bobby Cochran, Sjerp de Vries, Jon Flanders, Carl Folke, et al. 2019. “Nature and Mental Health: An Ecosystem Service Perspective.” *Science Advances* 5 (7): eaax0903. https://doi.org/10.1126/sciadv.aax0903.

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Limitations

- Further observation on-site may identify additional uses not identified here.
- Survey might not be offering an accurate picture of what uses are most prevalent on the site due to self-selection biases.
- Survey taken in only one season, missing activities that might occur different times of year. The survey did capture some out of season uses, as respondents chose to share uses from other times of the year, for example, one respondent offered up the winter activity of 'sledding' as a use.

Feeling Restored in Nature

- ***Facilitates a restorative nature experience, with 26% of 578 surveyed visitors using language indicative of a restorative experience when describing experiences in the park. Additionally, 28% selected "tranquil" when asked how they feel in the park, 30% reported restorative uses, and 82% reported engaging in nature-connected uses.***

Background:

Based on the seminal work of Rachel and Stephen Kaplan, there is an increasingly broad body of evidence that finds being in nature is restorative and calming. Nature experiences that foster restoration can be passive or active.

Method:

Coding Language:

We coded short answer responses in the survey for words, phrases, or descriptions of experiences indicative of feeling restored by spending time in the park and engaging with nature. 131 occurrences of restorative language were identified/offered by 70 respondents.

Questions that prompted restorative language included:

- 'Tell us more about why the park feels welcoming?'
- 'Describe something you like about a favorite spot in the park.'
- 'What does the history of the Dune Peninsula Park site mean to you?'
- 'Describe an experience in the park that stands out to you.'
- 'What is it about the park that makes you feel happier?'

Words and short phrases responses included:

> refreshing, without stress/ stress free, relax/ relaxing, calm/ calming, tranquil/ tranquility, happy/happier, peace/ peaceful/ peacefulness, quiet/ silence/ solitude, mental health, zen, harmonious with/ connected to, close to, surrounded by nature, soothing, feels lovely, rest/ resting, refuge from madness, meditate/ meditating, recharge the soul.

Words listed above that were used in a different context, for example when describing restored habitat vs. feeling restored, were excluded from the count.

For example, in response to 'Describe something you like about a favorite spot in the park.' One survey respondent offered the following paired description and photo:

> "A perfect opportunity for deep meditation, observing nature, experiencing the elements (weather), the various sounds and scents of being on the waterfront."

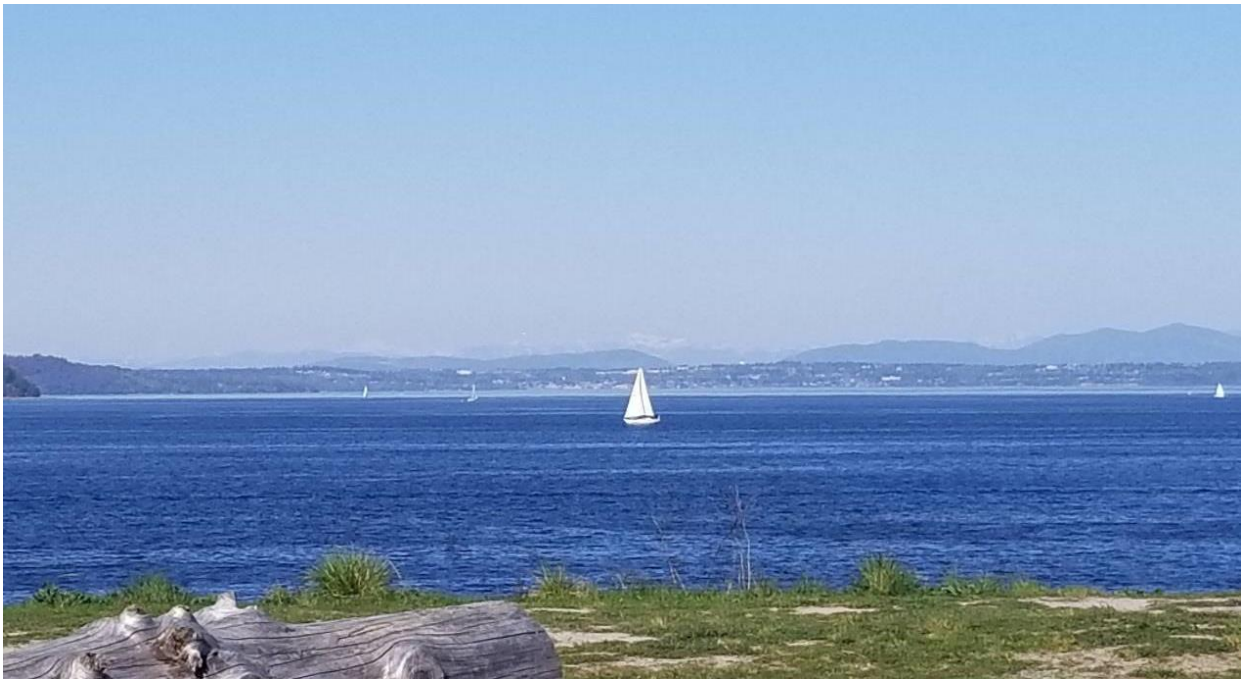

Figure 11. photo shared by an anonymous survey respondent paired with the above description of restorative, nature connected experiences at Dune Peninsula Park.

Survey Questions:

When survey respondents were asked, ‘Generally, how do you feel when you are in the park?’ 28% selected the response ‘tranquil’.

When survey respondents were asked, ‘What do you enjoy doing in the park?’, 30% selected restorative uses, defined as ‘rest’ and ‘meditation’ and 82% selected nature connected uses, defined as ‘enjoying views’ and ‘watching wildlife’.

Calculations:

Coded language is keyed back to survey respondents and each survey respondent volunteering language indicative of a restorative experience in relation to nature is counted. Percent of survey respondents volunteering language indicative of a restorative experience is calculated as:

$$\%RE = \Sigma SR / \Sigma RV$$

where:

- Σ: Greek symbol that means ‘sum’
- %RE: percent of respondents volunteering Restorative Experience language
- SR: total Survey Respondents
- RV: Respondents Volunteering restorative experience language

For the remaining survey question percentages, the total number of respondents to the question is divided by the number selecting the highlighted response or responses.

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Limitations:

- While an effective way to measure mood and affect, emoticon visual analogue scales may be limiting based on the emoticons that are used. How they are interpreted by participants can be subjective. We tried to limit any misinterpretation by including a one-word descriptor. This also applies to the question about park use.

- People derive restoration from both active and passive experiences, so it is important to acknowledge this by offering a range of options to select to measure engagement in activity in the park.

- Self-report measures carry an inherent risk of social desirability bias.

Happiness

- ***Supports positive emotional affect (happiness) in park visitors, with 94% of 578 surveyed visitors reporting a positive emotion when asked how they feel when they are in the park. 97% of 266 surveyed visitors responded “yes” when asked if spending time in the park made them feel happier. The park also scores a high-performing 82% on a happiness index assessment tool.***

Background - Survey:

Building from the Russell Circumplex model of emotional affect, which proposes that all affective states (emotions) are the product of two neurophysiological systems, valence (positive-negative continuum) and arousal. Building upon this model for the survey, we created a series of seven emoticons with corresponding words representing different combinations of valence and arousal.

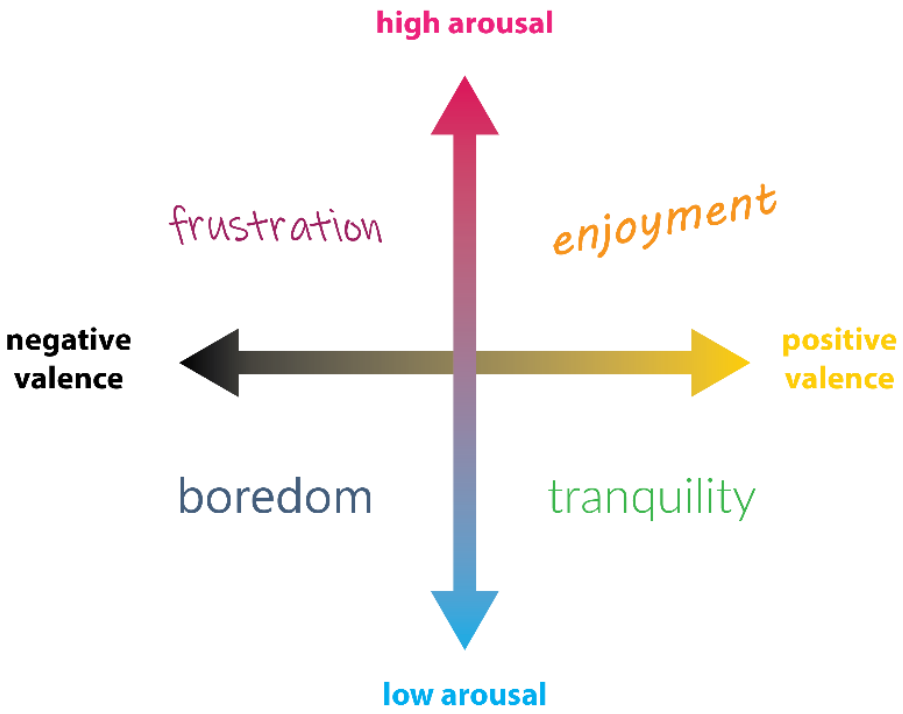

Figure 12. the Russel Circumplex model of emotional affect illustrated by Rebecca Habtour.

They were ordered as follows:

'overjoyed'		positive valence	**high arousal**
'happy'		positive valence	**medium arousal**
'tranquil'		positive valence	low arousal

‘neutral’		neutral valence	**medium arousal**
‘bored’		negative valence	low arousal
‘sad’		negative valence	**medium arousal**
‘upset’		negative valence	**high arousal**

The self-reported responses offer some nuanced information that can help us connect the responses to explanatory theories relating to the relationship between one’s physical environment and emotions.

Background – Happiness Index Tool:

Happiness is being promoted to governments as an alternative measure to gross domestic product and other monetary measures as a more direct and meaningful quality of life indicator, as exemplified in the *World Happiness Report* released annually since 2012. This is in part to seek out more direct and effective policy to improve people’s lives and in part to find more environmentally sustainable ways of supporting the improvement of human lives that do not rely on the endless expansion of material output required for economic growth models. The environments in which people spend their lives has been identified as having a significant impact on happiness, making built environment design an area ripe with potential.

Current research in psychology, environmental psychology, and neuroscience holds many implications for designing environments to encourage positive psychological experiences. However, there are ongoing challenges in transitioning research knowledge into effective built environment design synthesis. One challenge is in building a research-based understanding of how one may design a physical place specifically to encourage and support happiness in the design community. Another challenge lies in assigning a ‘happiness’ value to a physical place that can demonstrate return on investment, particularly in a way that is accessible to government policy makers, developers, and the public. To address both challenges, predictive-proxy metrics focused on happiness in the built environment can help, by identifying design elements and strategies that increase the likelihood that a place designed with these intentions will have the desired positive impact on users.

Rebecca Habtour, the author of the happiness index tool used here, is a member of this research team. She has drawn from research that varies across multiple topics, theories, definitions, and measures of happiness, identifying and extrapolating elements that can inform place design processes and decisions. This builds on her prior academic and professional research and design work in this area and is the focus of her current PhD studies. The measures of happiness referenced include immediate physiological measures of emotional states in response to different environmental stimuli, self-reported responses on momentary and overall happiness, and more holistic self-assessments of longer-term flourishing and meaning. The layered nature of what ties momentary to lasting happiness, and how exciting experiences and calming experiences contribute to meaningful positive life experience as a whole, is human understanding continuing to unfold. The tool's author has sought to be inclusive of any finding that indicates potential for building positive affect of any kind. She has worked to consolidate expansive findings into more essential and generalizable descriptions of elements to allow the tool to become simpler and more approachable. The tool is still under development and refinement. Its use here is a relatively preliminary test.

By comparing the predictive metrics drawn from research to the findings from survey respondents there is an opportunity to test the efficacy of the measures, see if they align as expected, if the survey may inform ways to weight and score in greater alignment to values reported, and where there may be conflicts or gaps to resolve. To address this thoroughly, it will require deeper study than what is included in this case study. Here we will introduce some of the work behind this approach.

The tool clusters evaluation under different topic headings:

- Nature, Light, and Water
- Beautiful Surprise
- Sociality
- Access
- Identity and Belonging
- Reparative Justice
- Resilience

A brief description of each and a selection of the references informing the elements in each topic follows.

Nature, Light, and Water
Nature in all its forms, including water and light, and at multiple scales, from a potted plant to extended time in remote wildlands, have shown in numerous studies to have the ability to significantly influence human happiness, offering opportunities for greater tranquility, delighted excitement, meaningful experiences, and positive physiological responses.

Beautiful Surprise
Beautiful surprise references the positive emotional and physiological response people have

when they experience something they perceive as beautiful or positive in some respect, in particular when that beauty is encountered unexpectedly, enhancing the influence of its effect.

Sociality
Sociality refers to both the joy-bringing potential of chance interactions with strangers and acquaintances, and to the building of more meaningful positive relationships with friends, colleagues, neighbors, and loved ones.

Access
Access to happiness-bringing assets is vital to one's overall happiness. A place can only bring joy if it is available and experienced. Inclusive opportunities for access to happy environments minimize the negative comparisons and resentments between “haves and have-nots” that damage happiness across communities.

Identity
Identity refers to one being grounded in a sense of self and how that provides a foundation for inner peace and tranquility. It also refers to the shared sense of identity that comes from being connected to a community and feeling like one belongs.

Reparative Justice
Reparative justice engages the difficult topic of repairing the injustices that are harming individuals and communities, many of which are physically embedded in our built environments. A perfect world is not required for one to bring happiness into one's life, but the potential for happiness is seriously impeded when one cannot escape the experience of glaring and ongoing stigma and injustice in the very physicality of the space surrounding them.

Resilience
Resilience refers to an individual's or a community's ability to weather disaster, looking towards how the built environment can facilitate both greater resilience as well as improved recovery. Disaster will always take an emotional toll on a community, so when the built environment can be designed and programmed to limit damage and provide support, it can be a significant boost to a community's ability to find happiness. Under each topic heading is a series of elements to look for. First, there is a point given for the presence of the element. Second, there is an opportunity to give the element a qualitative score. Guidance is offered in the notes regarding what to look for in judging quality. Subjective evaluation in qualitative measures is likely to vary, so on a project with multiple stakeholders, combining the results of multiple evaluators is recommended. Because the tool requests evaluation of one element at a time, the tool highlights strengths and opportunities to the evaluator, and helps the evaluator better understand where their own priorities lie, by the practice of its application.

<u>Method - Survey:</u>

Survey Questions:

Respondents were asked in the survey, “Generally, how do you feel when you are in the park?” and then were presented with a series of seven emoticons with corresponding words, each

representing positive, neutral, or negative valence emotions at different states of arousal ranging from low to high. Respondents could choose only one.

Figure 13. Emoticons offering different combinations of valence and arousal.

Of 546 responses to this question, 94% selected a positive valence emotion, with 13% selecting the high arousal ‘overjoyed’, 53% choosing the medium arousal ‘happy’, and 28% selecting the low arousal ‘tranquil’. Each of these may relate to different aspects of Dune Peninsula Park’s experience. For example, research finds that being in nature improves emotional state as well as increases positive affect. This research is applicable across the lifespan. However, the park offers opportunities for social interaction and play, which also improve emotional state, but with a potentially higher arousal effect than the restorative low arousal state typically associated with nature interaction.

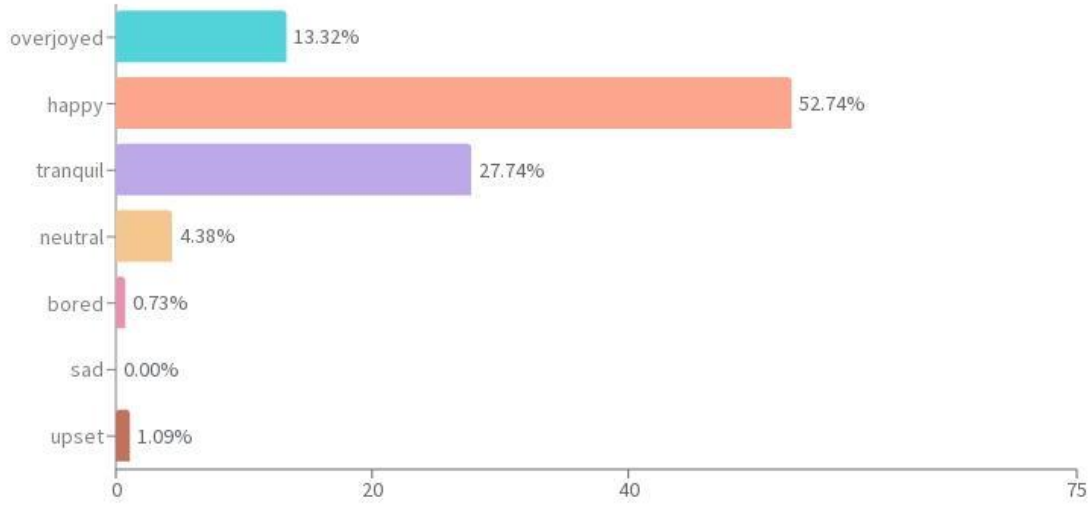

Figure 14. Most short survey respondents selected 'happy': 53%. Positive responses made up 94% of responses overall. No respondents selected: 'sad'

In the extended survey, respondents were asked to reply yes or no to 'Does spending time in Dune Peninsula Park make you feel happier?' The question was paired with a photo of a sunny day at the park with various people present in the scene walking, cycling, and looking at views. If respondents answered yes, the follow up question, 'What is it about the park that makes you feel happier?' was followed by the opportunity to upload a photo related to their description.

The intent of revisiting happiness in the extended survey in this manner was to investigate if people felt if time spent in the park was improving their mood, as opposed to just being in a positive mood when at the park generally. Its purpose was also to better understand what features of the park were encouraging the positive emotional responses.

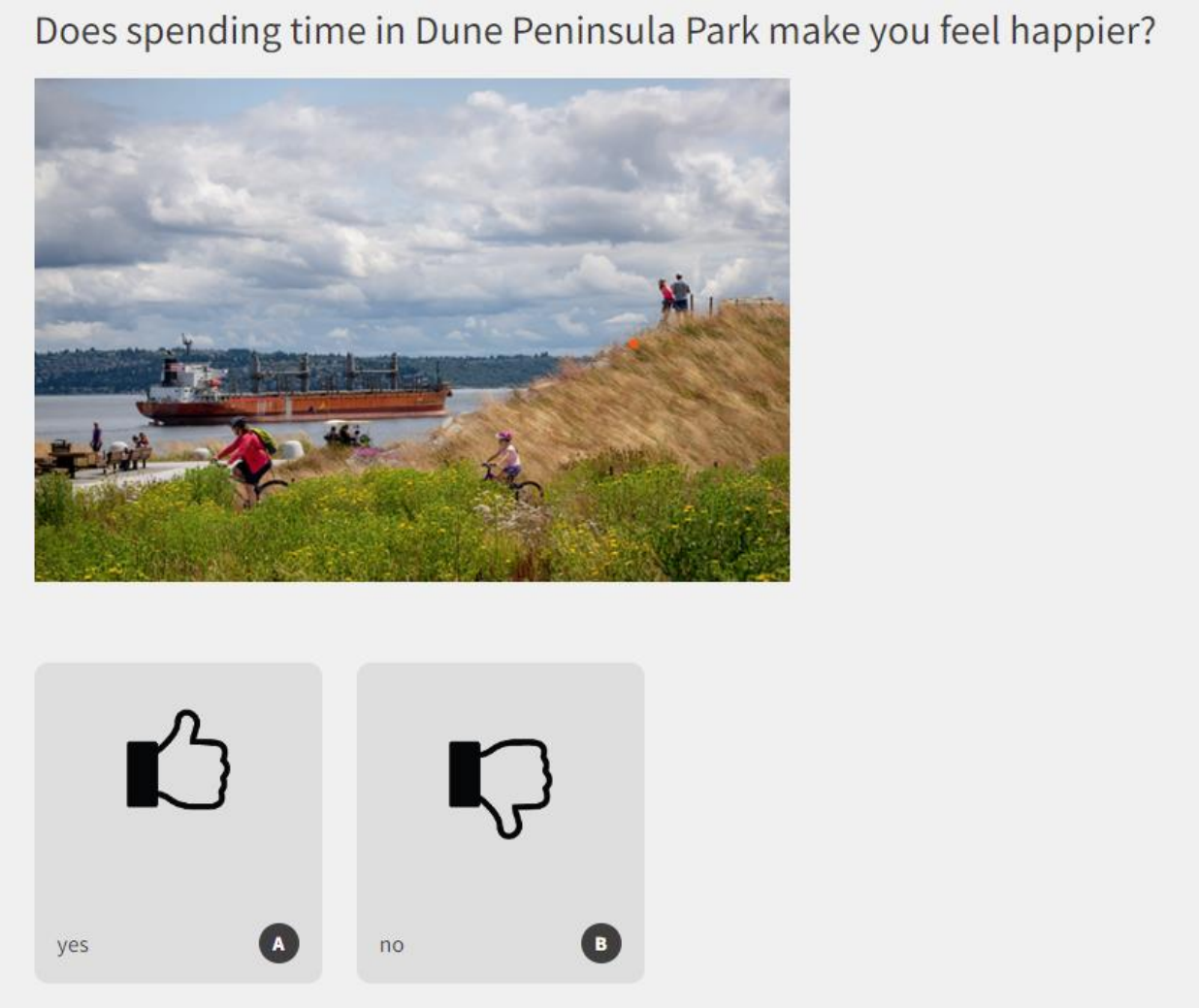

Figure 15. The extended survey asked, 'Does spending time in Dune Peninsula Park make you feel happier?' paired with an opportunity to describe why in the next question.

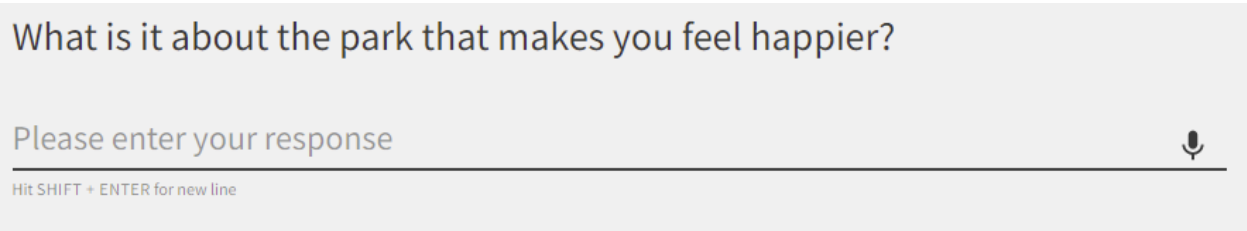

Figure 16. The option to describe more wasn't paired with a photo to not distract people from whatever was in their mind's eye.

227 out of 235 respondents answered yes to feeling happier: 97%. 189 went on to answer the follow up question describing what it was about the park they saw as influencing their happiness. Phrases and words such as views, nature, accessibility, activities, and being around other people all appeared in the descriptions.

Example descriptions and photos:

"Being outside, being in an open space, the expansive views, the varied landscape and grasses, the art installations"

Figure 17. In response to what about the park makes you happy, this photo was paired with, "Being outside, being in an open space, the expansive views, the varied landscape and grasses, the art installations"

“It’s thoughtfully sculpted, well programmed, tastefully designed, and ridiculously - and I hate to say it, but – Instagramable.”

Figure 18. In response to what about the park makes you happy, this photo was paired with, “It’s thoughtfully sculpted, well programmed, tastefully designed, and ridiculously - and I hate to say it, but - Instagramable.”

Method – Happiness Index Tool:

The happiness index assessment tool was used by one team member to assess Dune Peninsula Park. This was mainly due to the timing of the tool's development. For each element identified under each topic heading 0-1 point was given for the presence of the element, and 1-5 was given as a qualitative measure of that element. Several notes were taken to indicate why a particular qualitative score was chosen. The presence and quality scores were tabulated for each subject area, then combined for a total overall score. The evaluator offered notes for each topic area to offer an overview of their takeaways from that section of the evaluation. The scores and notes are paired below with images supplied by survey respondents sharing what elements of the park made them happier:

Nature, Light, & Water: 77%

Nature 89%, Water 85%, Light 75%, Indoor Structures 33%

Overall, very high performing in regard to bringing people close to nature, the score reflects opportunities to make the park a more nature-connected place, to offer shaded options for paths and resting places, and to find a way to bring a more immediate connection to water for visitors.

Figure 19. Image from survey respondent related to what it is about the park that makes them happier. Connecting to light, nature, water, and views was a frequent theme.

Beautiful Surprise: 91%

Offers many opportunities for pleasant surprise, reveals, summits, potential animal interactions, bursts of color, changing experiences, art, and play.

Figure 20. Image from survey respondent related to what it is about the park that makes them happier. Moments of beautiful surprise, like spotting an orca breaching, were often mentioned.

Sociality: 93%

Facilitating personal control over social interactions 89%,
Bringing people together 94%,
Buffers from Interfering elements 97%

Supports social interaction well. Several options for movement and rest allow for control over one's desired level of interactivity. Facilities and programming support shared activities both formal and informal. And the site is buffered from detracting elements.

Figure 21. Image from survey respondent related to what it is about the park that makes them happier. Programmed events at the park supported social interaction and relationship building.

Access: 91%

Physical access to site 90%,
Physical access on site 89%,
Psychological access 97%

A high level of physical, visual, and psychological openness, connectivity, and inclusivity make this a high access site. This is demonstrated by the diversity and number of users one sees there.

Figure 22. Image from survey respondent related to what it is about the park that makes them happier. The open, inclusive, character of the park was widely appreciated.

Identity & Belonging 91%

Shared community identity 92%,
Anchors connecting place to memories 100%
Connection through engagement 78%

Meaningful and thoughtful connections to local history, ecosystems, landmarks, and embrace of unique features help create a place for shared identity, belonging, and growing new memories.

Figure 23. Image from survey respondent related to what it is about the park that makes them happier. Iconic local landmarks create a place anchor that becomes a part of a community's identity and builds a sense of belonging.

Reparative Justice 84%

Reparative public investment 86%,
Environmental justice 96%,
Equity focused government intervention 83%,
Inclusive planning processes 71%

Repairing the environmental injustice on this site is meaningful and impactful. Public investments that improve areas may need to do more to consider combating displacement from rising property values from these kinds of investments and how to make their participatory processes even more inclusive.

Figure 24. Image from survey respondent related to what it is about the park that makes them happier. The transformation of this site from a toxic slag dump to a beautiful park offers a meaningful new legacy for future generations.

Resilience 48%

Resilience from natural disaster 44%,
Resilience from economic disaster 25%,
Resilience from health disasters 100%

Resilience was not a stated objective of the design. There are opportunities to look more deeply at how an intention towards resilience against disaster (natural, economic, health) can be woven into design.

Figure 25. Image from survey respondent related to what it is about the park that makes them happier. A place encouraging healthy behavior, like walking one's dog, provides a buffer and respite during health disasters.

Combined Happiness Index Score 82%

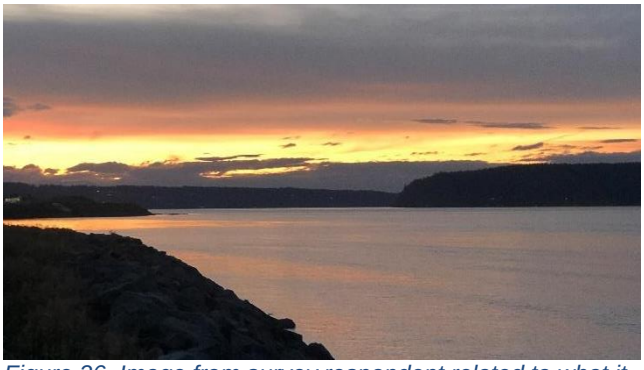

Figure 26. Image from survey respondent related to what it is about the park that makes them happier.

A few of the areas where the park scored lower in the index score were also reflected in the survey responses. For example, the lack of shade was called out by a few survey respondents as contributing less positive park experiences. Conflict between modes of transportation on the same shared use path, reflected in the index with a loss of points on appropriately scaled paths and separation of different speed travel modes, was also a cause of concern that came up in the survey.

Overall, the survey responses indicated a significant positive response to Dune Peninsula Park, in line with the strong performance in the happiness index. They also spoke directly to many of the elements in the index which scored well, most significantly the opportunities to connect with nature.

Calculations - Survey:

For all survey questions highlighted above, the total number of respondents to each question was divided by the number selecting the highlighted response to calculate a percentage.

Calculations – Happiness Index Tool:

Sum of presence score + sum of quality score/ number of elements = score as a percentage

Sample score sheet from the Dune Park Analysis:

Identity & Belonging	***Presence***	***Quality***	***Total Points***	***Notes about analysis***
	0 = not present 1 = present	1 = poor 5 = excellent		
Shared Community Identity				
community priorities visible	1	5	6	The inclusion of prairie is big.
community "brand" visible	1	4	5	The signage branding has a local flavor and is well placed and visible, could extend this to some amenities like garbage bins, etc. But overall, solid.
positive local/cultural markers and art	1	4	5	There are a lot of distinctive local elements that make this place special, would have liked it if the art was by local artists though…
storytelling elements	1	5	6	The inclusion of storytelling on several layers including local artifacts, is impressive here.

	4	18	22	community subtotal out of 24
	100%	90%	92%	percent of possible score
Anchors Connecting Place to Memories				
iconic landmarks	1	5	6	It is an iconic site that is visibly distinctive, can offer a wayfinding anchor for the area.
place-tied uniqueness	1	5	6	The view to Mt. Rainier alone is special, but there are several place-tied unique elements here.
nostalgia triggering elements	1	5	6	This is bittersweet for some, but I think great that meaningful connects were made visible here
unique places with elements that facilitate relationship building	1	5	6	The combination of views, art, story, nature, and places to sit, play, walk, hang out and engage with others safely, all intertwined, will likely facilitate meaningful memory building.
	4	20	24	anchors subtotal out of 24
	100%	100%	100%	percent of possible score
Connection through Engagement				
local participation in visioning, design, & care	1	3	4	There was a participatory process, but reportedly, it could have been more inclusive and communicative.
local participation in activities & events programming	1	4	5	Local government is involved in programming, and some other groups, I think there is opportunity for more.
opportunities for informal engagement	1	4	5	There are opportunities to hold small events activities here without formal arrangement, but the facilities limit this somewhat.
	3	11	14	engagement subtotal out of 18

	100%	73%	78%	percent of possible score
Total Scores	11	49	60	total out of 66
	100%	89%	91%	percent of possible score
				Analysis Note:
				Meaningful and thoughtful connections to local history, ecosystems, landmarks, and embrace of unique features help create a place for shared identity, belonging, and growing new memories.

Sources - Survey:

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Limitations - Survey:

- There are possible alternate interpretations of the emoticons. For example, respondents may select the highest arousal positive valence response to represent the intensity of their affection for the park, but not necessarily their actual emotional state when

spending time in the park.

- Many factors outside of a place designer's reach contribute to a person's emotional state, making attribution to environmental impacts more complicated.
- Self-report measures carry an inherent risk of social desirability bias.
- The selected imagery paired with the yes/no question may influence response.

Limitations – Happiness Index Tool:

- The index requires subjective evaluative measures, meaning inconsistent scoring depending on the evaluator.
- The index currently requires some level of background knowledge to use it effectively and may need further refinement to improve accessibility to a more general audience.
- Extrapolated design implications drawn from other research recommend more efficacy tests to confirm they offer the expected intended effect.

Meaningful Interaction with Nature

- ***Offers the potential for meaningful interactions with nature, scoring 90 out of 100 using an evaluation tool for human-nature interaction.***

Figure 10. Visitors to Dune Peninsula Park come face to face with a deer. Meaningful Human Nature Interaction Patterns offer a new method for evaluating the potential of a site to afford opportunities like the one evidenced here. Photo by Stuart Isett 2019.

Background:

Humans need ‘deep and intimate connection with nature, and more wild nature, to do well physically and psychologically’ (Kahn 2017 P.2). This underlying theory presents a case for the value of designing to facilitate these connections.

In their study, Kahn’s research team coded responses for a prompt, ‘Please describe an interaction you had with nature in the park that was meaningful to you.’ (Lev, Kahn et al. 2020 P.4). Identifying hundreds of interaction patterns, they clustered them into foundational themes: most frequent (MFIPs), most meaningful (MMIPs), nature linked (NLIPs) and psychological description linked (PLIPs), recording the frequency of occurrence in each cluster. Several of the patterns appeared in multiple clusters. They concluded that the relative wildness of the park was an important aspect affording the beneficial meaningful experiences that supported the physical and mental well-being sought, defining wildness as a variety of landscapes, unmanaged, biodiverse, large scale, and removed from civilization. (Lev, Kahn et al. 2020).

An evaluative tool was built utilizing the interaction patterns (IPs) identified in the work of Peter Kahn, et al. Each IP was weighted according to the frequency of occurrence in the original study. The tool was then used to evaluate Dune Peninsula Park for its potential to facilitate each pattern. The tool appeared in two parts, as follows, with scores combined at the end.

MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS	
WILDNESS	
Does the site have...	*no = 0* *yes, some = 1* *yes, a lot = 2*
A variety of landscapes	
Unmanaged or low management landscape	
Biodiversity	
Large scale elements (e.g. tall trees, large open spaces, expansive vistas)	
Remoteness from civilization	
Wildness score	0

MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS			
PRESENCE of Interaction Pattern (IP)			
Each question investigates the presence of a design element or natural feature that supports each IP. Answer 0 for no, and 1 for yes	*no = 0* *yes = 1*	*weight*	*weighted scores*

IP.1. Encountering wildlife *Q: Is there access to occupiable space in close proximity to wildlife habitat?*		0.34	0
IP.2 Exploring trails through nature *Q: Are there a variety of paths through nature to explore?*		0.30	0
IP.3 Exploring beach or waterside ecosystem *Q: Are there opportunities for beach or waterside ecosystem exploration?*		0.11	0
IP.4 Finding & gazing at scenic views *Q: Are there scenic view to be found with places to rest and gaze?*		0.09	0
IP.5 Walking to destination spot in nature *Q: Is there a spot or spots special enough to be considered 'destinations'?* *(eg. summit, waterside, unique natural feature)*		0.03	0
IP.6 Walking along edges (waterside or elevated land forms) *Q: Is there a water's edge and/or elevated land form with a path to walk alongside?*		0.01	0
IP.7 Walking with dog (or running) *Q: Are dogs welcome?*		0.01	0
		Presence of IP score	**0**

The closer the score is to 100, the greater the expected likelihood for meaningful human-nature interactions, with any score over 75 considered in the high likelihood range.

Method:

An evaluation was performed using the Interaction Patterns tool, separately by five research team members. The scores were then averaged to produce the final score of 90/100. The range of variability between the scoring landed at 11 points, indicating relatively good consistency in interpretation across evaluators. As a short, simple, and easy to apply tool, it offers a quick way to identify opportunities to optimize a design for meaningful human-nature interactions. The simplicity also makes the tool potentially accessible to people not necessarily trained in design.

The following photos from Dune Peninsula Park illustrate the elements upon which the evaluations were based:

IP.1 Encountering wildlife

Is there access to occupiable space in close proximity to wildlife habitat?

Photo: Stuart Isett 2019

IP.2 Exploring trails through nature

Are there a variety of paths through nature to explore?

Photo: Stuart Isett 2019

IP.3 Exploring beach or waterside ecosystem

Are there opportunities for waterside ecosystem exploration?

Photo: R. Habtour 2022

IP.4 Finding and gazing at scenic views

Are there scenic views to be found with places to rest and gaze?

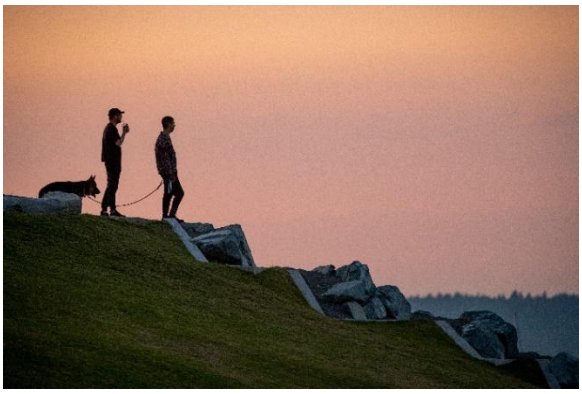


Photo: Stuart Isett 2019

IP.5 Walking to a destination spot in nature

Is there a spot special enough to be considered a destination?

Photo: Stuart Isett 2019

IP.6 Walking along edges (waterside or bluff)

Is there a water's edge or an elevated landform with a path to walk alongside it?

Photo: Stuart Isett 2019

IP.7 Walking with dog (or running)

Are dogs welcome?

Photo: Stuart Isett 2019

Table 1. Illustrating Human-Nature Interaction Patterns.

Calculations:

The following is an example of the evaluative tool as applied to Dune Peninsula Park, Tacoma WA by one evaluator.

MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS	
WILDNESS	
Does the site have...	*no = 0* *yes, some = 1* *yes, a lot = 2*
A variety of landscapes	1
Unmanaged or low management landscape	2
Biodiversity	2
Large scale elements (eg. tall trees, large open spaces, expansive vistas)	2
Remoteness from civilization	1
Wildness score	8

SITE/ DATE: Dune Peninsula Park, Tacoma WA / June 2022			
EVALUATOR: 5			
MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS			
PRESENCE of Interaction Pattern (IP)			
Each question investigates the presence of a design element or natural feature that supports each IP. Answer 0 for no, and 1 for yes	*no = 0* *yes = 1*	*weight*	*weighted scores*
IP.1. Encountering wildlife *Q: Is there access to occupiable space in close proximity to wildlife habitat?*	1	0.34	34

IP.2 Exploring trails through nature *Q: Are there a variety of paths through nature to explore?*	1	0.30	30
IP.3 Exploring beach or waterside ecosystem *Q: Are there opportunities for beach or waterside ecosystem exploration?*	0	0.11	0
IP.4 Finding & gazing at scenic views *Q: Are there scenic view to be found with places to rest and gaze?*	1	0.09	9
IP.5 Walking to destination spot in nature *Q: Is there a spot or spots special enough to be considered 'destinations'?* *(e.g. summit, waterside, unique natural feature)*	1	0.03	3
IP.6 Walking along edges (waterside or elevated land forms) *Q: Is there a water's edge and/or elevated land form with a path to walk alongside?*	1	0.01	1
IP.7 Walking with dog (or running) *Q: Are dogs welcome?*	1	0.01	1
		Presence of IP score	**79**
		Wildness score	8
		TOTAL SCORE	87

The ‘Wildness’ score and ‘Presence of IP’ score were added together for a total out of a possible 100.

The scores of each contributor were summed and divided by the number of contributors to get the final combined score of 90/100.

SITE/ DATE:	Dune Peninsula Park, Tacoma WA / June 2022		
EVALUATOR:	Combined		
	MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS		
	PRESENCE of Interaction Pattern (IP)		
	Each question investigates the presence of a design element or natural feature that supports each IP. Answer 0 for no, and 1 for yes		total scores
	Evaluator 1		88
	Evaluator 2		98
	Evaluator 3		84
	Evaluator 4		94
	Evaluator 5		87

		Total	**451**
		TOTAL SCORE	90

Sources:

Kahn, Peter H. 2017. “Generational Environmental Amnesia.” In *Nature Love Medicine: Essays on Wildness and Wellness*, First Torrey House Press edition. Torrey House Press.

Kahn, Peter H., Jolina H. Ruckert, Rachel L. Severson, Aimee L. Reichert, and Erin Fowler. 2010. “A Nature Language: An Agenda to Catalog, Save, and Recover Patterns of Human–Nature Interaction.” *Ecopsychology* 2 (2): 59–66. https://doi.org/10.1089/eco.2009.0047.

Lev, Elizabeth, Peter H. Kahn, Hanzi Chen, and Garrett Esperum. 2020. “Relatively Wild Urban Parks Can Promote Human Resilience and Flourishing: A Case Study of Discovery Park, Seattle, Washington.” *Frontiers in Sustainable Cities* 2. https://doi.org/10.3389/frsc.2020.00002.

Limitations:

- The tool requires subjective judgment so will likely vary with different evaluators. Combined scores from multiple evaluators may help mitigate this limitation.

- The subjectivity of evaluation will likely be influenced by the relative expectations placed on different contexts. This may limit the tool's usefulness in comparing across different sites. This limitation may be mitigated by having the same evaluators assessing all comparison sites keeping in mind that comparison between them is intended. For example, a small urban botanical garden might perform better when compared to a small lawn and tree urban park on a wildness metric but would likely be scored less favorably when compared with a much larger wildlife preserve outside of the city.

- Although development of all the metrics used by this evaluative tool is drawn from grounded theory research, as a new evaluative tool itself, the efficacy of its predictive ability will require additional data collection and testing to ensure reliability and validity.

Economic Benefits

On-site Subsoil Use

- ***Saved at least $750,000 by eliminating the export of dirt and import of replacement topsoil.***

Background:

The design team saved at least $750,000 by utilizing the contaminated surface soil from the land immediately adjacent to the site for slope grading, as well as sourcing clean soil from beneath the contaminated surface soil for planting material, eliminating the costly export of dirt and import of replacement topsoil common in projects requiring intensive remediation.

Method:

Through the use of pre-construction test plots an amendment strategy was identified, which kept 12,600 cubic yards of clean subsoils on-site for use as planting soil. This amended site soil cost $120,000. In comparison, this decision saved the project approximately $750k by eliminating the export of site dirt and the import of replacement topsoil.

Figure 28. The soil kept on site was used to create a gradual slope across the site, making paths more accessible to those with physical challenges, and to build sail mounds for people to summit and enjoy the views. Photos: Stuart Isett 2019, Rebecca Habtour 2022.

Cost information and savings estimate provided via project documents from the design team at Site Workshop. Cost of soil removal and import of replacement topsoil was estimated at $70 per cubic yard to reach the $750k figure. This is a conservative estimate, as the cost of just soil removal alone can reach around $200 per cubic yard according to an estimate from the Homewyse Dirt Removal Calculator. That would not include the import of replacement topsoil, or any additional disposal measures required for disposing of toxic dirt.

Calculations:

(cubic yards of soil used on site * estimated cost per cubic yard for removal and replacement) – amended site soil cost = overall estimated cost

Sources:

"Homewyse Calculator: Cost to Remove Dirt." n.d. Homewyse. Accessed August 8, 2022. //www.homewyse.com/services/cost_to_remove_dirt.html.

Limitations:

- The estimate here is conservative. Actual costs for removal and replacement could be much higher.

- ***Stimulates local economy by attracting visitors from outside the immediate area, as evidenced by 578 surveyed visitors reporting 85 unique zip codes.***

Background:

If Dune Peninsula Park is seen as a special destination, worth coming to for visitors from outside the immediate area, it draws an influx of potential patrons to the neighboring businesses.

Field observation notes taken at Dune Peninsula Park documented an active exchange of visitors between the park and the neighboring Point Ruston's retail amenities because of its close walkable proximity and complementary offerings. Bikes rented at Point Ruston can be frequently seen looping Dune Peninsula Park, seemingly non-stop when the weather is nice. People carry ice creams, coffees, or lunches up from Point Ruston to enjoy them in the park, and park visitors often stop by Point Ruston's public market and restaurants to grab a bite to eat before heading home.

Method:

A survey question asked, "What is your zip code?" Frequency counts of each unique zip code were tabulated in excel, then mapped in Maptive using their embedded US Census zip code data with one marker for each zip code represented. A green color overlay was then applied to the map with opacity set corresponding to the number of respondents in that zip code, as seen below.

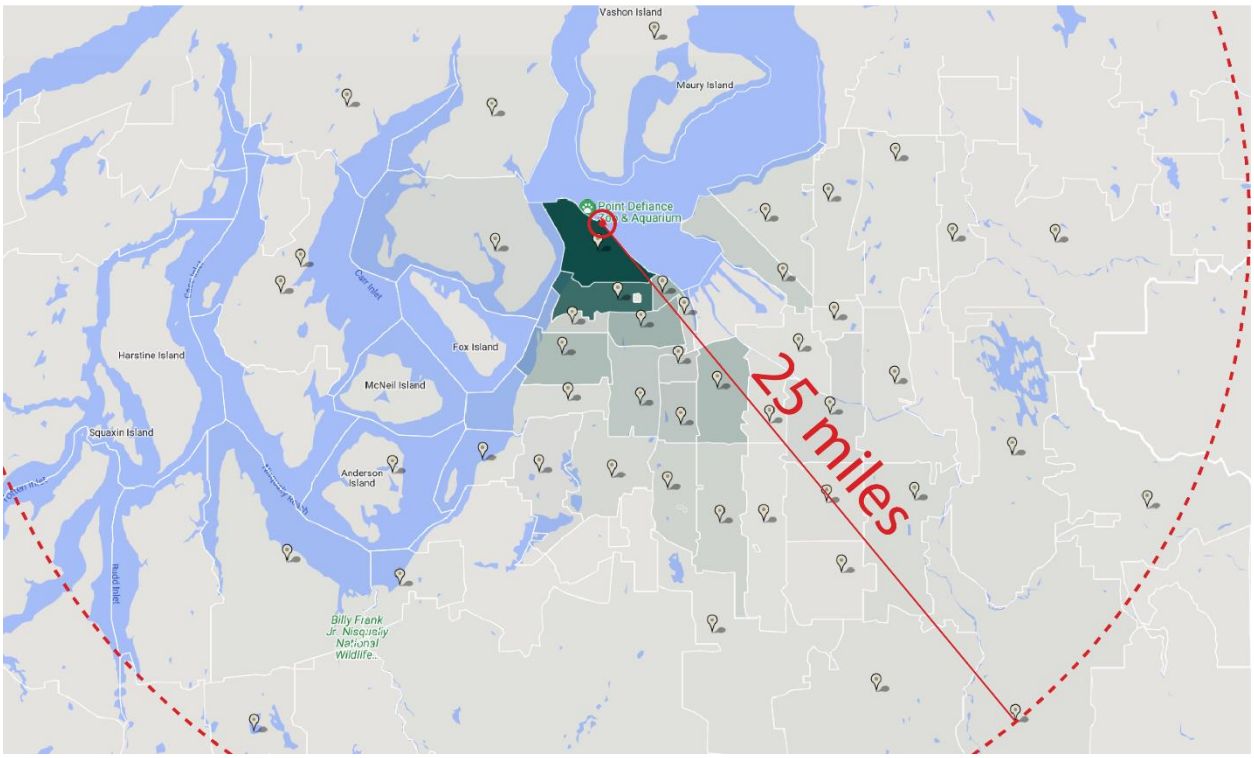


Figure 29. Park visitors from each marked zip code responded to the survey, with the furthest shown here about 25 miles out from the park. The color overlay has the opacity set to the number of respondents from that zip code, meaning the darker the green the more respondents reported that zip code.

Out of 566 survey respondents who answered the question, “What is your zip code?” 85 provided unique zip codes, including two visitors from over 2400 miles away (11103, 11566). Reported most frequently was the immediate zip code 98407 that Dune Peninsula Park at 120, followed in frequency by the multiple zip codes from the surrounding area.

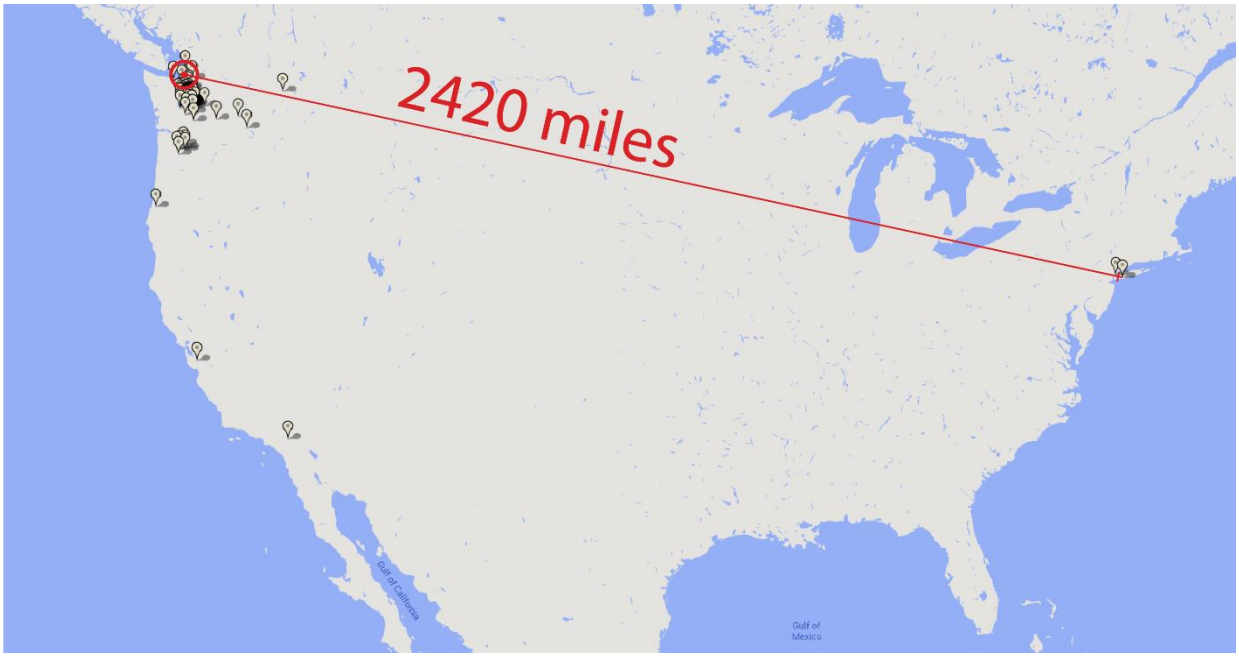


Figure 30. Zip codes provided by survey respondents as their zip codes included location across the country.

Calculations:

The frequency of occurrence of each zip code was tabulated in excel, and each unique zip code was counted. Distances were measured using google maps.

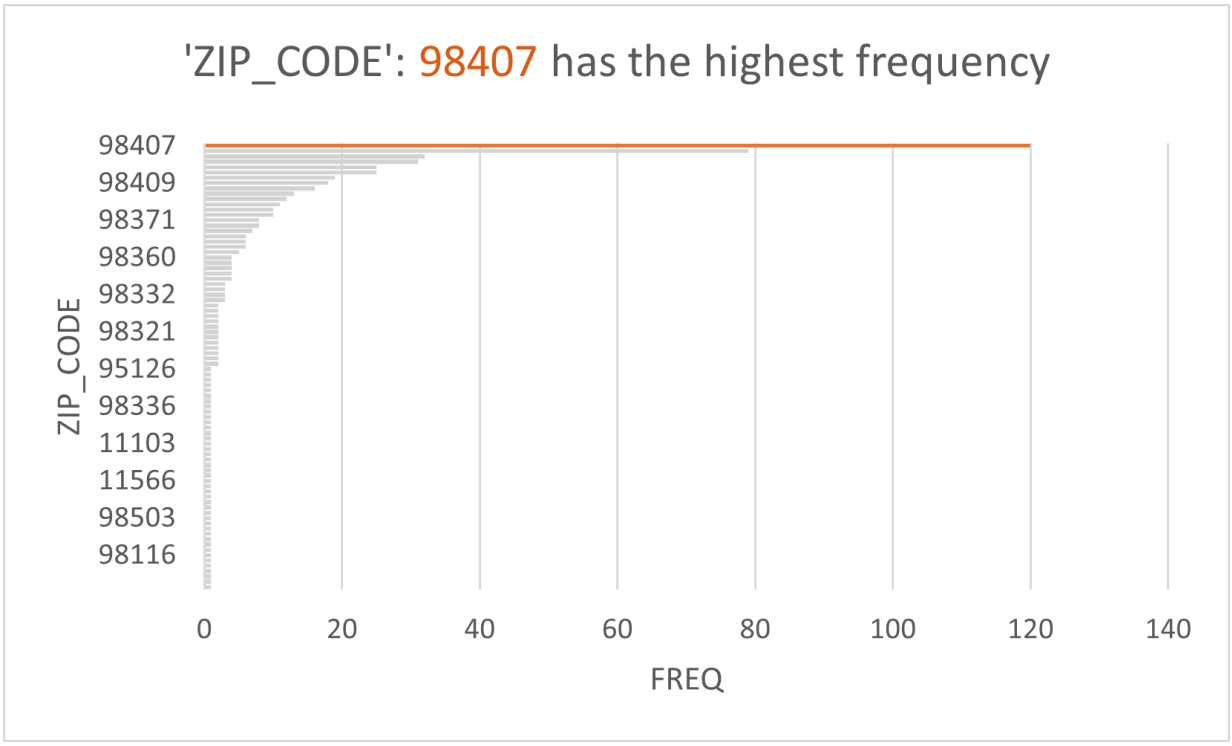


Table 3. Frequency of zip codes provided by survey respondents.

Sources:

"Custom Map Creator & Map Maker | Maptive Mapping Software." n.d. Maptive. Accessed August 7, 2022. https://www.maptive.com/.

Habtour, Rebecca. n.d. "Zip Codes Map." Google My Maps. Accessed July 22, 2022. https://www.google.com/maps/d/edit?mid=1M7FR9Ph-WxtdBbX-_sj2d3tkxUSsKtw&usp=sharing.

"TIGER/Line Shapefile, Current, Nation, U.S., 2020 5-Digit ZIP Code Tabulation Areas (ZCTA5)." n.d. US Census Bureau. Data.Gov. Accessed July 22, 2022. https://catalog.data.gov/dataset/tiger-line-shapefile-current-nation-u-s-2020-5-digit-zip-code-tabulation-areas-zcta5/resource/f1766567-b3f7-4233-9574-373bb647332e.

Limitations:

- As an indirect indicator, this analysis identifies a trend but does not capture the direct economic effect.

Inconclusive Benefit

- ***Contributed to a 130% increase in property values in the Tacoma/Ruston zip code from park completion in 2019 through May 2022.***

Background:

Dune Peninsula Park shares the remediation of the former ASARCO plant site with a 97-acre mixed-use mid-rise waterfront development, Point Ruston. In 2013 the first 143-unit residential building with ground floor retail was completed in Point Rustin. Construction has continued ever since with completion of 1,800 total living units, 500,000 square feet of commercial space, and a 194-room hotel expected by 2024.

The remediation of a toxic site, the development of an entirely new walkable, waterfront neighborhood, and the addition of Dune Peninsula Park each play an inseparable part in the increases of local property values.

There has been a strong regional trend of increasing home values throughout the Seattle-Tacoma-Bellevue metro area for several years. However, increases in Tacoma property values have historically not kept pace with the rest of the region. This is likely attributable to its long-held local reputation as a heavily polluted working-class area. The time sampled in our analysis

includes the Great Recession in 2007-2009 and the historically low mortgage rates since that time, as well as the economic downturn from COVID-19 in 2020.

Method:

Using data from the Zillow Home Value Index (ZHVI), changes in typical home values from January of 2000 to May of 2022 were calculated for the Seattle-Tacoma-Bellevue region, the city of Tacoma, and the zip code 98407 which encompasses Dune Peninsula Park and the surrounding area. Comparisons were made before and after the completion of the park, as well as between the local and regional levels.

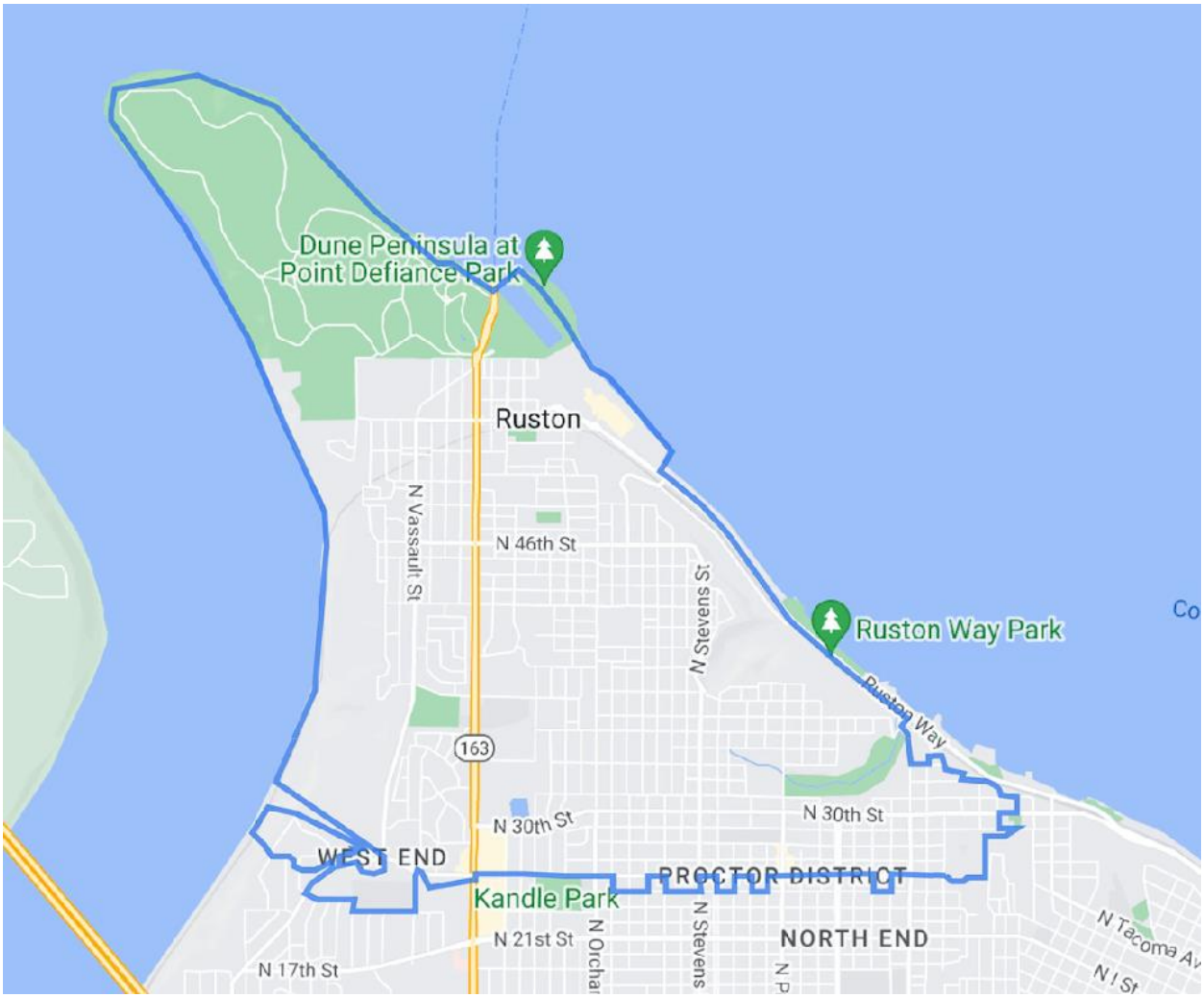


Figure 27. Boundary for zip code 98407 encompassing Dune Peninsula Park, Point Ruston, and surrounding neighborhoods. Image source: Google 2022.

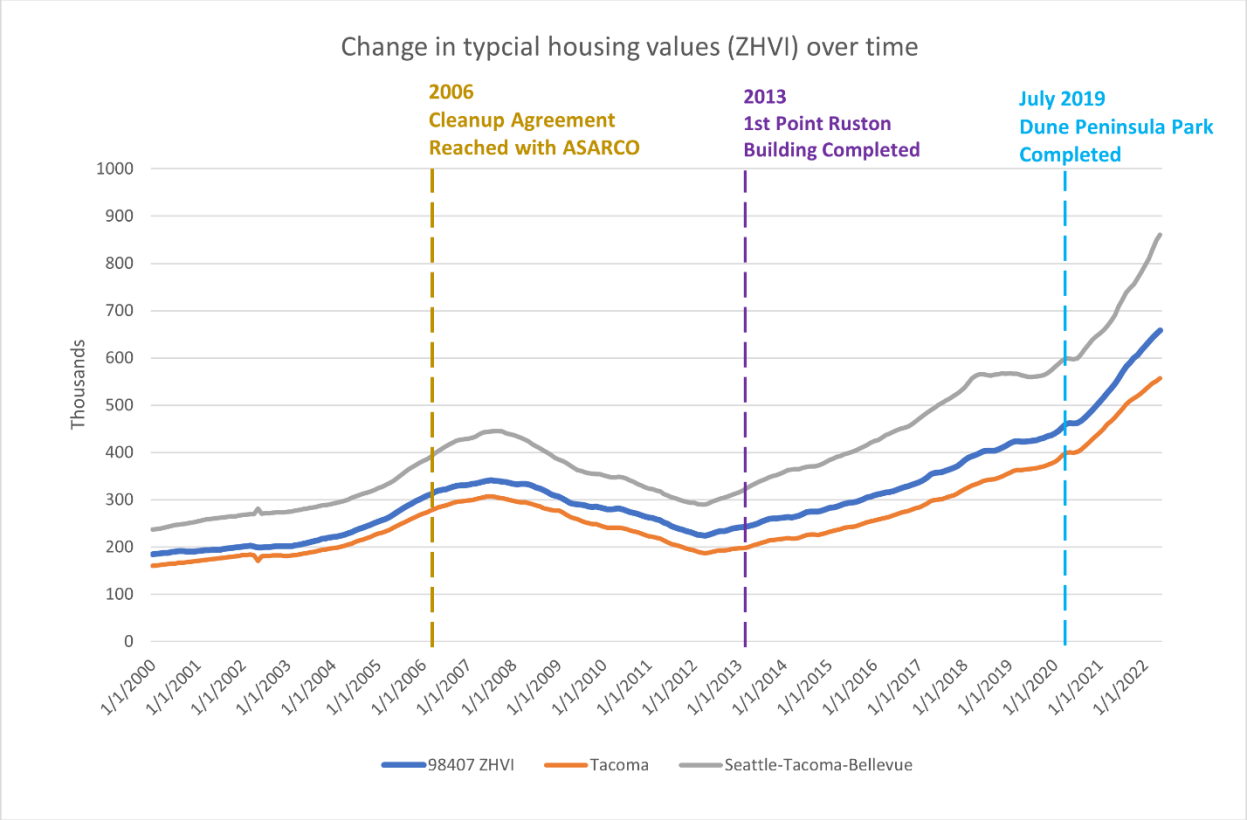


Table 2. Change in typical housing values (ZHVI) over time.

Zip Code 98407	Tacoma	Seattle-Tacoma-Bellevue	
Jan 2000 to May 2022			
255.73%	246.80%	262.77%	% change in property values
11.94%	11.52%	12.27%	% change per year
Jan 2000 to July 2019 - Before the completion of Dune Peninsula Park			
129.56%	127.28%	135.94%	% change in property values
6.67%	6.56%	7.00%	% change per year
July 2019 to May 2022 - After the completion of Dune Peninsula Park			
54.96%	52.59%	53.75%	% change in property values
14.34%	13.72%	14.02%	% change per year

Between January of 2000 to May of 2022, home values have increased significantly both locally and regionally. Although the increasing trend in property values in the local area after the park's completion are significant, when one zooms out, they are very close to alignment with regional trends.

Zip Code 98407	Tacoma	Seattle-Tacoma-Bellevue	
Difference between Before and After completion of Dune Peninsula Park			
7.67%	7.16%	7.02%	% change per year

The increase in the percentage change per year in housing values in 98407 is only slightly higher than Tacoma (0.51%), and only slightly higher than the entire Seattle-Tacoma-Bellevue region, (0.65%). It may be that the remediation of the toxic site, the construction of the park, and the new neighborhood development is what spurred the area to pull slightly ahead of the overall region in value growth, instead of lagging slightly behind as was the pattern before park completion. But the values are so close that one cannot draw any causal link. It seems that whatever impacts the remediation and the park may be having on housing values is buried by larger market trends.

Calculations:

% change in property values over time = (Value present - Value past)/ Value past

% change in property values per year = [(Value present - Value past)/ Value past]/ N

- where N stands for the number of years between the two values of past and present.

Sources:

"Blog | Page 89 of 96." n.d. Point Ruston. Accessed July 4, 2022. https://www.pointruston.com/blog/page/89/.

Gallup, Lauren. 2022. "Pushing Back On The Gentrification Of The Hilltop." Northwest Public Broadcasting. Accessed July 26, 2022. https://www.nwpb.org/2022/07/26/pushing-back-on-the-gentrification-of-the-hilltop/.

"Government Reaches Agreement with Asarco and Point Ruston to Clean Up Contaminated Site in Washington State." 2006. Point Ruston. Accessed August 1, 2006. https://www.pointruston.com/2006/08/government-reaches-agreement-with-asarco-and-point-ruston-to-clean-up-contaminated-site-in-washington-state/.

"Map of All ZIP Codes in Tacoma, Washington - Updated July 2022." n.d. Zipdatamaps.Com. Accessed July 4, 2022. //www.zipdatamaps.com/.

"Point Ruston Development Update by Bendavidson320 on Genially." n.d. Genial.Ly. Accessed July 2, 2022. https://view.genial.ly/5c5c77871ef86d73dd9ae07a/interactive-content-point-ruston-development-update.

"Ruston, WA | Data USA." n.d. Accessed July 2, 2022. https://datausa.io/profile/geo/ruston-wa#economy.

"ZHVI Housing Data." 200AD. *Zillow Research* (blog). to 2022 200AD. https://www.zillow.com/research/data/.

Limitations:

- Housing property values turned out to not be a very good indicator for positive local economic impact in this study because the local impacts were obscured by larger market forces.

- Increases in property values at the current level of acceleration are not necessarily something that the people in Tacoma would universally see as a benefit. These kinds of value increases lead to unaffordability and displacement of multi-generational family residents. Historically an affordable working-class community, Tacoma has seen a steep increase in property values, along with increases in rent, leading to communities scrambling to combat displacement. One survey respondent seemed to see Dune Peninsula Park as just such a signal of a gentrifying influx of outsiders. "It's obviously built to impress the California and Seattle transplants. Locals who aren't in the artsy or hipster crowd are made to feel unwelcome and frankly the park is pretty barren."

Cost Comparison

Savings on Play Equipment

- ***The multi-use play features throughout the site eliminated an estimated cost of $380,000 for the sole-use play equipment that is typically used in traditional park design while maintaining the developmental benefits of supporting play. This alternative approach expanded opportunities for play to a wider set of users, including adults.***

Figure 31. Many opportunities for play and discovery are built into the landscape at Dune Peninsula Park. Photos: Stuart Isett 2019, R. Habtour 2022, Stuart Isett 2019.

Background:

A high-quality playground in its traditional form offers a rich variety of play experiences targeted to children aged 2-12 years. Such a facility might require 5,000 sf of space dedicated to this sole use, cost upwards of $400k and commit the parks department to regular inspections and increased maintenance needs.

Method and Calculations:

A reasonable regional comparison that included the budget estimate for a new park installed in a Seattle area park in 2017 was found to base the estimate upon and cost adjusted for inflation. The comparison project was budgeted at $365,000, which, if installed in 2019 would be $380,691.

Sources:

"$365,000 in 2017 → 2019 | Inflation Calculator." n.d. Accessed June 22, 2022. https://www.in2013dollars.com/us/inflation/2017?amount=365000.

"Washington Park Playfield Playground Installation - Parks | Seattle.Gov." n.d. Accessed June 22, 2022. https://www.seattle.gov/parks/washington-park-playfield-playground-installation.

Limitations:

- Costs for playgrounds vary widely depending on the design. The comparison selected here was of a relatively conservative cost compared with other area playground renovation projects.

Figure 32. Dune Peninsula Park view of Mt. Rainier over the prairie. Photo: R. Habtour

Appendix A – Plants Identified

The following table shows the plants identified during the field sampling for Dune Peninsula at Point Defiance Park on June 20, 2022. It also includes whether the species is identified as endemic to the region as well as the species primary and tertiary CSR strategy(ies).

Common Name	**Scientific Name**	**Code**	**Endemism**	**C (%)**	**S (%)**	**R (%)**	**CSR strategy**
Common Yarrow	*Achillea millefolium*	AM	native	22.02	58.81	19.18	S/CSR
Mouse Ear Chickweed	*Cerastium fontanum*	CF	introduced	10.47	12.32	77.21	R/SR
Smooth Hawksbeard	*Crepis capillaris*	CC	introduced	36.33	0	63.67	R/CR
Field Horsetail	*Equisetum arvense*	EA	native	14.71	63.77	21.53	S/CSR
Common Woolly Sunflower	*Eriophyllum lanatum*	CWS	native	no data	no data	no data	
Hard Fescue	*Festuca ovinium*	FO	native	1.91	73.32	24.77	S/SR
Red Fescue	*Festuca rubra*	FR	native	10.41	35.7	53.89	SR
Cutleaf Geranium	*Geranium dissectum*	GC or GD	introduced	18.69	25.08	56.24	R/CSR
Puget Sound Gumweed	*Grindelia integrifolia*	GI	native	no data	no data	no data	
Common Velvet Grass	*Holcus lanatus*	HI	native	20.06	28.82	51.13	R/CSR
Common Rush	*Juncus effusus*	JE	native	38.48	61.52	0	CS
Torey's Rush	*Juncus torreyi*	JT	native	no data	no data	no data	
Perennial Ryegrass	*Lolium perenne*	LP	introduced	21.68	0	78.32	R/CR
Birdsfoot Trefoil	*Lotus corniculatus*	LC	introduced	14.21	18.98	66.81	R/SR
Narrowleaf Plantain	*Plantago lanceolata*	PL	introduced	71.82	0	28.18	C/CR
Slender Cinquefoil	*Potentilla gracilis*	PG	native	no data	no data	no data	
Sulfur Cinquefoil	*Potenttilla Recta*	PR	introduced	25.56	51.8	22.64	S/CSR
Himalayan Blackberry	*Rubus armeniacus*	RA	introduced	no data	no data	no data	
Autumn Hawkbit	*Scorzoneroides autumnalis*	SA	introduced	22.91	48.88	28.22	S/CSR
Spiny Sowthistle	*Sonchus asper*	SS	introduced	no data	no data	no data	
Smooth Swamp Aster	*Symphyotrichum firmum*	SF	introduced	9.57	46.25	44.18	SR
Common Dandelion	*Taraxacum officianale*	TO	introduced	57.78	0.57	41.65	CR
Lesser Trefoil	*Trifolium dubium*	TD	introduced	78.6	0	21.4	C/CR
Alsike Clover	*Trifolium hybridum*	TH	introduced	45.45	25.76	28.79	C/CSR
Red Clover	*Trifolium pratense*	TP	introduced	30.9	19.03	50.07	R/CSR
White Clover	*Trifolium rubens*	TR	introduced	31.95	47.76	20.3	S/CSR
Common Vetch	*Vicia sativa*	CV	introduced	11.14	44.73	44.13	SR/CSR
Lentil Vetch	*Vicia tetrasperma*	VT	introduced	26.31	13.64	60.05	R/CSR
Bare Ground	-	BARE	-	-	-	-	-

Appendix B – Bird Species

The following table is a list of all the bird species (207) identified and reported to eBird by citizen scientists between 2017 and 2022 at Dune Peninsula Park in Tacoma, Washington. Each species is hyperlinked to a description provided by eBird.

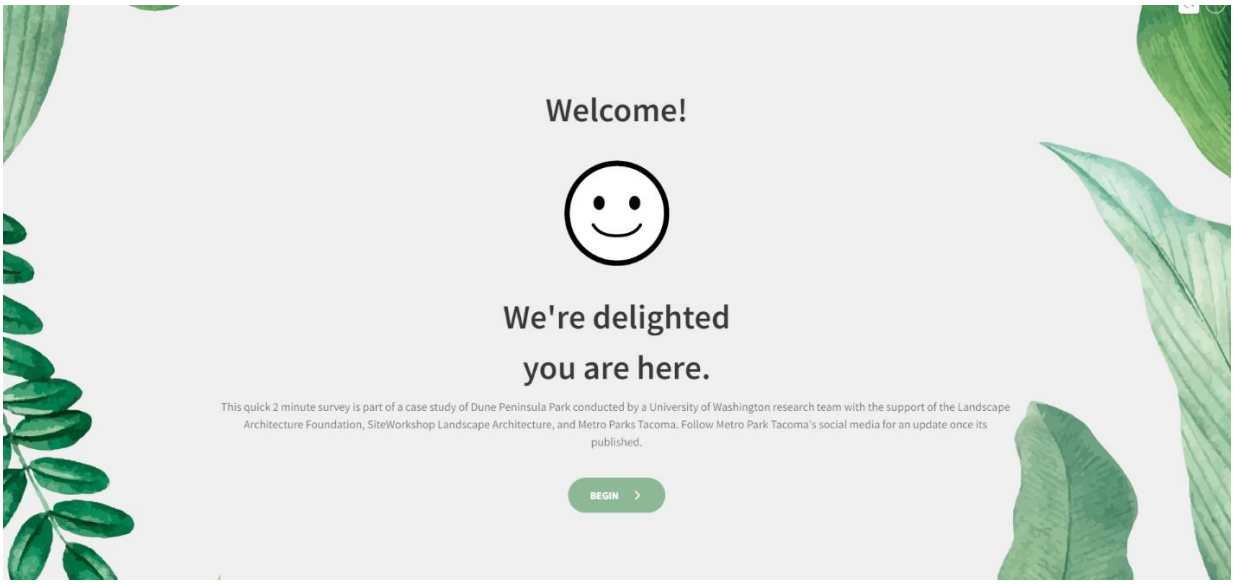
Accipiter cooperii	Calidris mauri	Dryobates pubescens
Accipiter striatus	Calidris melanotos	Dryocopus pileatus
Actitis macularius	Calidris minutilla	Empidonax difficilis
Aechmophorus occidentalis	Calidris pusilla	Empidonax hammondii
Agelaius phoeniceus	Calypte anna	Empidonax traillii
Aix sponsa	Cardellina pusilla	Eremophila alpestris
Anas acuta	Cathartes aura	Euphagus cyanocephalus
Anas crecca	Catharus guttatus	Falco columbarius
Anas platyrhynchos	Catharus ustulatus	Falco peregrinus
Anser albifrons	Cepphus columba	Falco sparverius
Anser caerulescens	Cerorhinca monocerata	Fulica americana
Anthus rubescens	Certhia americana	Fulmarus glacialis
Aphelocoma californica	Chaetura vauxi	Gallinago delicata
Ardea herodias	Charadrius semipalmatus	Gavia immer
Ardenna tenuirostris	Charadrius vociferus	Gavia pacifica
Arenaria melanocephala	Charlie Wright	Gavia stellata
Asio flammeus	Charlie Wright	Geothlypis trichas
Aythya affinis	Chordeiles minor	Haematopus bachmani
Aythya collaris	Chroicocephalus philadelphia	Haemorhous mexicanus
Aythya marila	Circus hudsonius	Haemorhous purpureus
Aythya valisineria	Cistothorus palustris	Haliaeetus leucocephalus
Bombycilla cedrorum	Clangula hyemalis	Hirundo rustica
Brachyramphus marmoratus	Coccothraustes vespertinus	Histrionicus histrionicus
Branta bernicla	Colaptes auratus	Hydrobates leucorhous
Branta canadensis	Columba livia	Hydroprogne caspia
Branta hutchinsii	Contopus cooperi	Icterus bullockii

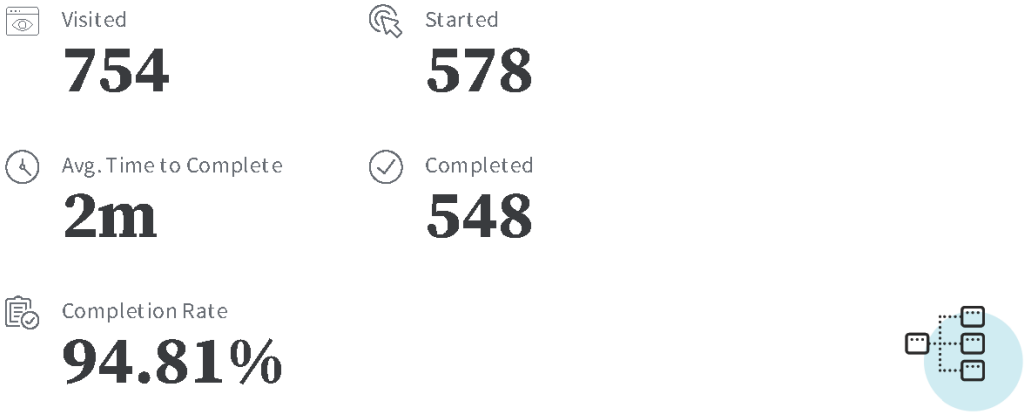
Bucephala albeola	Contopus sordidulus	Ixoreus naevius
Bucephala clangula	Corthylio calendula	Junco hyemalis
Bucephala islandica	Corvus brachyrhynchos	Larus argentatus
Buteo jamaicensis	Corvus corax	Larus brachyrhynchus
Buteo swainsoni	Cyanocitta stelleri	Larus californicus
Calcarius lapponicus	Cygnus buccinator	Larus delawarensis
Calidris alba	Cygnus columbianus	Larus fuscus
Calidris alpina	Cypseloides niger	Larus glaucescens
Larus glaucoides	Phalaropus lobatus	Stercorarius parasiticus
Larus heermanni	Pheucticus melanocephalus	Stercorarius pomarinus
Larus occidentalis	Pipilo maculatus	Sterna hirundo
Leiothlypis celata	Piranga ludoviciana	Sterna paradisaea
Leiothlypis ruficapilla	Plectrophenax nivalis	Streptopelia decaocto
Leucophaeus pipixcan	Pluvialis fulva	Strix varia
Limnodromus griseus	Pluvialis squatarola	Sturnella neglecta
Limnodromus scolopaceus	Podiceps auritus	Sturnus vulgaris
Lophodytes cucullatus	Podiceps grisegena	Sula leucogaster
Loxia curvirostra	Podiceps nigricollis	Synthliboramphus antiquus
Mareca americana	Podilymbus podiceps	Tachycineta bicolor
Mareca penelope	Poecile atricapillus	Tachycineta thalassina
Mareca strepera	Poecile rufescens	Thryomanes bewickii
Megaceryle alcyon	Pooecetes gramineus	Tringa incana
Melanitta americana	Progne subis	Tringa melanoleuca
Melanitta deglandi	Psaltriparus minimus	Troglodytes pacificus
Melanitta perspicillata	Ptychoramphus aleuticus	Turdus migratorius
Melospiza lincolnii	Regulus satrapa	Tyrannus tyrannus
Melospiza melodia	Riparia riparia	Tyrannus verticalis
Mergus merganser	Sayornis nigricans	Tyto alba
Mergus serrator	Sayornis saya	Uria aalge
Molothrus ater	Selasphorus rufus	Uria lomvia
Myadestes townsendi	Setophaga coronata	Urile pelagicus

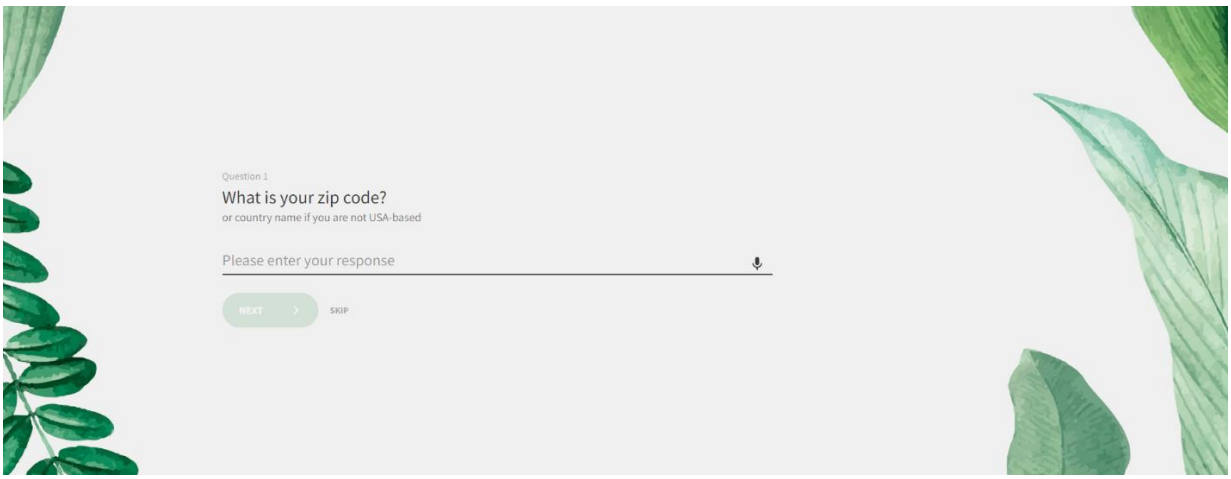
Nannopterum auritum	Setophaga nigrescens	Urile penicillatus
Numenius phaeopus	Setophaga palmarum	Vireo cassinii
Nycticorax nycticorax	Setophaga petechia	Vireo gilvus
Oxyura jamaicensis	Setophaga townsendi	Xanthocephalus xanthocephalus
Pandion haliaetus	Sialia currucoides	Xema sabini
Passer domesticus	Sitta canadensis	Zenaida macroura
Passerculus sandwichensis	Spatula clypeata	Zonotrichia atricapilla
Passerella iliaca	Sphyrapicus ruber	Zonotrichia leucophrys
Passerina amoena	Spinus pinus	
Patagioenas fasciata	Spinus psaltria	
Pelecanus erythrorhynchos	Spinus tristis	
Pelecanus occidentalis	Spizella passerina	
Petrochelidon pyrrhonota	Stelgidopteryx serripennis	
Phalaropus fulicarius	Stercorarius longicaudus	

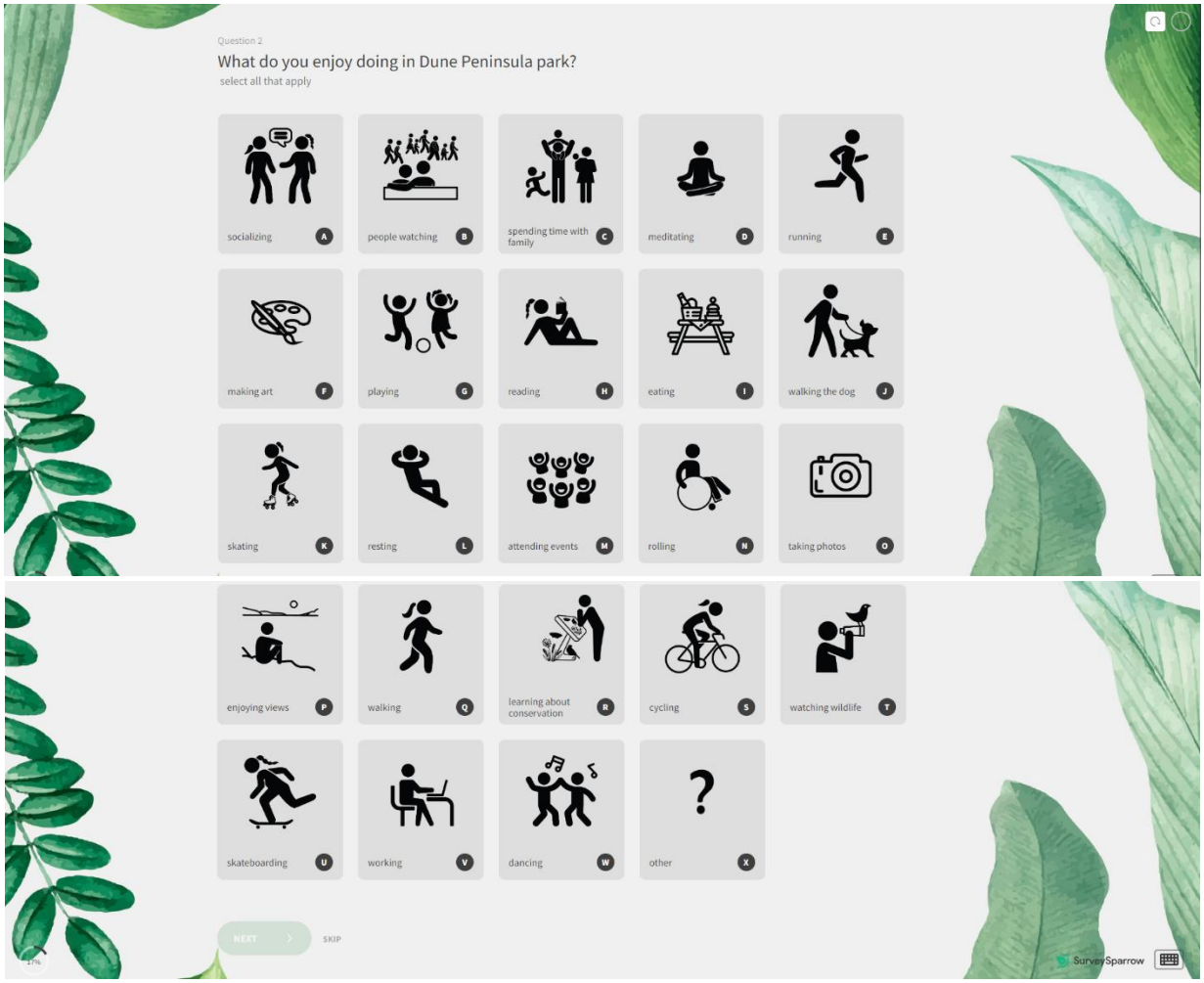
Appendix C – Short Survey

Short Survey & Abbreviated Results July 31, 2022









ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
resting	158	4.58%
socializing	165	4.78%
attending events	100	2.90%
eating	159	4.61%
cycling	78	2.26%
dancing	17	0.49%
enjoying views	465	13.47%
spending time with family	283	8.20%
learning about conservation	105	3.04%
walking	457	13.24%
making art	20	0.58%
playing	85	2.46%

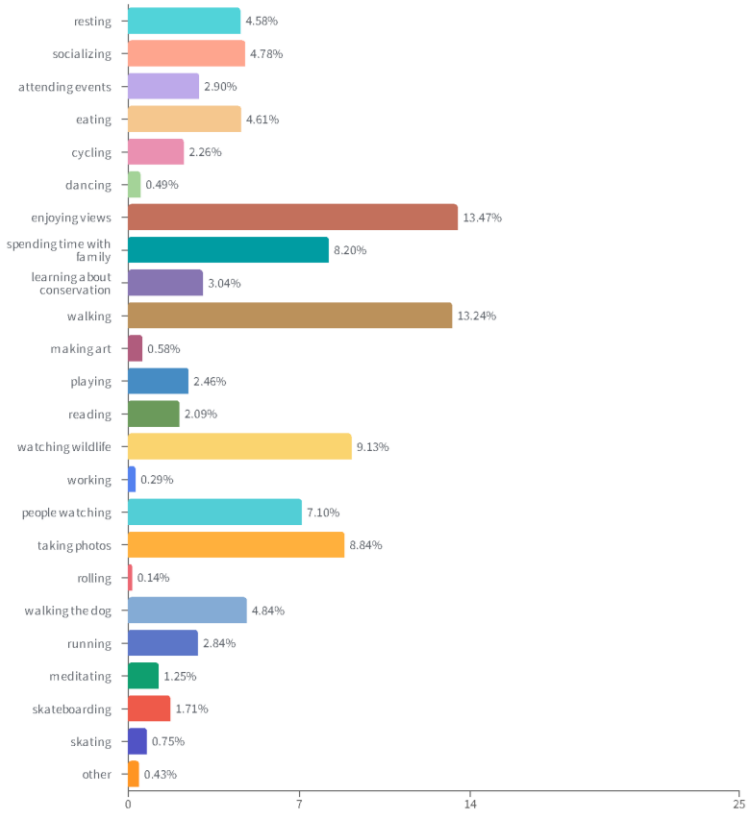
reading	72	2.09%
watching wildlife	315	9.13%
working	10	0.29%
people watching	245	7.10%
taking photos	305	8.84%
rolling	5	0.14%
walking the dog	167	4.84%
running	98	2.84%
meditating	43	1.25%
skateboarding	59	1.71%
skating	26	0.75%
other	15	0.43%

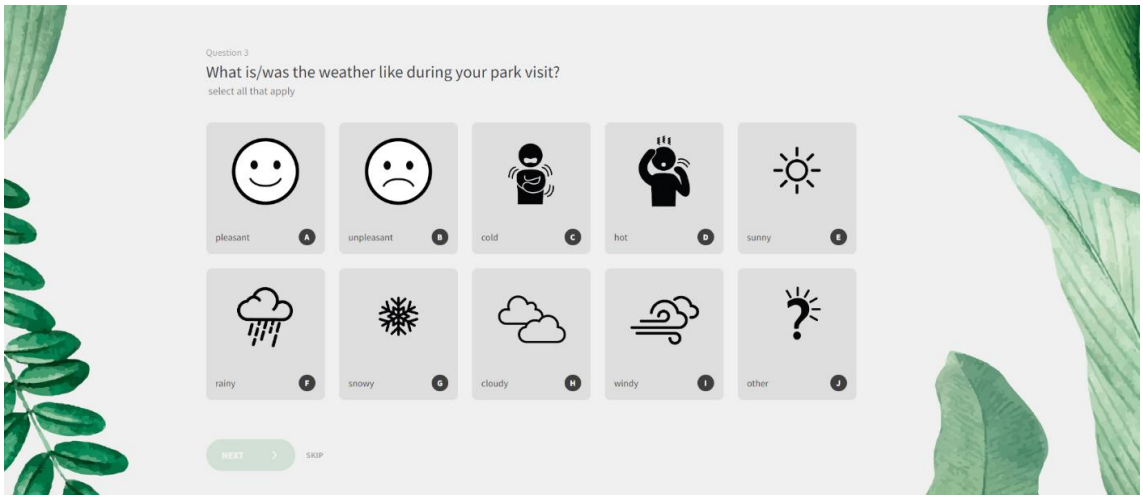
QUESTION 02 | PICTURE CHOICE

What do you enjoy doing in Dune Peninsula park?

select all that apply

Answered: **568** Skipped: **4**





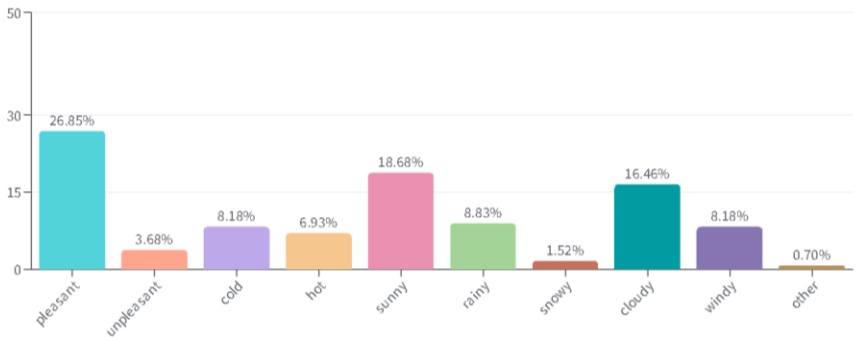
ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
pleasant	496	26.85%
unpleasant	68	3.68%
cold	151	8.18%
hot	128	6.93%
sunny	345	18.68%
rainy	163	8.83%
snowy	28	1.52%
cloudy	304	16.46%
windy	151	8.18%
other	13	0.70%

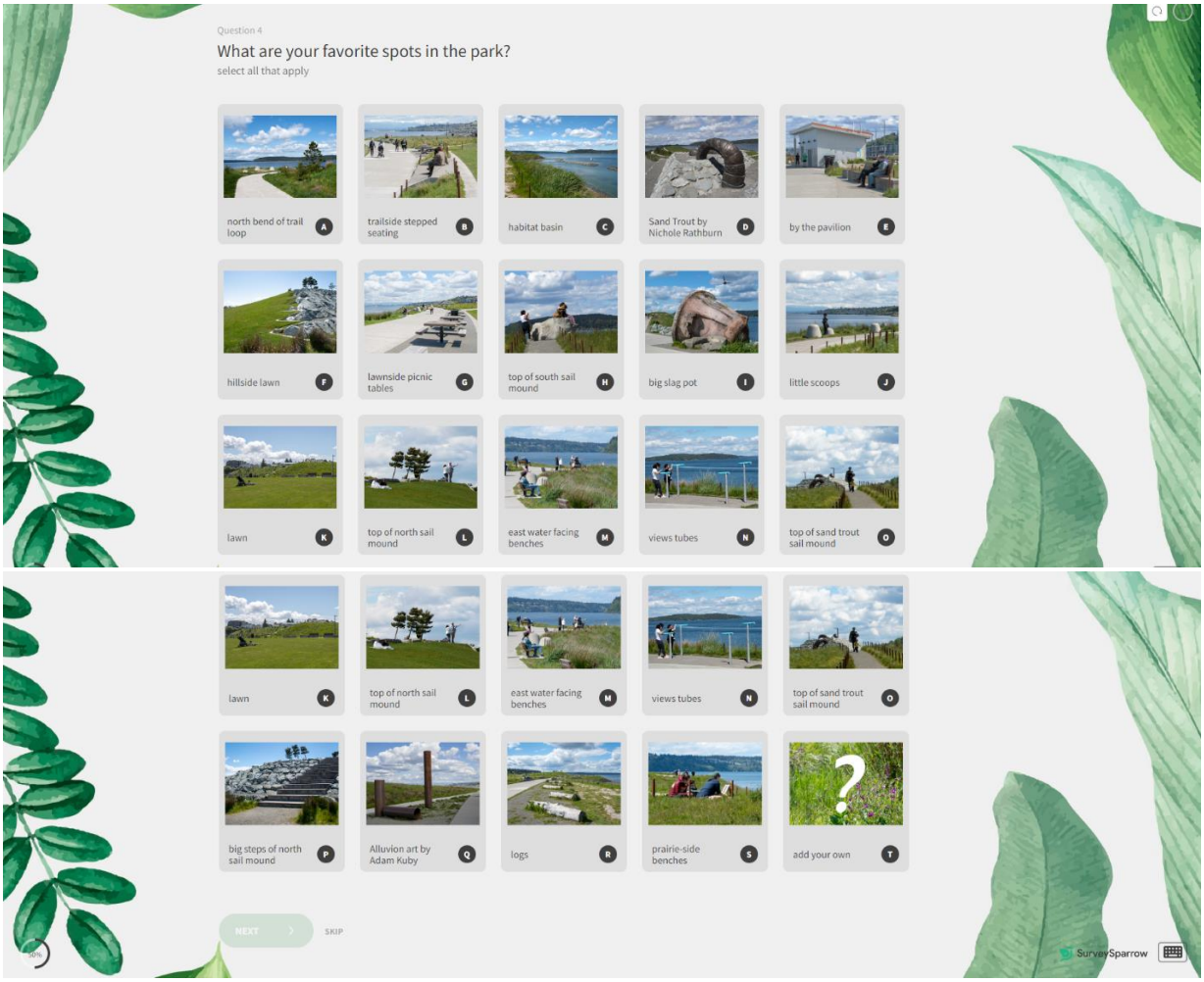
QUESTION 03 | PICTURE CHOICE

What is/was the weather like during your park visit?

select all that apply

Answered: **565** Skipped: **5**





ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
big slag pot	163	5.35%
habitat basin	260	8.53%
Alluvion art by Adam Kuby	68	2.23%
east water facing benches	221	7.25%
lawn	169	5.54%
lawnside picnic tables	135	4.43%
trailside stepped seating	185	6.07%
little scoops	105	3.44%
logs	102	3.35%
big steps of north sail mound	203	6.66%

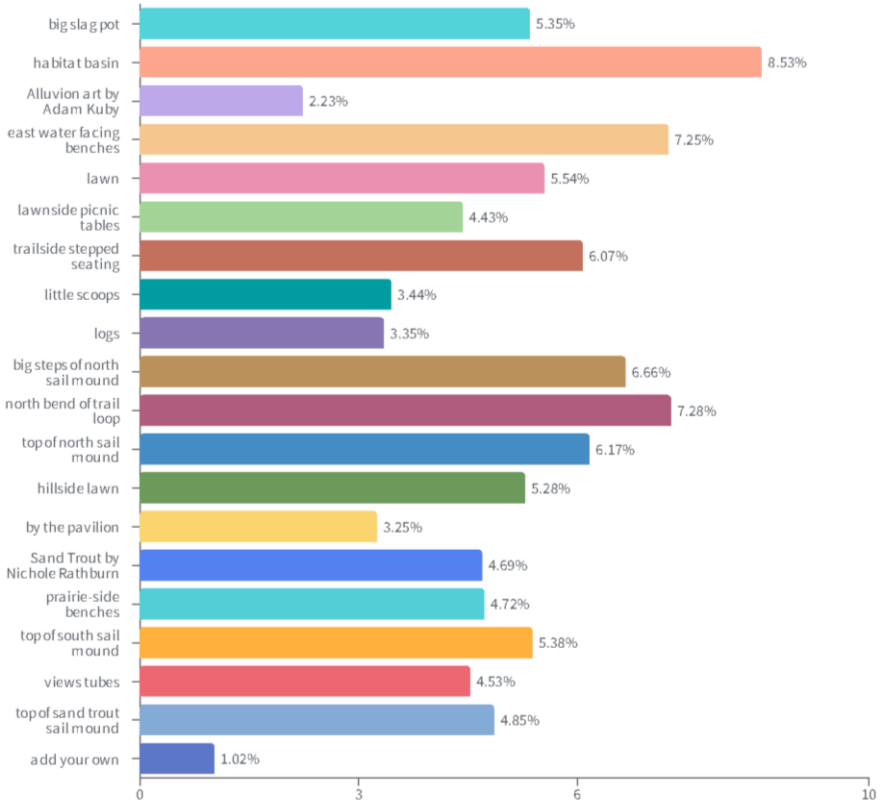
north bend of trail loop	222	7.28%
top of north sail mound	188	6.17%
hillside lawn	161	5.28%
by the pavilion	99	3.25%
Sand Trout by Nichole Rathburn	143	4.69%
prairie-side benches	144	4.72%
top of south sail mound	164	5.38%
views tubes	138	4.53%
top of sand trout sail mound	148	4.85%
add your own	31	1.02%

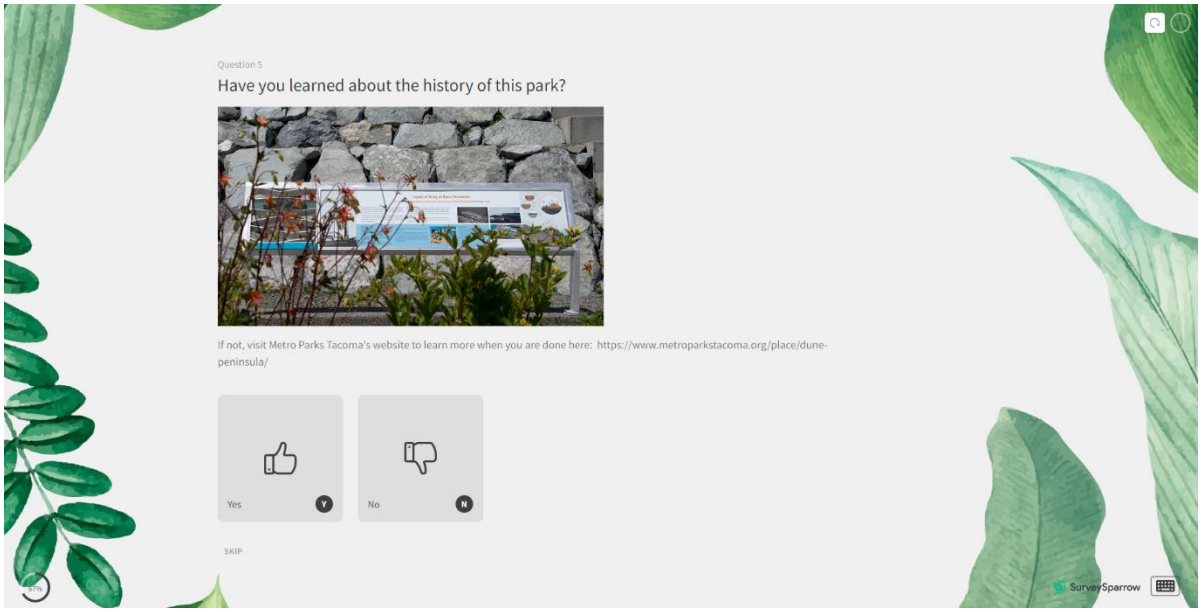
QUESTION 04 | PICTURE CHOICE

What are your favorite spots in the park?

select all that apply

Answered: **541** Skipped: **12**



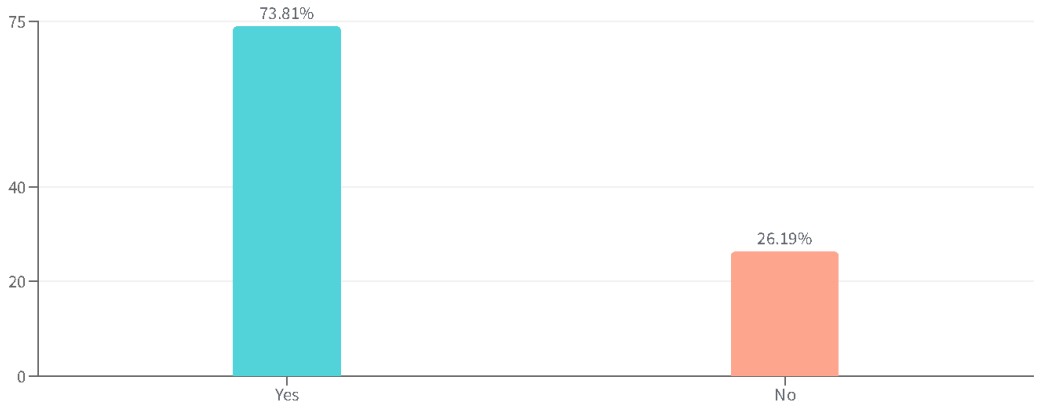


QUESTION 06 | YES OR NO

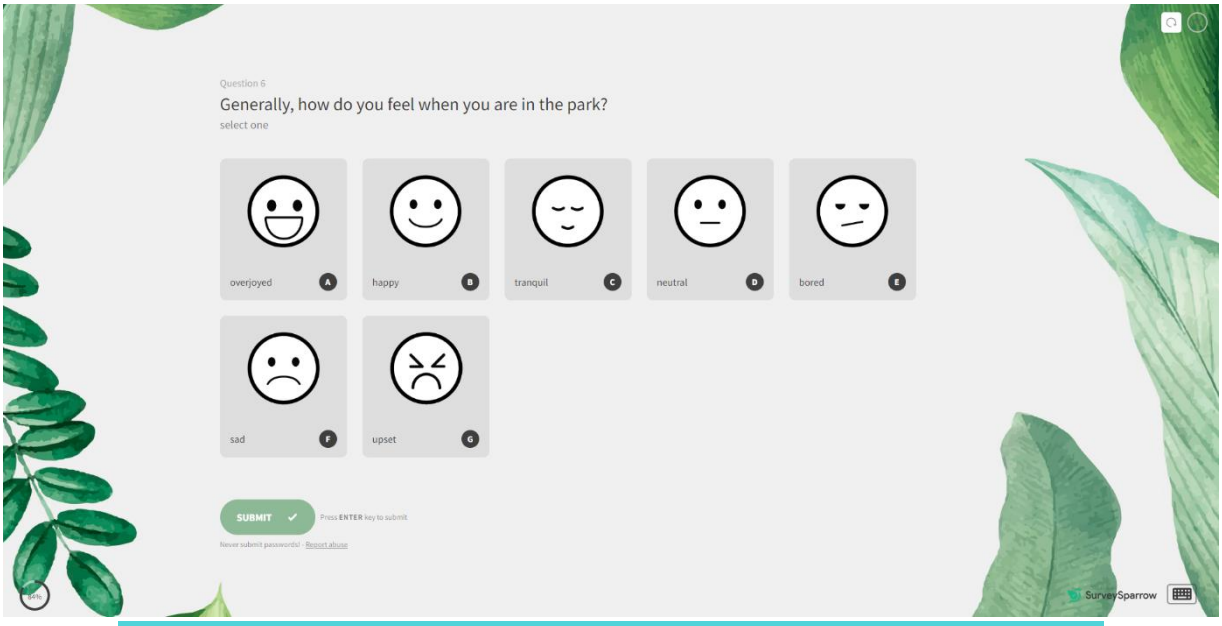
Have you learned about the history of this park?

If not, visit Metro Parks Tacoma's website to learn more when you are done here: https://www.metroparkstacoma.org/place/dune-peninsula/

Answered: **527** Skipped: **25**



ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
Yes	389	73.81%
No	138	26.19%

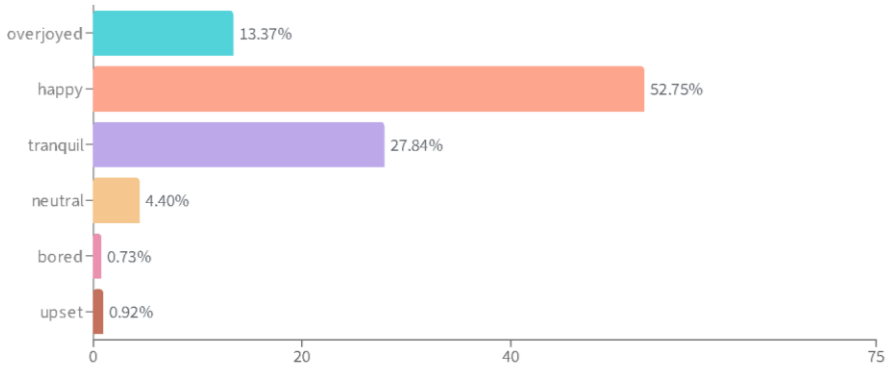


QUESTION 07 | PICTURE CHOICE

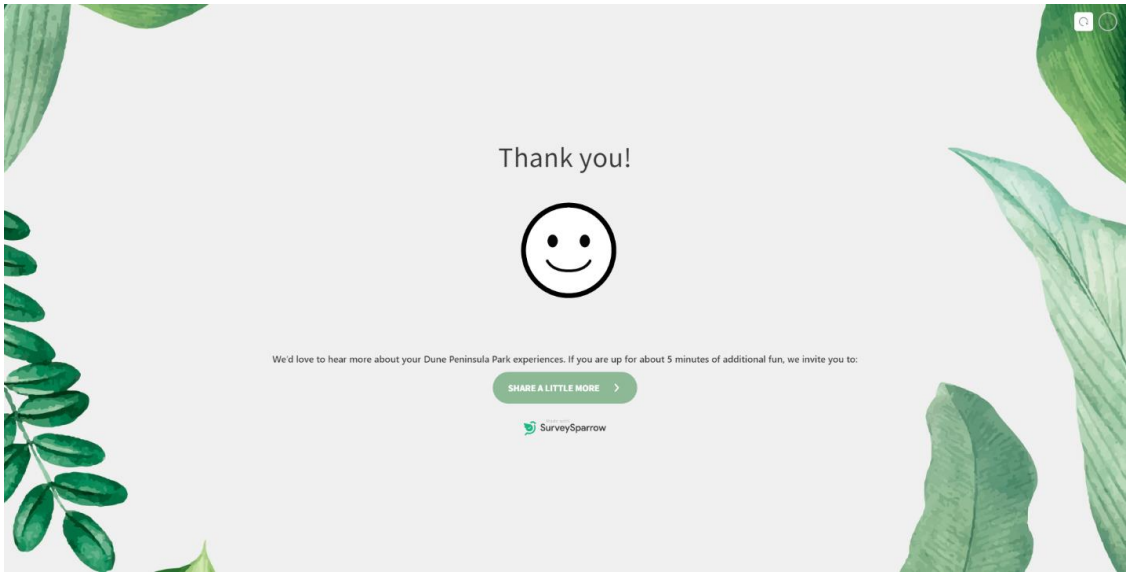
Generally, how do you feel when you are in the park?

select one

Answered: **546** Skipped: **4**

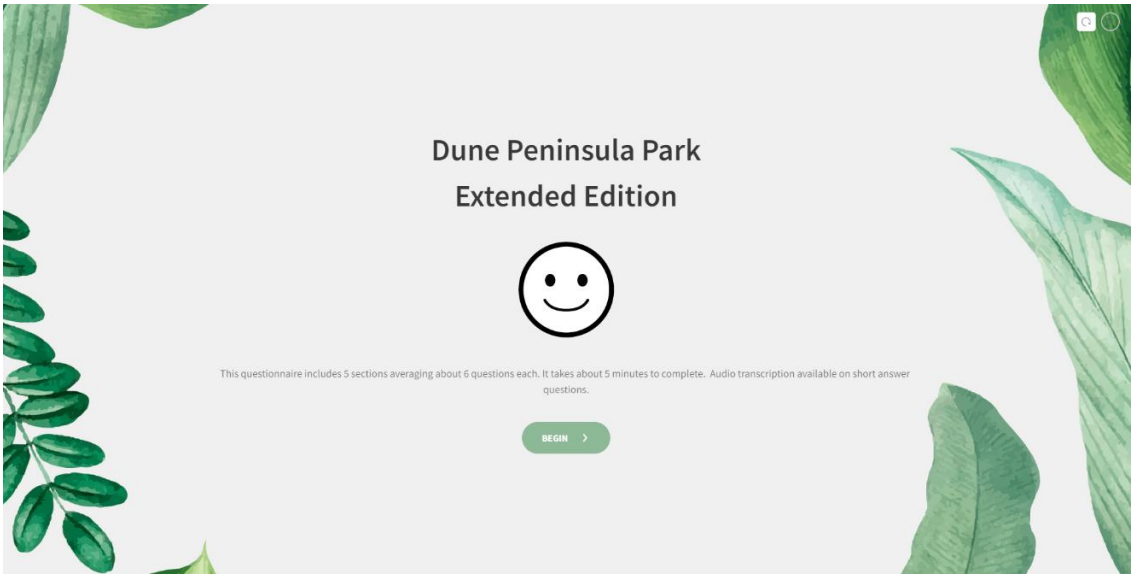


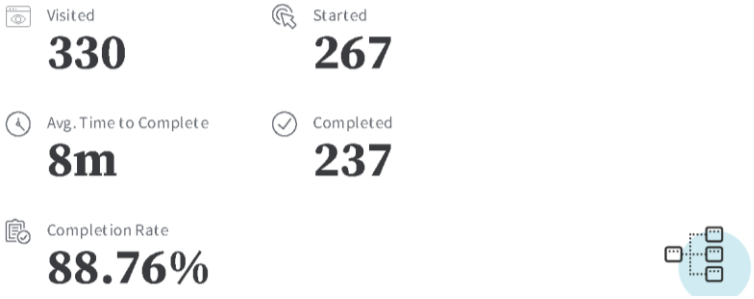
ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
overjoyed	73	13.37%
happy	288	52.75%
tranquil	152	27.84%
neutral	24	4.40%
bored	4	0.73%
upset	5	0.92%

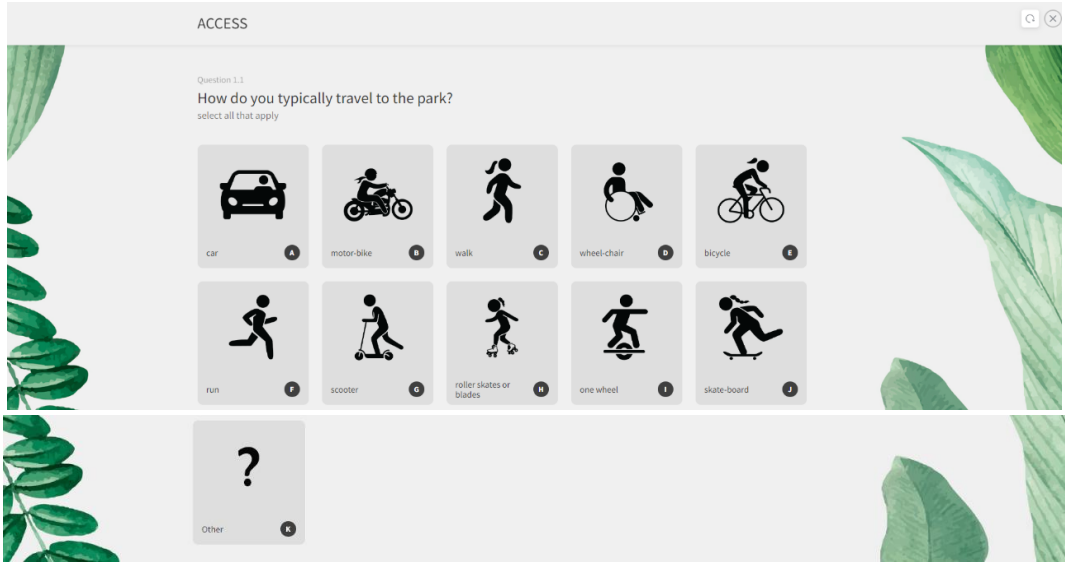


Appendix D – Extended Survey

Extended Survey & Abbreviated Results July 31, 2022

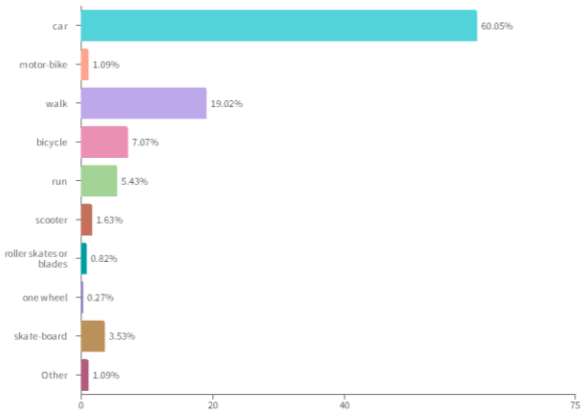


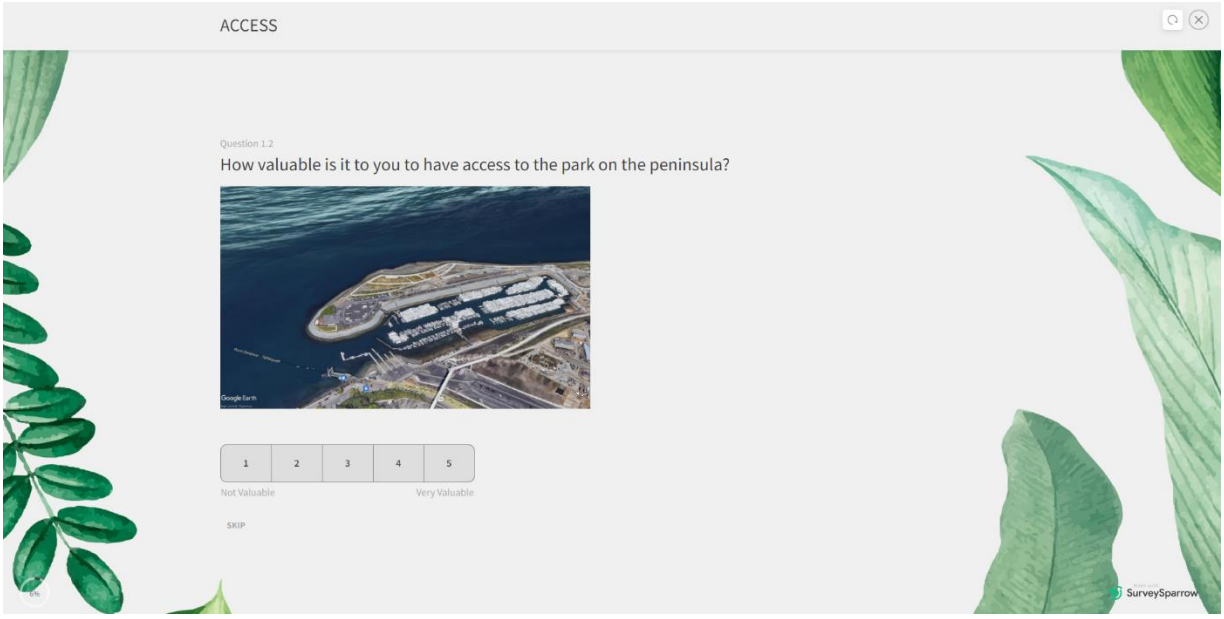




ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
car	221	60.05%
motor-bike	4	1.09%
walk	70	19.02%
bicycle	26	7.07%
run	20	5.43%
scooter	6	1.63%
roller skates or blades	3	0.82%
one wheel	1	0.27%
skate-board	13	3.53%
Other	4	1.09%

Answered: **265** Skipped: **1**



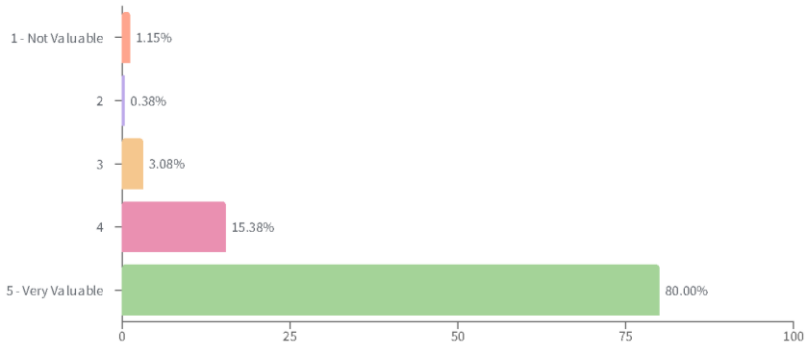


ACCESS

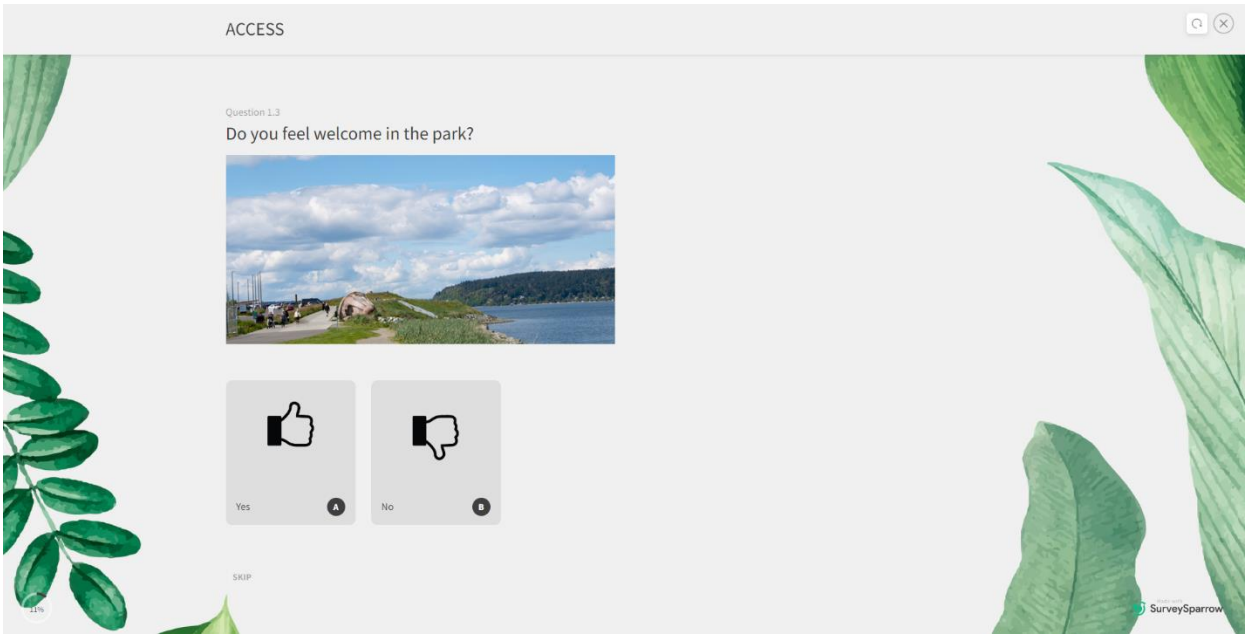
QUESTION 02 | OPINION SCALE

How valuable is it to you to have access to the park on the peninsula?

Answered: **260** Skipped: **4**



ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
1 - Not Valuable	3	1.15%
2	1	0.38%
3	8	3.08%
4	40	15.38%
5 - Very Valuable	208	80.00%

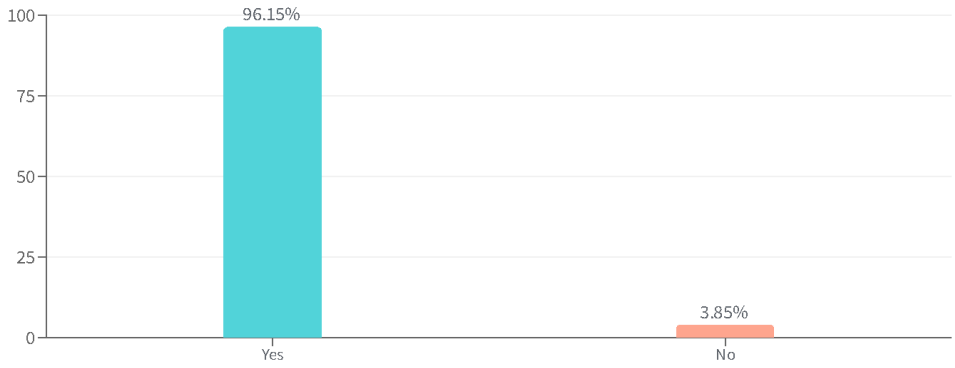


ACCESS

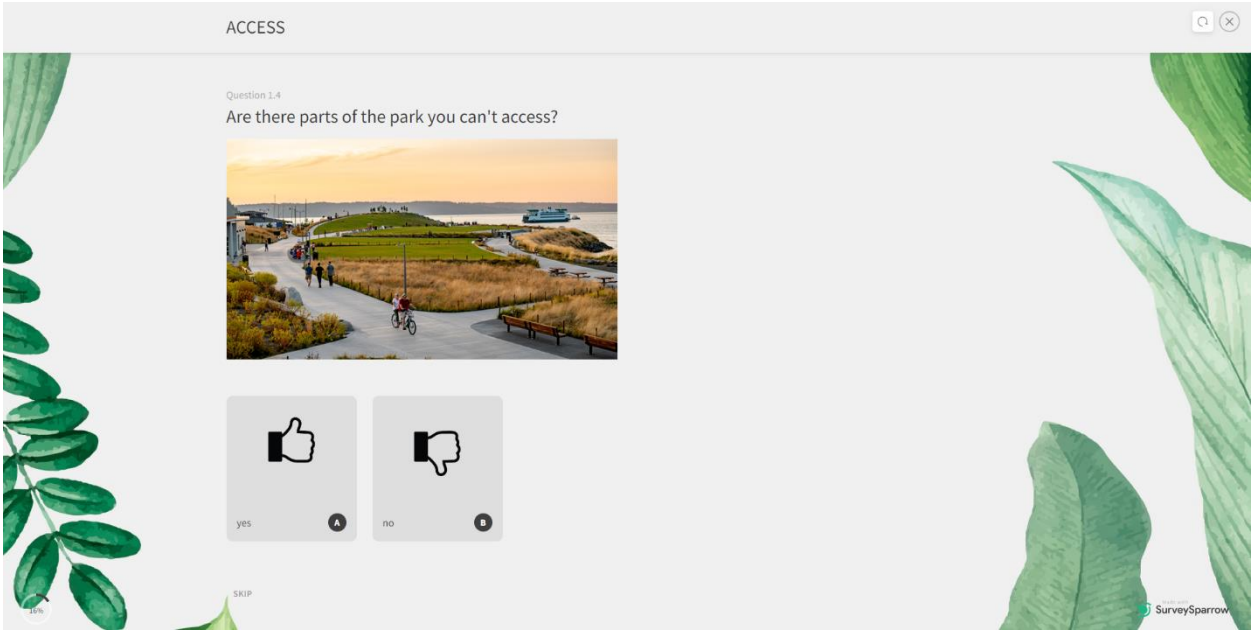
QUESTION 03 | PICTURE CHOICE

Do you feel welcome in the park?

Answered: **260** Skipped: **5**



ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
Yes	250	96.15%
No	10	3.85%

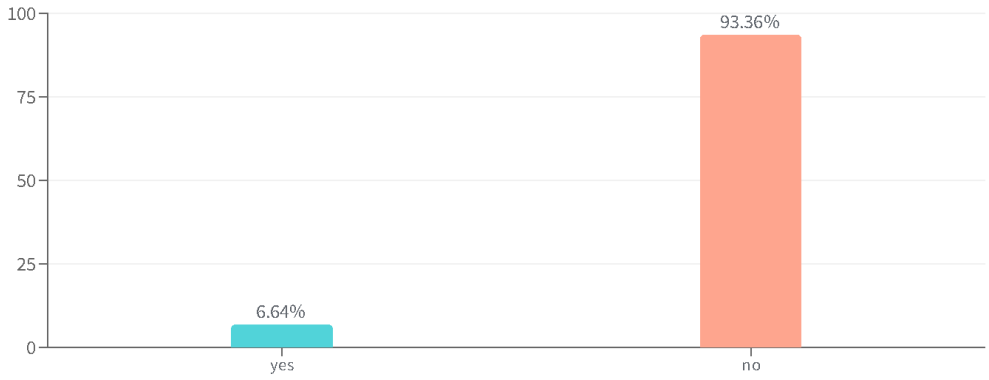


ACCESS

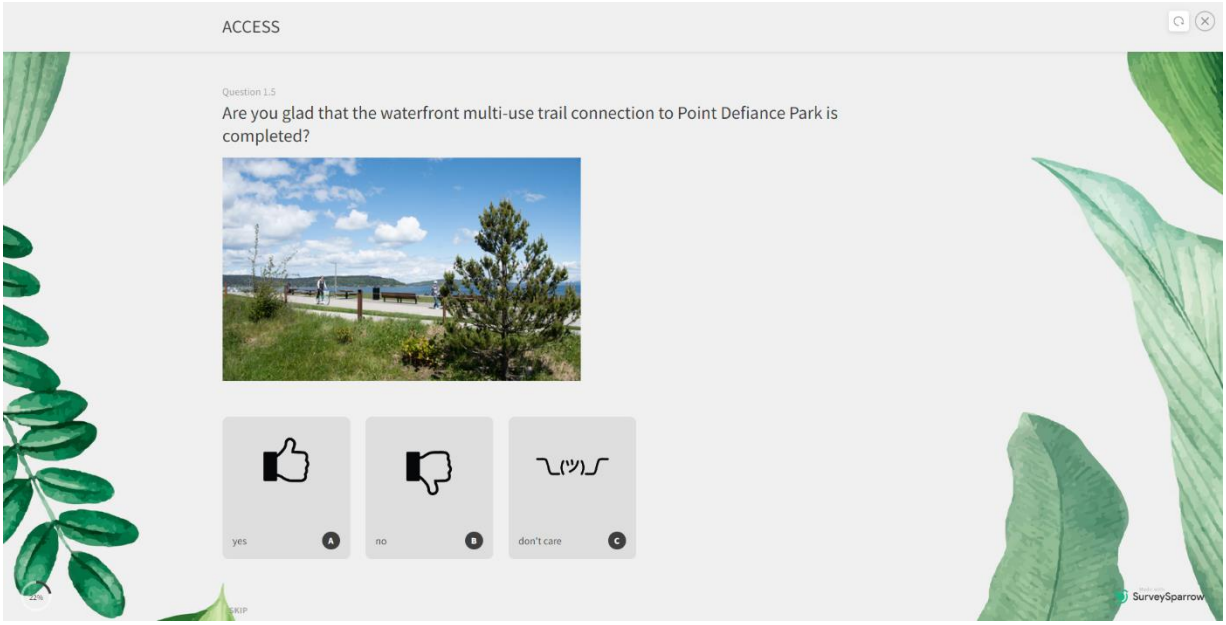
QUESTION 06 | PICTURE CHOICE

Are there parts of the park you can't access?

Answered: **256** Skipped: **5**



ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
yes	17	6.64%
no	239	93.36%

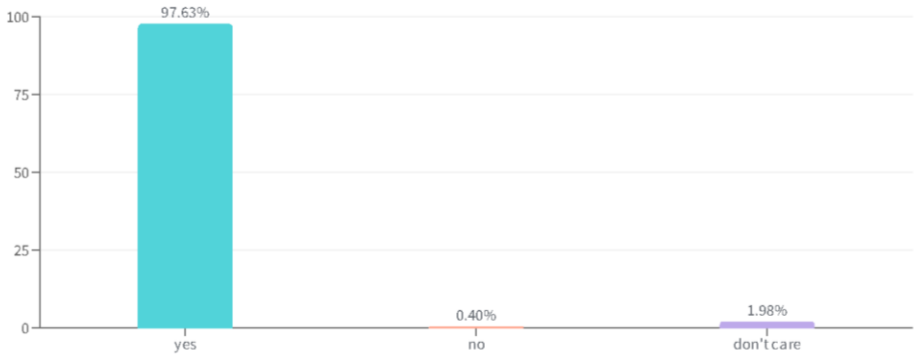


ACCESS

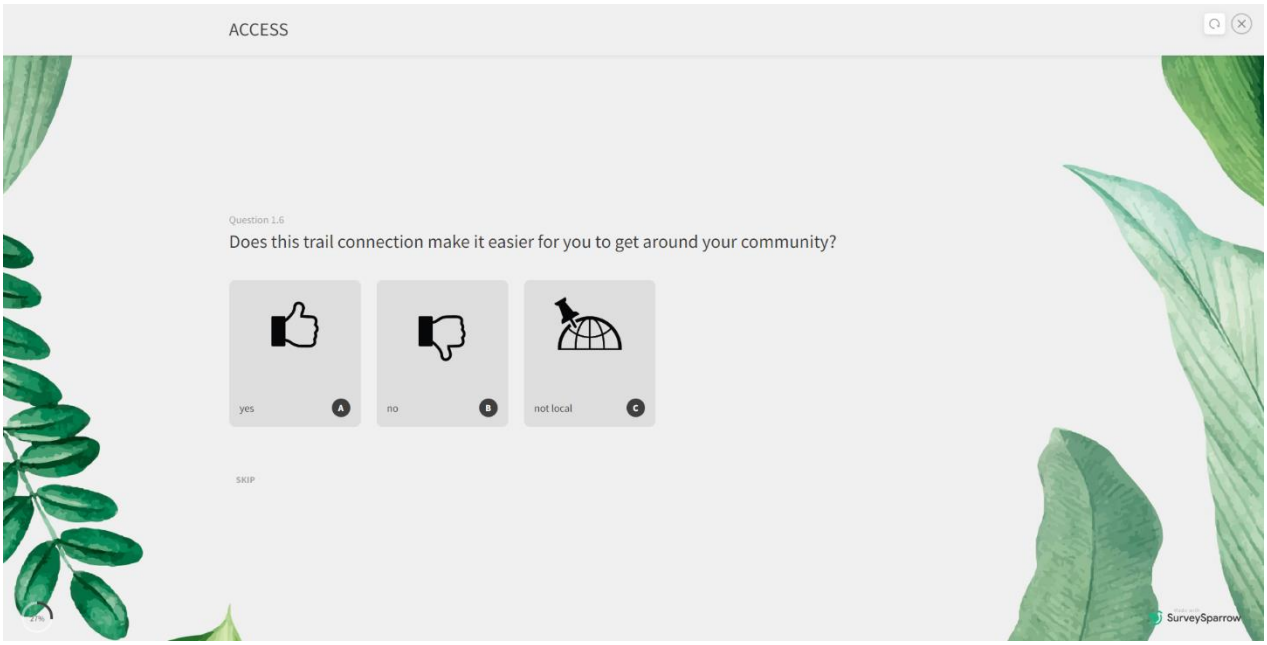
QUESTION 08 | PICTURE CHOICE

Are you glad that the waterfront multi-use trail connection to Point Defiance Park is completed?

Answered: **253** Skipped: **7**



ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
yes	247	97.63%
no	1	0.40%
don't care	5	1.98%

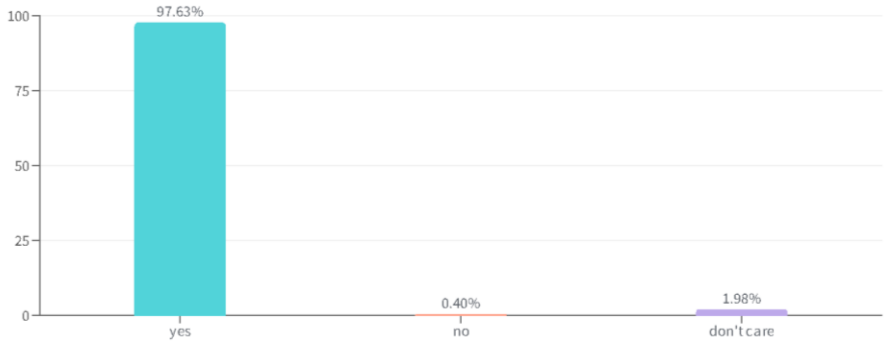


ACCESS

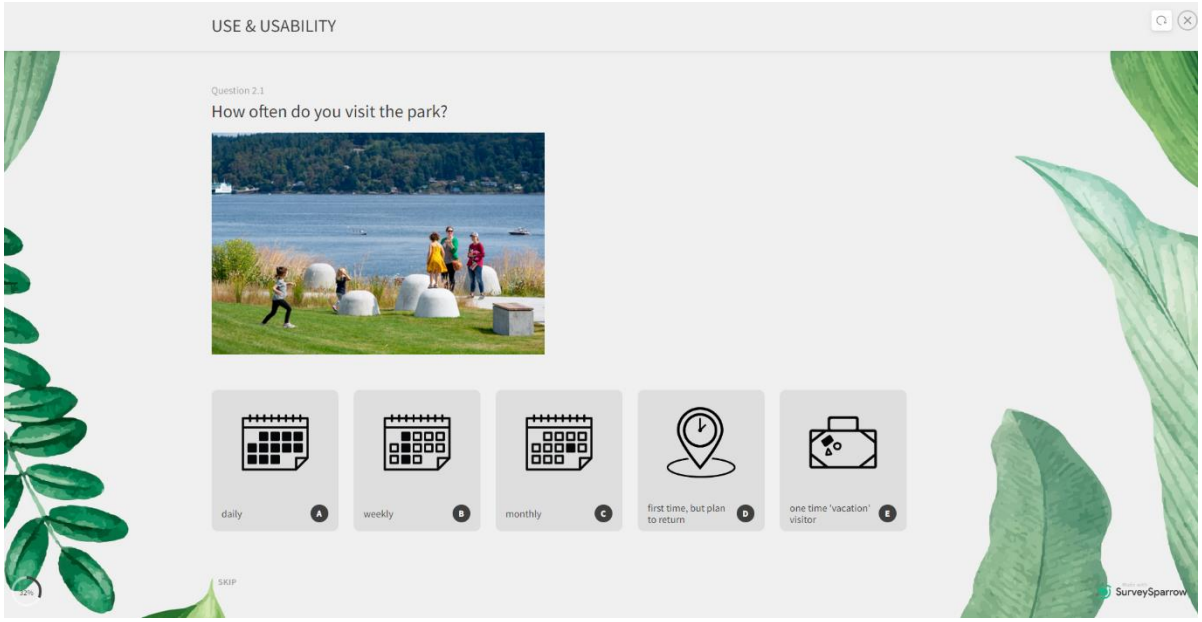
QUESTION 08 | PICTURE CHOICE

Are you glad that the waterfront multi-use trail connection to Point Defiance Park is completed?

Answered: **253** Skipped: **7**



ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
yes	247	97.63%
no	1	0.40%
don't care	5	1.98%

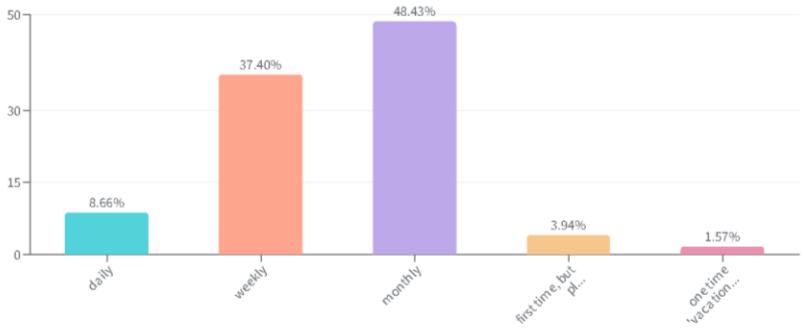


USE & USABILITY 4 Questions

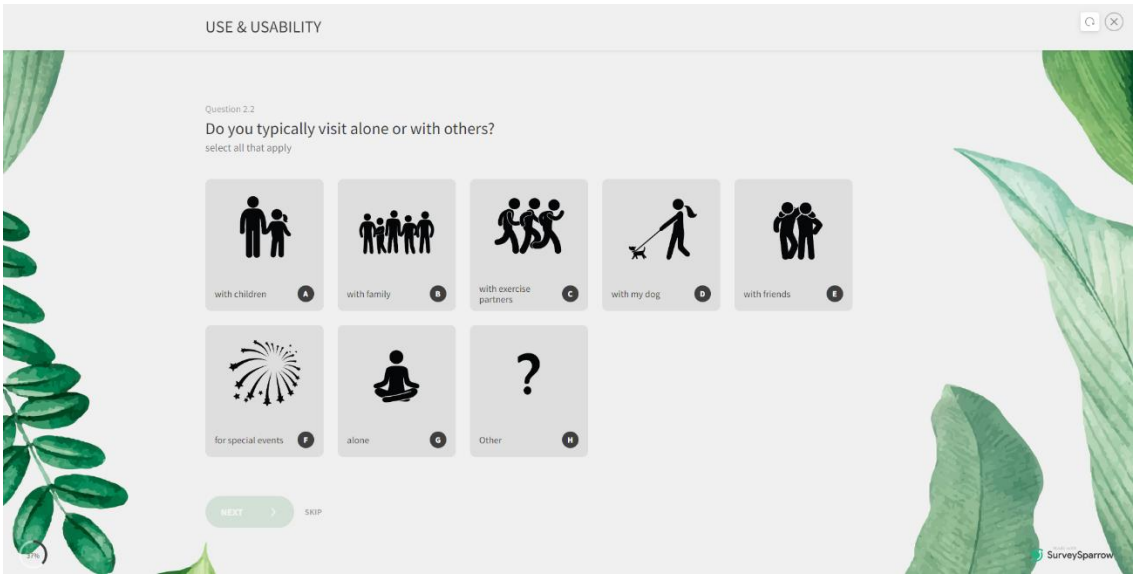
QUESTION 10 | PICTURE CHOICE

How often do you visit the park?

Answered: **254** Skipped: **5**



ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
daily	22	8.66%
weekly	95	37.40%
monthly	123	48.43%
first time, but plan to return	10	3.94%
one time 'vacation' visitor	4	1.57%



ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
alone	110	19.13%
with my dog	66	11.48%
for special events	34	5.91%
with family	158	27.48%
with friends	102	17.74%
with exercise partners	34	5.91%
with children	65	11.30%
Other	6	1.04%

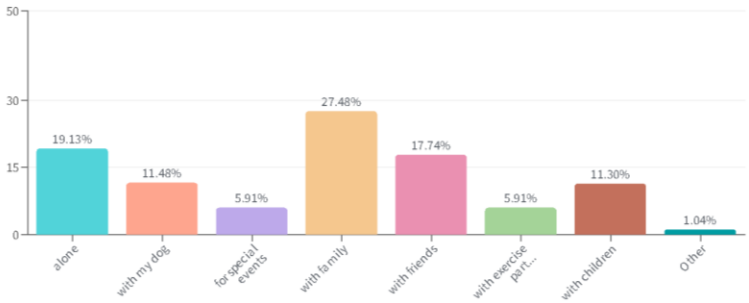
USE & USABILITY

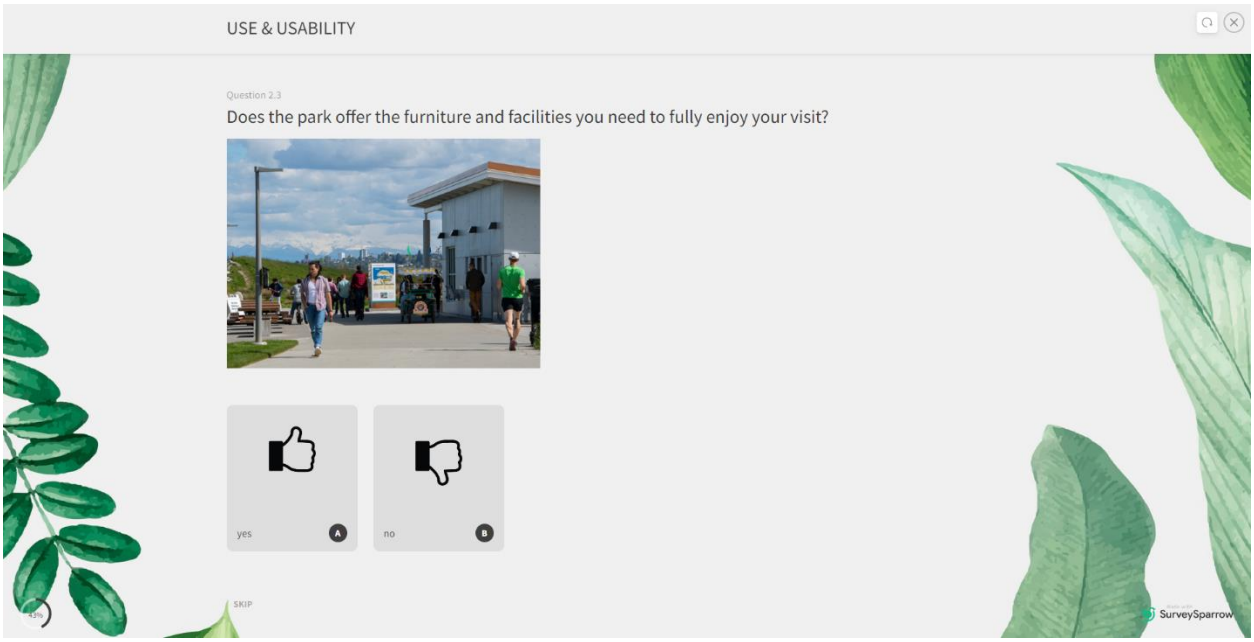
QUESTION 11 | PICTURE CHOICE

Do you typically visit alone or with others?

select all that apply

Answered: **257** Skipped: **3**



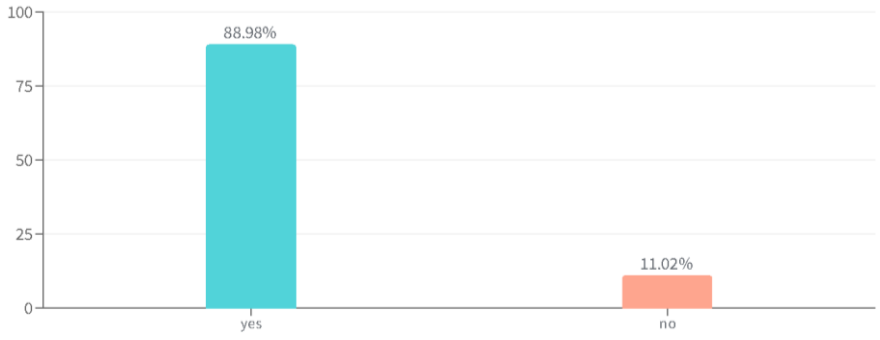


USE & USABILITY

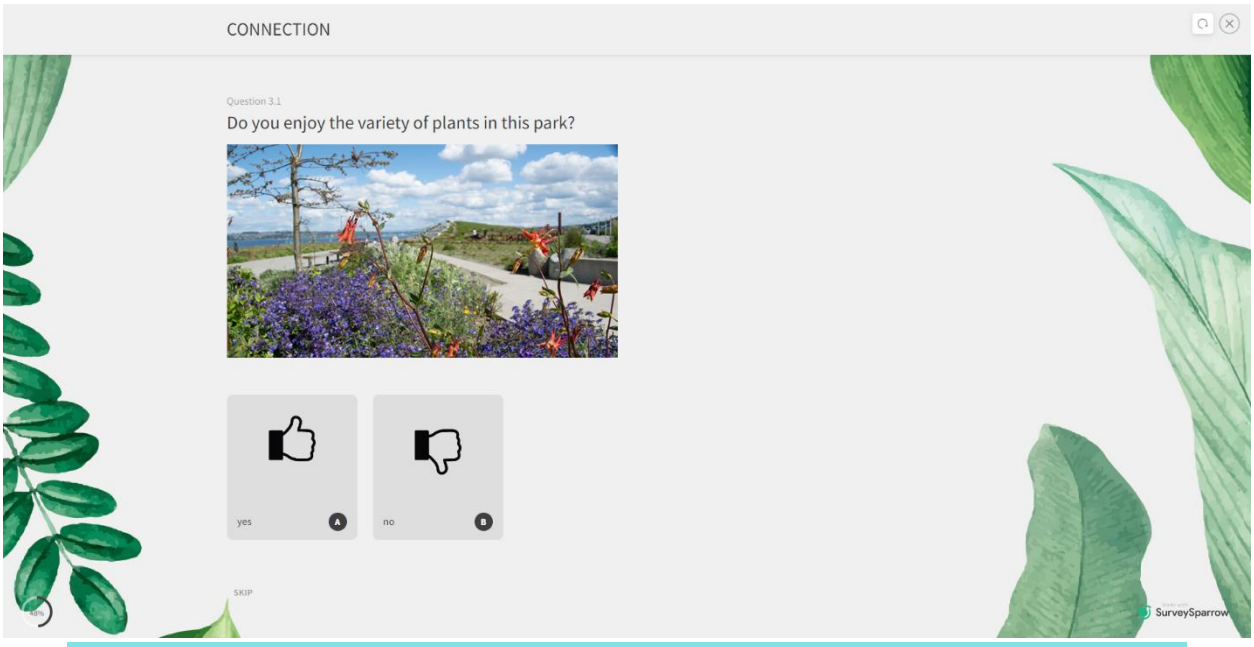
QUESTION 12 | PICTURE CHOICE

Does the park offer the furniture and facilities you need to fully enjoy your visit?

Answered: **254** Skipped: **6**



ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
yes	226	88.98%
no	28	11.02%

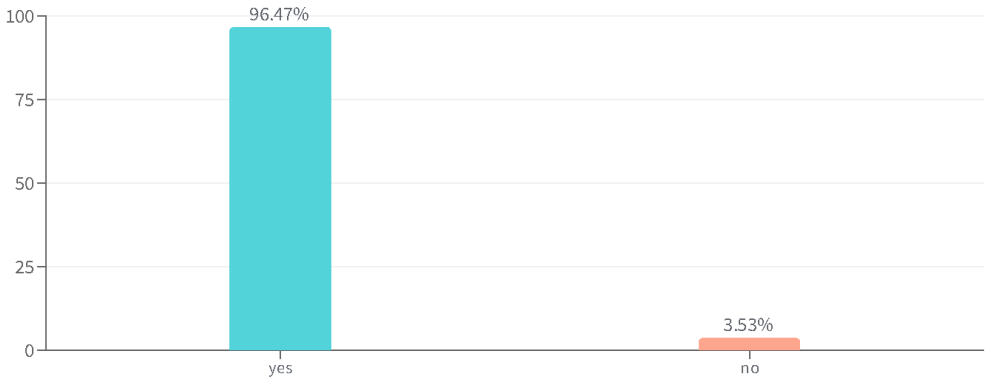


CONNECTION 5 Questions

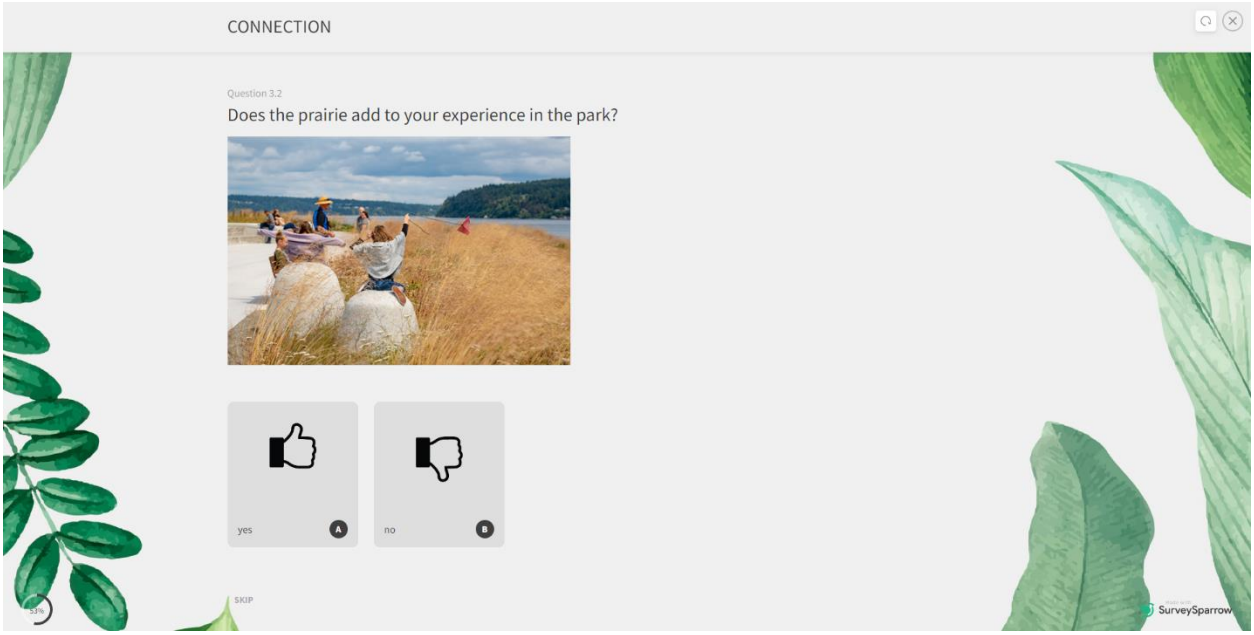
QUESTION 14 | PICTURE CHOICE

Do you enjoy the variety of plants in this park?

Answered: **255** Skipped: **5**



ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
yes	246	96.47%
no	9	3.53%

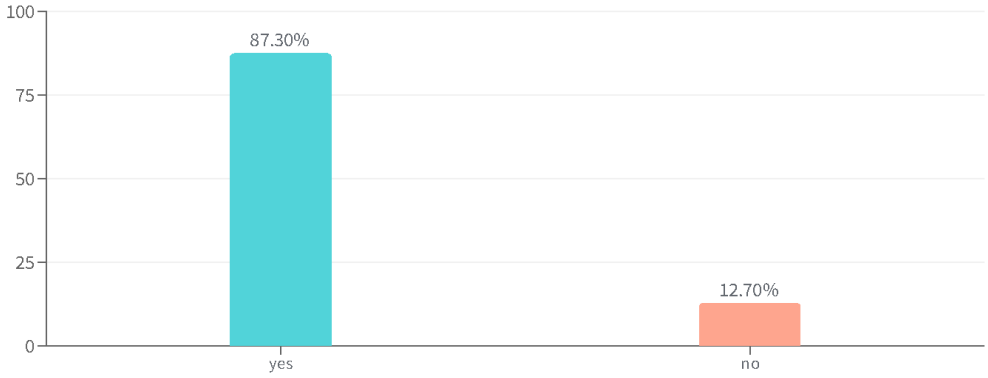


CONNECTION

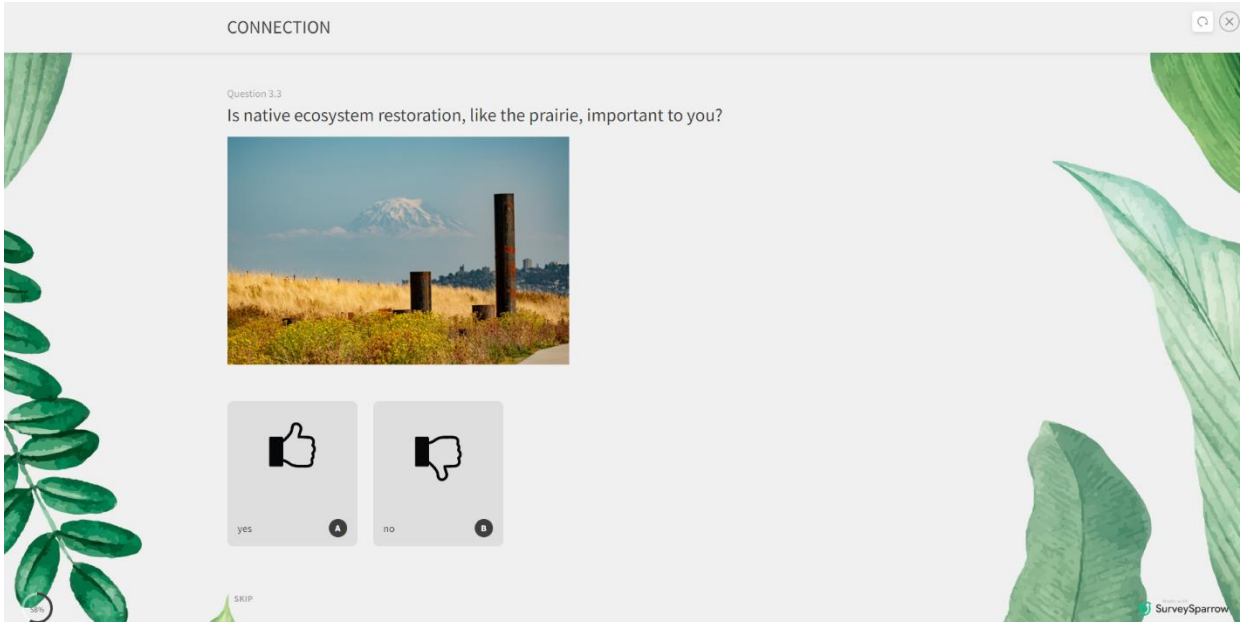
QUESTION 15 | PICTURE CHOICE

Does the prairie add to your experience in the park?

Answered: **252** Skipped: **8**



ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
yes	220	87.30%
no	32	12.70%

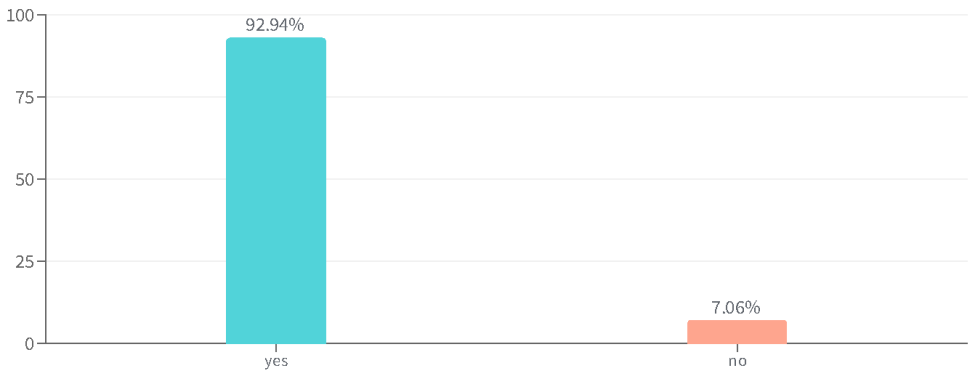


CONNECTION

QUESTION 16 | PICTURE CHOICE

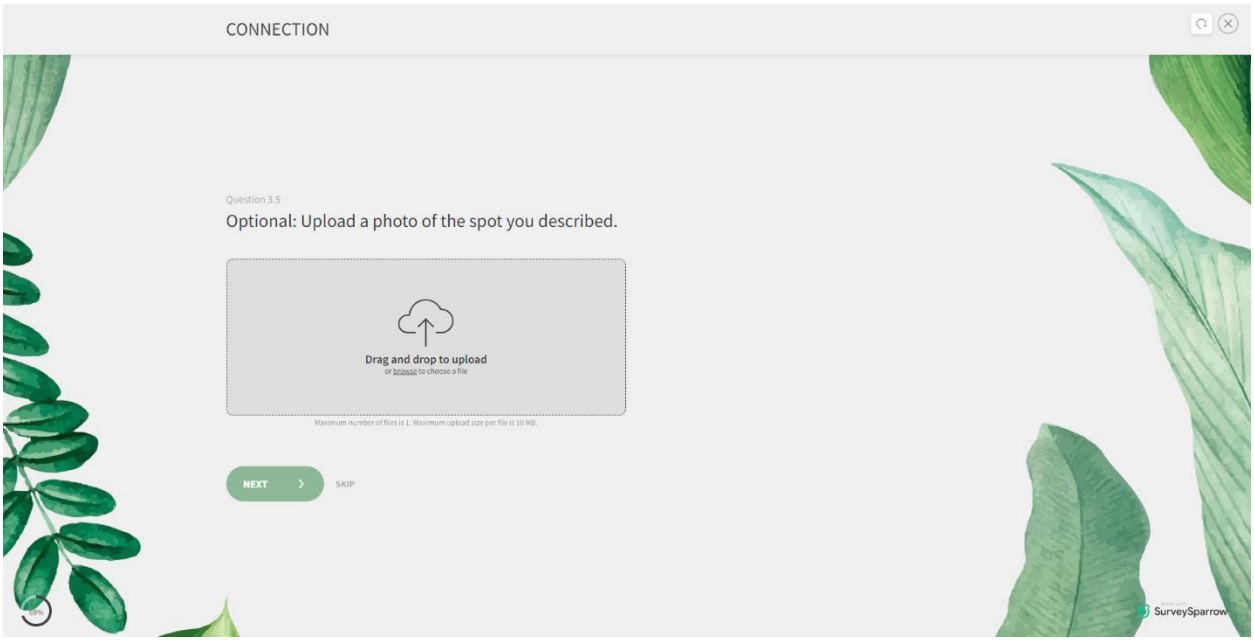
Is native ecosystem restoration, like the prairie, important to you?

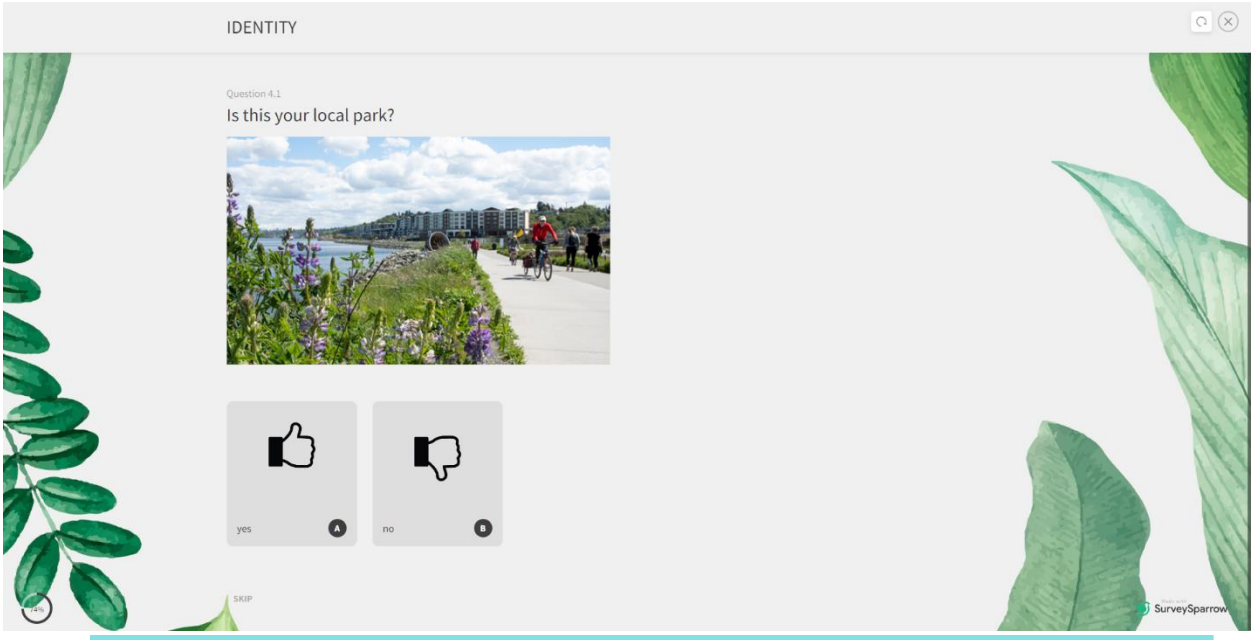
Answered: **255** Skipped: **5**



ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
yes	237	92.94%
no	18	7.06%


CONNECTION
Question 3.4
Describe something you like about a favorite spot in the park.
Please enter your response
Hit SHIFT + ENTER for new line
NEXT
SKIP
SurveySparrow


CONNECTION
Question 3.5
Optional: Upload a photo of the spot you described.
Drag and drop to upload
or browse to choose a file
Maximum number of files is 1. Maximum upload size per file is 10 MB.
NEXT
SKIP
SurveySparrow

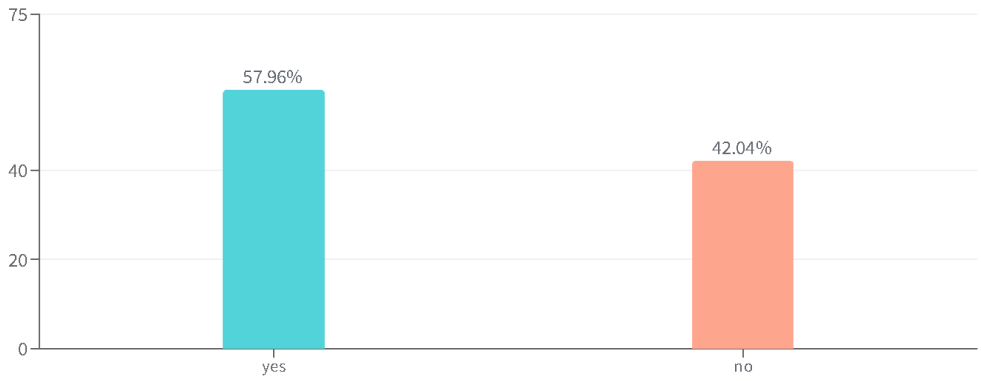


IDENTITY 4 Questions

QUESTION 19 | PICTURE CHOICE

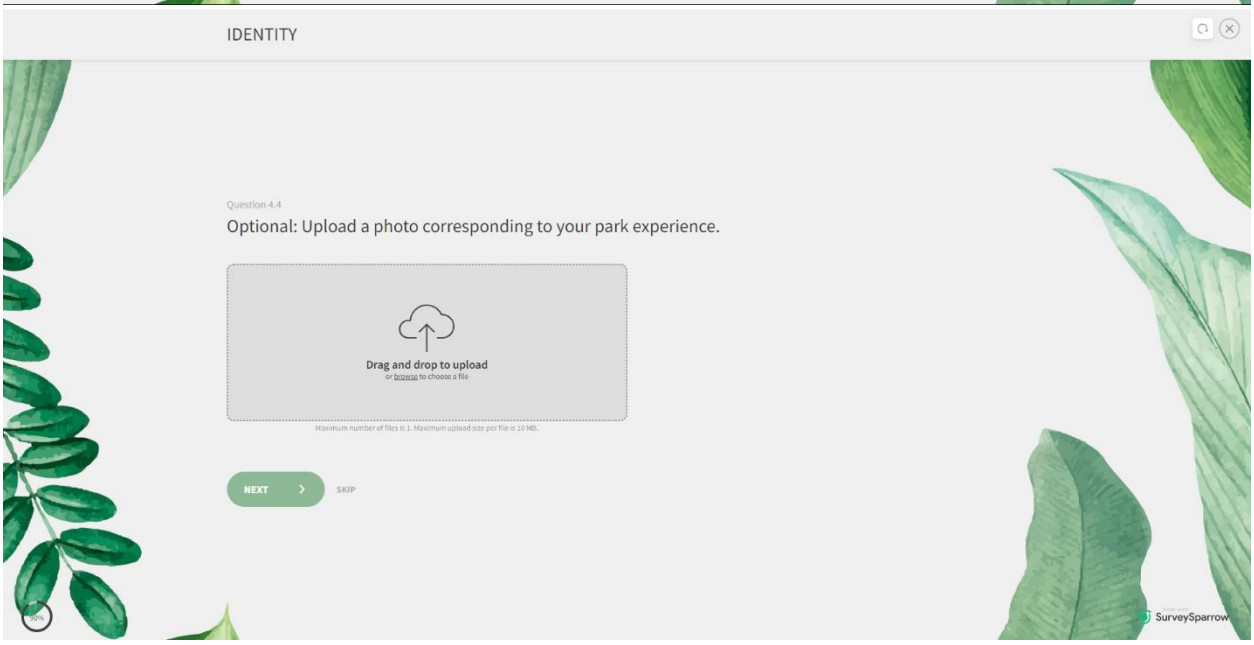
Is this your local park?

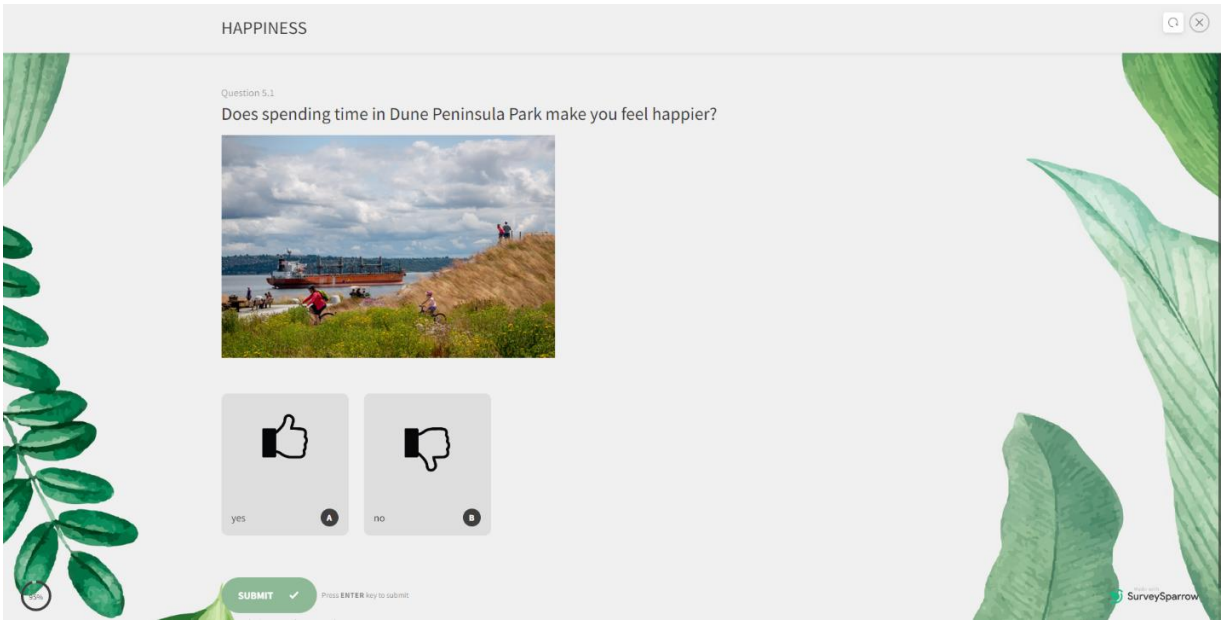
Answered: **245** Skipped: **10**

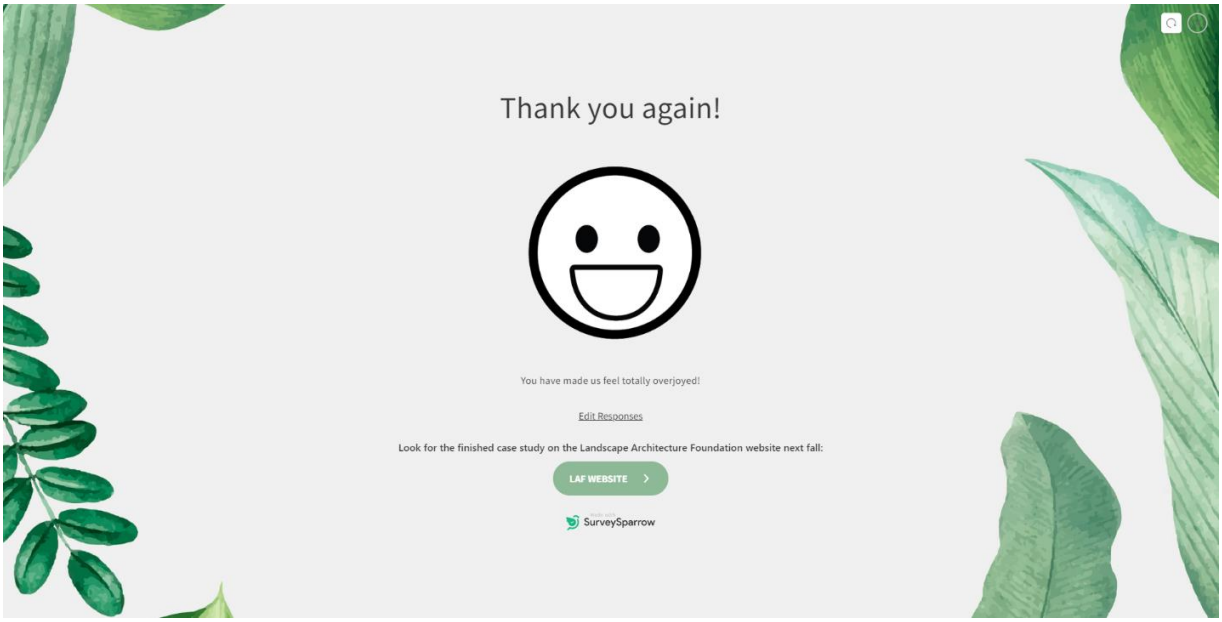


ANSWER CHOICES	RESPONSES	RESPONSE PERCENTAGE
yes	142	57.96%
no	103	42.04%


IDENTITY
Question 4.3
Describe an experience in the park that stands out to you.
Please enter your response
Hit SHIFT + ENTER for new line
NEXT
SKIP
SurveySparrow


IDENTITY
Question 4.4
Optional: Upload a photo corresponding to your park experience.
Drag and drop to upload
or browse to choose a file
Maximum number of files is 1. Maximum upload size per file is 10 MB.
NEXT
SKIP
SurveySparrow


HAPPINESS
Question 5.1
Does spending time in Dune Peninsula Park make you feel happier?
yes
A
no
B
SUBMIT
Press ENTER key to submit
SurveySparrow


Thank you again!
You have made us feel totally overjoyed!
Edit Responses
Look for the finished case study on the Landscape Architecture Foundation website next fall:
LAF WEBSITE
SurveySparrow

Appendix E – Interaction patterns

Meaningful Human-Nature Interaction Pattern Evaluations

Evaluator 1

MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS	
WILDNESS	
Does the site have...	*no = 0* *yes, some = 1* *yes, a lot = 2*
A variety of landscapes	2
Unmanaged or low management landscape	2
Biodiversity	2
Large scale elements (e.g. tall trees, large open spaces, expansive vistas)	2
Remoteness from urban environments	1
Wildness score	9

MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS			
PRESENCE of Interaction Pattern (IP)			
Each question investigates the presence of a design element or natural feature that supports each IP. Answer 0 for no, and 1 for yes	*0=no* *1=yes*	*weight*	*weighted scores*
IP.1. Encountering wildlife *Q: Is there access to occupiable space in close proximity to wildlife habitat?*	1	0.34	34
IP.2 Exploring trails through nature *Q: Are there a variety of paths through nature to explore?*	1	0.30	30
IP.3 Exploring beach or waterside ecosystem *Q: Are there opportunities for beach or waterside ecosystem exploration?*	0	0.11	0
IP.4 Finding & gazing at scenic views *Q: Are there scenic views to be found with places to rest and gaze?*	1	0.09	9
IP.5 Walking to destination spot in nature *Q: Is there a spot or spots special enough to be considered 'destinations'? (e.g. summit, waterside, unique natural feature)*	1	0.03	3
IP.6 Walking along edges (waterside or elevated land forms) *Q: Is there a water's edge and/or elevated land form with a path to walk alongside?*	1	0.01	1
IP.7 Walking with dog (or running) *Q: Are dogs welcome?*	1	0.01	1
		Presence of IP score	**79**

		TOTAL SCORE	88

Evaluator 2

MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS	
WILDNESS	
Does the site have...	*no = 0* *yes, some = 1* *yes, a lot = 2*
A variety of landscapes	2
Unmanaged or low management landscape	1
Biodiversity	2
Large scale elements (e.g. tall trees, large open spaces, expansive vistas)	2
Remoteness from urban environments	1
Wildness score	8

MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS			
PRESENCE of Interaction Pattern (IP)			
Each question investigates the presence of a design element or natural feature that supports each IP. Answer 0 for no, and 1 for yes	*0=no* *1=yes*	*weight*	*weighted scores*
IP.1. Encountering wildlife *Q: Is there access to occupiable space in close proximity to wildlife habitat?*	1	0.34	34
IP.2 Exploring trails through nature *Q: Are there a variety of paths through nature to explore?*	1	0.30	30
IP.3 Exploring beach or waterside ecosystem *Q: Are there opportunities for beach or waterside ecosystem exploration?*	1	0.11	11
IP.4 Finding & gazing at scenic views *Q: Are there scenic view to be found with places to rest and gaze?*	1	0.09	9
IP.5 Walking to destination spot in nature *Q: Is there a spot or spots special enough to be considered 'destinations'? (eg. summit, waterside, unique natural feature)*	1	0.03	3
IP.6 Walking along edges (waterside or elevated land forms) *Q: Is there a water's edge and/or elevated land form with a path to walk alongside?*	1	0.01	1
IP.7 Walking with dog (or running) *Q: Are dogs welcome?*	1	0.01	1
		Presence of IP score	**90**
		TOTAL SCORE	98

Evaluator 3

MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS	
WILDNESS	
Does the site have...	*no = 0* *yes, some = 1* *yes, a lot = 2*
A variety of landscapes	1
Unmanaged or low management landscape	1
Biodiversity	1
Large scale elements (eg. tall trees, large open spaces, expansive vistas)	2
Remoteness from urban environments	0
Wildness score	5

MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS			
PRESENCE of Interaction Pattern (IP)			
Each question investigates the presence of a design element or natural feature that supports each IP. Answer 0 for no, and 1 for yes	*0=no* *1=yes*	*weight*	*weighted scores*
IP.1. Encountering wildlife *Q: Is there access to occupiable space in close proximity to wildlife habitat?*	1	0.34	34
IP.2 Exploring trails through nature *Q: Are there a variety of paths through nature to explore?*	1	0.30	30
IP.3 Exploring beach or waterside ecosystem *Q: Are there opportunities for beach or waterside ecosystem exploration?*	0	0.11	0
IP.4 Finding & gazing at scenic views *Q: Are there scenic view to be found with places to rest and gaze?*	1	0.09	9
IP.5 Walking to destination spot in nature *Q: Is there a spot or spots special enough to be considered 'destinations'? (e.g. summit, waterside, unique natural feature)*	1	0.03	3
IP.6 Walking along edges (waterside or elevated land forms) *Q: Is there a water's edge and/or elevated land form with a path to walk alongside?*	1	0.01	1
IP.7 Walking with dog (or running) *Q: Are dogs welcome?*	1	0.01	1
		Presence of IP score	**79**
		TOTAL SCORE	84

Evaluator 4

MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS	
WILDNESS	
Does the site have...	*no = 0* *yes, some = 1* *yes, a lot = 2*
A variety of landscapes	1
Unmanaged or low management landscape	1
Biodiversity	1
Large scale elements (e.g. tall trees, large open spaces, expansive vistas)	1
Remoteness from urban environments	0
Wildness score	4

MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS			
PRESENCE of Interaction Pattern (IP)			
Each question investigates the presence of a design element or natural feature that supports each IP. Answer 0 for no, and 1 for yes	*0=no* *1=yes*	*weight*	*weighted scores*
IP.1. Encountering wildlife *Q: Is there access to occupiable space in close proximity to wildlife habitat?*	1	0.34	34
IP.2 Exploring trails through nature *Q: Are there a variety of paths through nature to explore?*	1	0.30	30
IP.3 Exploring beach or waterside ecosystem *Q: Are there opportunities for beach or waterside ecosystem exploration?*	1	0.11	11
IP.4 Finding & gazing at scenic views *Q: Are there scenic view to be found with places to rest and gaze?*	1	0.09	9
IP.5 Walking to destination spot in nature *Q: Is there a spot or spots special enough to be considered 'destinations'? (e.g. summit, waterside, unique natural feature)*	1	0.03	3
IP.6 Walking along edges (waterside or elevated land forms) *Q: Is there a water's edge and/or elevated land form with a path to walk alongside?*	1	0.01	1
IP.7 Walking with dog (or running) *Q: Are dogs welcome?*	1	0.01	1
		Presence of IP score	**90**

		TOTAL SCORE	94

Evaluator 5

MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS	
WILDNESS	
Does the site have...	*no = 0* *yes, some = 1* *yes, a lot = 2*
A variety of landscapes	1
Unmanaged or low management landscape	2
Biodiversity	2
Large scale elements (e.g. tall trees, large open spaces, expansive vistas)	2
Remoteness from civilization	1
Wildness score	8

MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS			
PRESENCE of Interaction Pattern (IP)			
Each question investigates the presence of a design element or natural feature that supports each IP. Answer 0 for no, and 1 for yes	*0=no* *1=yes*	*weight*	*weighted scores*
IP.1. Encountering wildlife *Q: Is there access to occupiable space in close proximity to wildlife habitat?*	1	0.34	34
IP.2 Exploring trails through nature *Q: Are there a variety of paths through nature to explore?*	1	0.30	30
IP.3 Exploring beach or waterside ecosystem *Q: Are there opportunities for beach or waterside ecosystem exploration?*	0	0.11	0
IP.4 Finding & gazing at scenic views *Q: Are there scenic view to be found with places to rest and gaze?*	1	0.09	9
IP.5 Walking to destination spot in nature *Q: Is there a spot or spots special enough to be considered 'destinations'? (e.g. summit, waterside, unique natural feature)*	1	0.03	3
IP.6 Walking along edges (waterside or elevated land forms) *Q: Is there a water's edge and/or elevated land form with a path to walk alongside?*	1	0.01	1

IP.7 Walking with dog (or running) *Q: Are dogs welcome?*	1	0.01	1
		Presence of IP score	**79**
		TOTAL SCORE	87

Combined Evaluations

SITE/ DATE:	Dune Peninsula Park, Tacoma WA / June 2022		
	MEANINGFUL HUMAN-NATURE INTERACTION PATTERNS - ANALYSIS		
	PRESENCE of Interaction Pattern (IP)		
	Each question investigates the presence of a design element or natural feature that supports each IP. Answer 0 for no, and 1 for yes		total scores
	Evaluator 1		88
	Evaluator 2		98
	Evaluator 3		84
	Evaluator 4		94
	Evaluator 5		87
		Total	**451**
		TOTAL SCORE	90

Score interpretation: The closer the score is to 100, the higher the likelihood for meaningful Human-Nature interactions.
75-100 high likelihood 50-75 moderate-high likelihood 25-50 moderate-low likelihood 0-25 low likelihood

Appendix F – Happiness Index

Happiness Index Dune Peninsula Park Assessment

Happiness Index

The Happiness Index scoring tool is meant to find and highlight opportunities to make a design more likely to encourage and support human happiness in different ways. As an overall performance metric, it offers an opportunity to gage value to quality of life as an alternative to economic measures.

Score Performance Guide:
0-50% Poor
50-75% Moderate
75-100% High

Areas of Influence with Design Implications

Nature, Light, & Water	***score***	***194***	***77%***
Nature in all its forms, including water & light, and at multiple scales, from a potted plant to extended time in remote wildlands, have shown in numerous studies to have the ability to significantly influence human happiness, offering opportunities for greater tranquility, delighted excitement, meaningful experiences, and positive physiological responses.	/	228	Overall, very high performing regarding bringing people close to nature, the score reflects opportunities to make the pavilion a more nature-connected place, to offer shaded options for paths and resting places, and to find a way to bring a more immediate connection to water for visitors.

Beautiful Surprise	***score***	***60***	***91%***
Beautiful surprise references the positive emotional and physiological response people have when they experience something they perceive as beautiful, or positive in some respect, in particular when that beauty is encountered unexpected, enhancing the influence of its effect.	/	66	Offers many opportunities for pleasant surprise, reveals, summits, potential animal interactions, bursts of color, changing experiences, art and play.

Sociality	***score***	***112***	***93%***
Sociality refers to the both the joy bringing potential of chance interactions with strangers and acquaintances, and to the building of more meaningful positive relationships with friends, colleagues, neighbors, and loved ones.	/	120	Supports social interaction well. Several options for movement and rest allow for control over one's desired level of interactivity. Facilities and programming support shared activities both formal and informal. And the site is buffered from detracting elements.
Access	***score***	***104***	***91%***
Access to happiness bringing assets is vital to one's overall happiness. A place can only bring joy if it is available and experienced. Inclusive opportunities for access to happy environments minimize the negative comparisons and resentments between haves & have-nots that damage happiness across communities		114	A high level of physical, visual, and psychological openness, connectivity, and inclusivity make this a high access site. This is demonstrated by the diversity and number of users one sees there.
Identity & Belonging	***score***	***60***	***91%***
Identity refers to one being grounded in a sense of self and how that provides a foundation for inner peace and tranquility. It also refers to the shared sense of identity that comes from being connected to a community and feeling like one belongs.	/	66	Meaningful and thoughtful connections to local history, ecosystems, landmarks, and embrace of unique features help create a place for shared identity, belonging, and growing new memories.

Reparative Justice	***score***	***86***	***84%***
Reparative justice engages the difficult topic of repairing the injustices that are harming individuals and communities, many of which are physically embedded in our built environments. A perfect world is not required for one to bring happiness into one's life, but the potential for happiness is seriously impinged when one cannot escape the experience of glaring and ongoing stigma and injustice in the very physicality of the space surrounding them.	/	102	Repairing the environmental injustice on this site is meaningful and impactful. Public investments that improve areas may need to do more to consider combating displacement from rising property values from these kinds of investments & how to make their participatory processes even more inclusive.

Resilience	***score***	***26***	***48%***
Resilience refers to an individual's or a community's ability to weather disaster, looking towards how the built environment can facilitate both greater resilience as well as improved recovery. Disaster will always take an emotional toll on a community, so when the built environment can be designed and programmed to limit damage and provide support, it can be a significant boost to a community's ability to find happiness.	/	54	Resilience wasn't a stated objective of the design. There are opportunities to look more deeply at how an intention towards resilience against disaster (natural, economic, health) can be woven into design.

Combined Happiness Score		***642***	***82%***
	/	*750*	

Nature, Light, & Water	*Presence*	*Quality*	*Total Points*	*notes about analysis*
	0=not present 1=present	1=poor 5=excellent		
Nature				
plant life	1	5	6	present, extensive, and in good care
biodiversity	1	4	5	much higher than the average park, not as good as native prairie historically
legibility	1	5	6	very easy to navigate, lots of prospect points
habitat / ecosystem	1	4	5	extensive for the size of the site, reasonably good quality
wildlife (pollinators, beneficial bugs)	1	4	5	lots of bees, wish there were more butterflies
wildlife (fish, birds, mammals, reptiles)	1	4	5	good representation of species for the site
rare/ especially valued wildlife	1	4	5	eagles & orcas in particular
sense of being 'away'	1	3	4	pretty busy and near urban area, but when less crowded excels at this
multi-seasonal	1	4	5	great sledding hill, I understand - needs shade for when it is hot
sensory experience (sound, smell, taste, beauty)	1	4	5	rich experiences, all categories
scenic nature vista	1	5	6	excels at this
Paths through nature	1	5	6	many, wide & and varied
Places of rest / seating in nature	1	5	6	many and varied - high quality
nature destinations	1	5	6	multiple summits for special views & art/nature interactive moments
interactive or nature responsive art or play	1	5	6	several interactive art pieces, view tubes, climbable worms & deconstructed metal tube, big slag pot, lil pot mounds, rolling/sledding hill, flexible lawn, space for concerts, etc.
pet-accepting	1	3	4	allowed, but not many supporting amenities, like dog level water
	16	69	85	nature subtotal out of 96
	94%	81%	89%	percent of possible score

Water				
water	1	4	5	extensive, beautiful, in remediation (getting cleaner), cool water animals, no direct access here though
coastline	1	4	5	great except no direct access to shoreline for waterside exploration - toe dipping, etc.
water habitat / ecosystem	1	4	5	in remediation, getting better all the time, cool views to habitat
water sensory experience (sound, smell, taste, beauty)	1	4	5	great in all ways, except touch
movement, pattern, reflection	1	5	6	wonderful wild Sound water
multi-seasonal	1	5	6	year-round access, always amazing
scenic water vista	1	5	6	exceptional
Paths by, to, or through water	1	4	5	alongside of water paths great, no paths to or in
Places of rest / seating by water (or in water)	1	4	5	seating with views to, but nothing immediately next to water, or in water, buts lots of seating, variety, and potential lookouts
water-related destinations	1	3	4	just views, and great views, but nothing more interactive or closer
interactive or water responsive art or play	1	3	4	water is boatable, but marina access is exclusive
drinkable water	1	4	5	water fountain & water bottle refill station for humans on site, tastes ok
	12	49	61	water subtotal out of 72
	100%	82%	85%	percent of possible score
Light				
natural light	1	5	6	everywhere, and beautifully dramatic
supports habitat/ecosystem	1	5	6	plenty of light for the plants and animals
shadow play / shaped light / fractals	1	3	4	water ripple reflections, not much shade patterning though
sensory experience (beauty, temperature, low glare)	1	4	5	varies - on hot sunny days it can get a little overwhelming, otherwise quite nice
multi-seasonal	1	5	6	

sun/shade path options	1	1	2	virtually no shade to be found anywhere on the site, potential improvement when some of the trees grow
sun/shade rest / seating options	1	1	2	virtually no shade to be found for any seating, except occasionally near the pavilion - room for improvement
interactive or light responsive art or play	1	2	3	on occasions - fireworks displays
night lighting	1	3	4	not sure - may have to follow up re: quality there are lights present, and human scale, but parking is closed after hours, so I haven't been at night
	9	29	38	light subtotal out of 54
	100%	64%	70%	percent of possible score
Indoor Structures				
special animal/plants hosted w/ special structures/support	0		0	none in the pavilion, perhaps an opportunity for some form of this?
simulacrums of natural light (on interiors)	0		0	none in the pavilion, there are opportunities for this
natural materials (on interiors)	0		0	not really, surprising the pavilion didn't go for more of this
indoor to outdoor connectivity	1	5	6	yes, the pavilion opens right up
simulacrums of nature in art or form / fractal geometries	1	3	4	not inside the pavilion but integrated in features around the site. It seems the pavilion wasn't given the same level of detailed attention regarding connection to nature and comfort as the rest of the park
	2	8	10	indoor structure subtotal out of 30
	40%	32%	33%	percent of possible score
Total Scores	37	147	194	total out of 252
	90%	72%	77%	percent of possible score

Analysis Note:

Overall, very high performing regarding bringing people close to nature, the score reflects opportunities to make the pavilion a more nature-connected place, to offer shaded options for paths and resting places, and to find a way to bring a more immediate connection to water for visitors.

Beautiful Surprise	***Presence***	***Quality***	***Total Points***	***notes about analysis***
	0=not present 1=present	1=poor 5=excellent		
changing art	1	3	4	most art is static, noticeable change minimal; view tube experience will change because of the change in the framed views, other art will change in relation to the light a bit, what's growing around it, reveals from the snow, or the patina of age
color	1	4	5	blooming flowers offer an impressive array of exciting colors when they are out, sky/sunset sunrises can be spectacular here
curved or rounded forms	1	5	6	the paths, the art, the pots, etc., lots of curved forms to engage with
play	1	5	6	informal play, climbing, rolling, whatever. I give high points because it is non-exclusive spatially, unlike sport fields or courses that deny other activities
moment of gestalt	1	5	6	arriving at the top of a sail mound, and having the whole revealed as a unified and beautiful composition, stunning.
an interesting break in a repeated pattern	1	4	5	changes in the plantings on the north sail mound really breaks the norm from the other plantings, the same with the special flower plantings near

				the pavilion, there are surprise Herbert quotes here and there, I think there is room for a little more play in this category though.
a reveal	1	5	6	one outstanding one, curving around the north bend behind the sail mound when traveling counterclockwise (which most do) the trail turns to frame Mt. Rainier perfectly - which, when the mountain is visible, is always a jaw dropper. The reveal of the Puget Sound coming around clockwise is also great.
elements that facilitate potential animal interactions	1	5	6	lots of habitat & views, nice place to walk dogs, overall, great
programmed events	1	4	5	concerts, holiday events, yoga, etc. There is some quality programming. I docked it a point for charging money for some events.
amenities that facilitate surprises	1	4	5	the music stage, seating above the habitat basin, unique features atop each sail mound,
any special element that is pleasant and unexpected	1	5	6	the rare creatures - hard to beat orca and eagle sightings
Total Scores	11	49	60	total out of 66
	100%	89%	91%	percent of possible score

Analysis Note:

Offers many opportunities for pleasant surprise, reveals, summits, potential animal interactions, bursts of color, changing experiences, art and play.

Access	*Presence*	*Quality*	*Total Points*	*notes about analysis*
	0 = not present 1 = present	1 = poor 5 = excellent		
Physical Access to Site				
safe connected maintained multi-modal routes to & through site	1	5	6	excellent connections to trail systems & walkable networks
all-abilities friendly transit options to site & facilities	1	3	4	transit available, but not as connected and convenient as it can be, particularly from some areas, transit in this area still carries a bit of a stigma too.
connects places of frequent complementary use	1	5	6	lots nearby
inclusive physical access	1	5	6	great accessibility
wildlife access	1	4	5	there are safe ways in for many animals
	5	22	27	access to subtotal out of 30
	100%	88%	90%	percent of possible score
Physical Access on Site				
open, public, ungated, wide walkways	1	5	6	
free entry, or accessible level of cost	1	4	5	yes, except for some events, venue rental
all-abilities friendly path options	1	5	6	
multiple places to rest & be	1	5	6	
facilitates multiple uses for a wide range of users	1	5	6	
refuge for creatures/ non-human visitors	1	5	6	
free maintained restrooms, drinking water & supportive facilities	1	5	6	
bike parking & other accommodations for multi-modal inclusion	1	4	5	pretty good, could be improved some

free & reliable access to tech	1	1	2	an outlet outside the pavilion one could potentially charge a phone on, otherwise, none that I know of
	9	39	48	access on subtotal out of 54
	100%	87%	89%	percent of possible score
Psychological Access				
visible and inviting from the outside	1	5	6	
design elements, maintenance and care supporting a sense of safety	1	5	6	
design elements or signage that communicate inclusivity	1	4	5	might be possible to find ways for further outreach to some communities, but overall, it is a very welcoming site, as evidenced by the diversity of users you see there.
legible and navigable in design	1	5	6	
comfortable and convenient furnishing and amenities	1	5	6	
	5	24	29	psychological subtotal out of 30
	100%	96%	97%	percent of possible score
Total Scores	19	85	104	total out of 114
	100%	89%	91%	percent of possible score

Analysis Note:
A high level of physical, visual, and psychological openness, connectivity, and inclusivity make this a high access site. This is demonstrated by the diversity and number of users one sees there.

Sociality	***Presence***	***Quality***	***Total Points***	***notes about analysis***
	0=not present 1=present	1=poor 5=excellent		
Facilitating personal control over social interactions				
path options for movement	1	5	6	for the size of the site and the crowd it serves, overall, quite good
rest / seating options	1	4	5	lots of seating & options, could be some configurable options, and/or shade options
options for use	1	5	6	outstanding for the site, maybe too many
clusters of occupiable assets around shared amenities	1	3	4	There is seating near the pavilion, and appropriate amenities, but I think an opportunity for more in this regard, e.g. A small coffee stand/ice cream or food truck stationed there frequently wouldn't go amiss for many. Social clustering isn't really the style of this design, overall.
unambiguous places that offer safe retreat	1	5	6	there are some safe feeling prospects and refuges in the park
inclusive options	1	4	5	the accessibility accommodations for a public park are outstanding, wheelchair space next to benches, accessible restrooms, wide smooth paths, handicapped parking, there may have been a few opportunities to improve for those with sensory issues, for example, perhaps finding ways to minimize space conflicts with fast rollers and slow walkers, but overall, very impressive.
	6	26	32	control subtotal out of 36
	100%	87%	89%	percent of possible score
Bringing people together				
places that encourage playing with others	1	5	6	I witnessed lots of playfulness on the site
walkable proximities to communities	1	4	5	a fairly sizeable, diverse and growing communities are right nearby, the single-family neighborhoods slow this potential a little, but overall, pretty accessible

near other valued amenities	1	5	6	with the nearby development I'd say yes, several
social-scaled walking paths	1	5	6	nice wide paths even for groups
social-scaled mid-speed lanes	1	4	5	yes, but when shared with peds at crowded times, conflicts occur
special affordances for vulnerable populations	1	4	5	yes, some nice ones overall
opportunities for nature interactions encouraging relationship development	1	5	6	impressive how the animals here bring strangers into conversation
programmable spaces for cultural events, entertainments, and social activities	1	5	6	a very thoughtful set up for events
	8	37	45	together subtotal out of 48
	100%	93%	94%	percent of possible score
Buffers from Interfering Elements				
sound damping buffers from traffic and other loud noises	1	5	6	the location offers this
design elements offering improved visibility, escape options, and space buffers from danger	1	5	6	the visibility, legibility, and openness of this design are great for this
nature buffered places	1	5	6	everywhere
adjacent or on site uses that provide many friendly eyes	1	5	6	a very active site
positive remembrances & intentional removal of hostile symbols & design	1	4	5	a very intentional and hopeful embrace of local stories, history, and potential better futures tied up in the design, no visible hostility to users - other than no staking tents, but that protects the space for most users, so I think it's still a positive - some are intimidated by signs about the rocks
maintenance, care, and ongoing investment	1	5	6	it has a reputation for and appearance of being a well-maintained space.

	6	29	35	buffers subtotal out of 36
	100%	97%	97%	percent of possible score
Total Scores	20	92	112	total out of 120
	100%	92%	93%	percent of possible score

Analysis Note:
Supports social interaction well. Several options for movement and rest allow for control over one's desired level of interactivity. Facilities and programming support shared activities both formal and informal. And the site is buffered from detracting elements.

Identity & Belonging	***Presence***	***Quality***	***Total Points***	***notes about analysis***
	0=not present 1=present	1=poor 5=excellent		
Shared Community Identity				
community priorities visible	1	5	6	the inclusion of prairie is big
community "brand" visible	1	4	5	The signage branding has a local flavor and is well placed and visible, could extend this to some amenities like garbage bins, etc. But overall, solid.
positive local/cultural markers and art	1	4	5	There are a lot of distinctive local elements that make this place special. I would have liked it if the art was by local artists though…
storytelling elements	1	5	6	The inclusion of storytelling on several layers including local artifacts, is impressive here.
	4	18	22	community subtotal out of 24
	100%	90%	92%	percent of possible score

Anchors Connecting Place to Memories				
iconic landmarks	1	5	6	it is an iconic site that is visibly distinctive, can offer a wayfinding anchor for the area
place-tied uniqueness	1	5	6	
nostalgia triggering elements	1	5	6	this is bittersweet for some, but I think great that meaningful connects were made visible here
unique places with elements that facilitate relationship building	1	5	6	this will be a special place in the memories of a lot of people in the area
	4	20	24	anchors subtotal out of 24
	100%	100%	100%	percent of possible score
Connection through Engagement				
local participation in visioning, design, & care	1	3	4	there was a participatory process, but reportedly, it could have been more inclusive and communicative
local participation in activities & events programming	1	4	5	local government is involved in programming, and some other groups, I think there is opportunity for more
opportunities for informal engagement	1	4	5	there are opportunities to hold small events activities here without formal arrangement, but the facilities limit this somewhat
	3	11	14	engagement subtotal out of 18
	100%	73%	78%	percent of possible score
Total Scores	11	49	60	total out of 66
	100%	89%	91%	percent of possible score
				Analysis Note:

Meaningful and thoughtful connections to local history, ecosystems, landmarks, and embrace of unique features help create a place for shared identity, belonging, and growing new memories.

Reparative Justice	***Presence***	***Quality***	***Total Points***	***notes about analysis***
	0=not present 1=present	1=poor 5=excellent		
Reparative Public Investment				
helps repair an historic injustice for a vulnerable community	1	5	6	the pollution here has a long-storied history, this helps remediate some of that in a significant way
fills a needed amenity gap for a disinvested community	1	4	5	there were parks nearby, but the prairie and access to the views is unique and special
improves the quality of life for a disadvantaged community	1	3	4	yes, for those who are displaced or priced out by local gentrification, there are still communities not benefitting as much as others from this park
offers inclusivity to an excluded community	1	5	6	it offers connected access for the disabled in a significant way for a public park
helps protect a vulnerable community from future harm	1	4	5	yep, pollution reduction, but more could be done regionally to offset affordability crisis
connects a disenfranchised community to opportunity	1	4	5	it offers connected access in a meaningful way, to the whole area
offers infrastructure that directly supports future reparative work	1	4	5	as a good public amenity can, it leads by example
	7	29	36	reparative subtotal out of 42
	100%	83%	86%	percent of possible score
Environmental Justice				
helps repair an environmental injustice	1	5	6	this is its core purpose and is succeeding

offers a reduction of future environmental harm and/or pollutants	1	4	5	it does this, but opportunities for more sustainable features, renewable onsite energy, on-site waste processing, more eve parking, more bike parking/storage, etc.
helps repair or restore native ecosystems or habitat	1	5	6	
offers pollution reducing alternatives on site	1	5	6	
	4	19	23	environmental subtotal out of 24
	100%	95%	96%	percent of possible score
Equity focused Government Intervention				
effects change in favor of greater equity &/or reparation	1	3	4	offers inclusive amenity to a historically working-class town, but gentrification in the region overall is driving folks out
provides open and equitable access to a new public benefit	1	5	6	it is very public, beneficial, open to all
	2	8	10	equity subtotal out of 12
	100%	80%	83%	percent of possible score
Inclusive Planning Processes				
integrates community feedback in design, gathered from inclusive outreach	1	3	4	yes, but might have done more from what I understand
hired local labor to construct and/or run	1	3	4	it is run by locals; I don't know about construction
followed principles and guidelines from a neighborhood visioning document	1	3	4	not sure how directly, but community priorities are visible
facilitates inclusive community led activities & events	1	4	5	transit access to some areas may limit this some
	4	13	17	inclusive subtotal out of 24
	100%	65%	71%	percent of possible score
Total Scores	17	69	86	total out of 102

	100%	81%	84%	percent of possible score

Analysis Note:
Repairing the environmental injustice on this site is meaningful and impactful. Public investments that improve areas may need to do more to consider combating displacement from rising property values from these kinds of investments & how to make their participatory processes even more inclusive.

Resilience	***Presence***	***Quality***	***Total Points***	***notes about analysis***
	0=not present 1=present	1=poor 5=excellent		
Resilience from Natural Disaster				
Offers a protective buffer or harm reduction from disaster	1	3	4	It is high enough to remain intact with significant sea level rise, a feature enhanced by the height added by this project.
Includes assets that will stay available/online through a disaster	1	3	4	The park is likely to remain open and available to the public as a place of respite during most disasters, but it only offers so much for the public as far as fulfilling needs. It may be useful as a food & supplies distribution site.
Directly supports post-disaster recovery	0		0	not directly, so far as I can see, but indirectly yes, potentially
	2	6	8	natural subtotal out of 18
	67%	40%	44%	percent of possible score
Resilience from Economic Disaster				
Helps diversify the local economy meaningfully	0		0	the overall project does, but the park itself doesn't
Provides new or more connections to trade for local businesses	0		0	no new trade connections

Directly supports economic disaster recovery	0		0	not directly
No cost public amenity remaining accessible during economic downturns	1	5	6	it absolutely offers this
	1	5	6	economic subtotal out of 24
	25%	25%	25%	percent of possible score
Resilience from Health Disasters				
Provides safety or relief of some kind in an epidemic or pandemic	1	5	6	Open outdoor space with opportunity for safe distance gathering with opportunity to de-stress.
Supports activity that helps people improve health outcomes	1	5	6	Encourages physical activity, social relationship building, and stress reduction.
	2	10	12	health subtotal out of 12
	100%	100%	100%	percent of possible score
Total Scores	5	21	26	total out of 54
	56%	47%	48%	percent of possible score

Analysis Note:
Resilience wasn't a stated objective of the design. There are opportunities to look more deeply at how an intention towards resilience against disaster (natural, economic, health) can be woven into design.