LANDSCAPE PERFORMANCE SERIES by the Landscape Architecture Foundation

Story Mill Community Park
Methods

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This investigation was conducted as part of the Landscape Architecture Foundation's 2023 *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*.

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

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Abbreviations

SMCP	Story Mill Community Park
TPL	Trust for Public Land
MSU	Montana State University
LAF	Landscape Architecture Foundation
CSI	Case Study Investigation

Acknowledgements

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Finally, thank you to LAF for supporting this program. Participating in CSI has been both a literal and figurative ‘breath of fresh air’ and we are reenergized in our work and discipline.

Research Strategy

Our approach began with building an understanding of the park design process, design team partners and roles, community engagement, history of the area, and project goals to inform the types of landscape performance benefits and research methods we would pursue. We did this by reading and exploring past data and primary source documents, meeting with Design Workshop (lead landscape architect) and design team members either in-person or remotely, and performing an initial site visit. Associate Professor Rebekah VanWieren was abroad on academic sabbatical during the spring 2023 semester, so remote meetings were held on a biweekly basis with the research assistant until June.

The research methods for environmental benefits relied heavily on past assessments and data from project partners, including the site survey, tree survey, river and wetland restoration mapping and construction documents, and the SMCP construction document set. Because the significant river and wetland restoration activities occurred before TPL turned the park property over the City of Bozeman, the results of this work were already documented. Many learning opportunities emerged related to ground-truthing others' work and making adjustments based on existing conditions, as some of the documents and surveys dated back to 2016.

For social and economic benefits, our strategy included several on-site methods for new data collection. These methods were utilized to perform park user counts and activity observation, collect survey data, assess walkability, and interview nearby businesses. The park use and survey data will also be used to communicate an overall park assessment for the Parks and Recreation Department related to park operations and management. Due to heavy snowpack and late spring snowfall, the primary data collection onsite occurred from late June-late July.

The research faculty and research assistant completed 88 hours of direct observation, walking 70 miles, within the park. This on-site approach allowed for observation across time and space, to build a comprehensive understanding of park use, care, functionality, and the sensory and aesthetic experience that contribute to the landscape performance benefits. Completing this work simultaneously allowed for reciprocal mentoring and learning, and discussions of the layered benefits and challenges of park management.

Environmental Benefits

- ***Limits disturbance, with 45% of park construction occurring within previously developed areas of the site. 53% of the 60-acre site was untouched by construction.***

Background: Before the park, parts of the site were used for a mobile home park, homestead, and a variety of industrial and agricultural structures. The ecological integrity of these predeveloped areas of the site were compromised due to disturbance of soil, water, and vegetative systems. However, there were areas of the site that were of high ecological value and not previously developed for heavy land uses. These areas were a mixture of undeveloped remnant ecosystems, pasture, or other agricultural uses. The design team prioritized preserving or restoring areas of high ecological value, while placing park programming that required more disturbance in construction or end-use in areas that were previously developed or showed higher existing disturbance.

Method: Predeveloped portions of the site are defined as those showing signs of previous development or heavy compaction and degradation, using Google Earth aerial imagery from August 1995, August 2003, July 2005, May 2011, July 2014, and July 2020. When determining what qualified as predeveloped, we did not consider any land linked to agricultural usage (pasture, crops, livestock uses, etc.) as predeveloped.

Predeveloped Characteristics:

- Roads
- Paths or trails
- Railway corridors
- Utility corridors
- Parking lots
- Sidewalks
- Structures and surrounding access with heavily disturbed land
- Other transportation related features

For the park construction we defined “heavy disturbance” as any area within the site plan that was surfaced with hardscape materials for paving and trails, installation of furnishings, or areas where soils were replaced or regraded for new plantings. The construction document set provided by the landscape architect and Google Earth Pro aerial site plan from July 2020 were referenced to identify disturbed portions of the site to construct the park.

Park Construction Disturbance Characteristics:

- Roads
- Paths or trails
- Areas of restoration activities
- Utility corridors
- Parking lots
- Sidewalks
- New structures and surrounding access with heavily trafficked spaces
- Planting areas where soils were replaced or regraded
- Playground features of the site
- Furnishings and surrounded disturbed area

Calculations: A 2003, pre-park construction, Google Earth Pro aerial photo was scaled and measured to align with the final site plans found in construction documentation. After scaling the plan and photo to overlay each other, previously developed areas were identified on the 2003 aerial with drawn polygons (Figure 1).

Figure 1: Construction disturbance and predeveloped areas.

The polygon areas were identified by reading and analyzing the aerial photograph to estimate which areas within the site were previously developed or highly disturbed. Areas disturbed to construct the park were identified using the final site plan, restoration construction documents, and aerial imagery. Total acreage was calculated for the entire park and these two zones by using the AutoCAD command "MEASUREGEOM" and converted from square feet to acres. Then, the two polygonal maps were overlaid. Overlapping areas were considered areas of construction disturbance that were limited to previously developed portions of the site. A percentage overlap was determined by comparing area

measurements. This percentage overlap represents the construction disturbance to pre-developed portions of the site.

Table 1 shows the acreages calculated in AutoCAD using 'MEASUREGEOM' command:

Land Type/Area	Acreage (sf)
Total park area	60.00 ac (2,613,600 sf)
Previously developed area	16.44 ac (715,947.60 sf)
Park construction disturbance	31.69 ac (1,380,431.91 sf)
Overlapped areas of park construction disturbance and pre-developed	14.28 ac (622,244.52 sf)

Table 1: Park construction disturbance and pre-developed areas measured in AutoCAD.

- Percentage of park construction disturbance limited to pre-developed areas: 14.28 ac/31.69 ac = 0.4506 x 100 = 45.1%
- Percentage of site disturbed by park construction: 31.69 ac/60.00 ac = 0.5282 x 100 = 52.8%

Sources:

Canfield, Jessica and Elise Fagan. "Blue Hole Regional Park Methods." *The Landscape Performance Series.* Landscape Architecture Foundation, 2013. https://doi.org/10.31353/cs0451.

"Story Mill Park, Bozeman, MT." 45°42'04.11"N, 111°01'34.89"W. *Google Earth Pro.* Access on April 29, 2023.

"Story Mill Community Park, Bozeman, MT. 100% Construction Documents." Provided by Design Workshop. April 23, 2018.

Limitations:

- AutoCAD area measurements may not be exact and are subject to human error during the scaling process.
- Previously developed areas were determined from historical aerial photographs available on Google Earth Pro history. There may have been further development than the photographs indicated, or development that took place prior to aerial photography.
- Observations of previously disturbed areas are subject to human error.

Increases ecological quality as demonstrated by a Floristic Quality Index (FQI) value in the restored riparian buffer that is 3.4 times higher than an unrestored portion of the river (17.4 compared to 5.1).

Method: A Floristic Quality Assessment was performed onsite to assess the impacts of restoration on park vegetative quality. Two transects were identified and marked onsite using a measuring wheel length of 75 ft (Figure 2). Transect 1 represents an East Gallatin River riparian condition where

restoration activities have not taken place. The vegetation and site conditions along Transect 1 include 45’ of woody and herbaceous plant material along the riparian buffer, a 5’ aggregate path, and 25’ of irrigation turfgrass. Transect 2 represents an East Gallatin River riparian condition where restoration activities have taken place as part of the park project. These activities include a combination of riprap and trash removal, regrading, and planting seed mixes and woody plant material. The site conditions along Transect 2 include 20’ of remnant/preserved woody and herbaceous material and 55’ of newly established vegetation between 2015-2019.

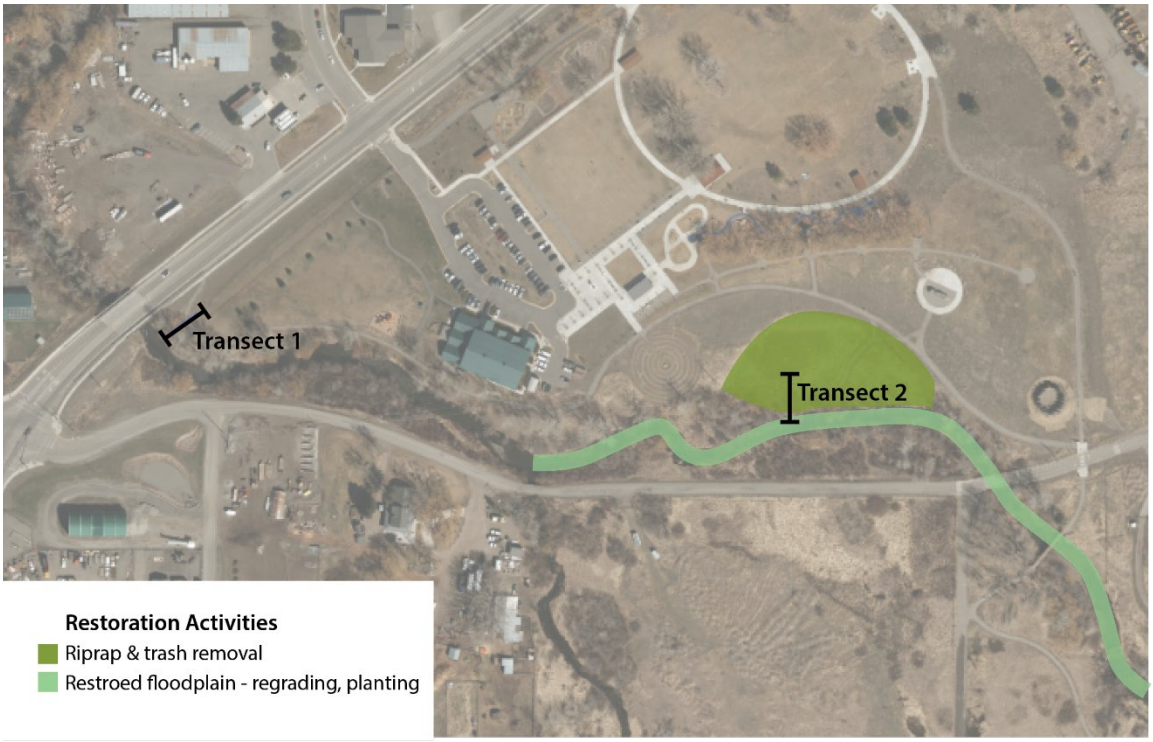


Figure 2: Transect locations for vegetation analysis for unrestored and restored riparian buffer.

The research team used a regional plant identification iOS application to identify plants along the transect lines (Tilt, W. & High Country Apps, 2011), as well as planting plans from the park and restoration construction documents. The planting plans showed the seed mixes and associated species composition. Surveyed species data was entered into an Excel spreadsheet for analysis. Coefficients of Conservatism were assigned for each surveyed plant species using the State guide for FQI (Pipp, 2017), and the Floristic Quality Index (FQI) values were calculated for each transect. Coefficients of Conservatism are defined in Table 2 (Pipp, 2017).

Non-Native Montana Species	
0	invasive
1	relatively benign
Native Montana Species	
Opportunistic, Broad Ecological Tolerance	

2	exhibits a broad range of ecological tolerance and is more or less restricted to areas of human disturbance
Non-Opportunistic, Intermediate Ecological Tolerance	
3	exhibits an intermediate range of ecological tolerance, typifies a stable phase of a native community, and thrives and/or persists under natural or human disturbance
4	exhibits an intermediate range of ecological tolerance, typifies a stable phase of a native community, and persists but does not thrive with some natural or human disturbance
5	exhibits an intermediate range of ecological tolerance, typifies a stable phase of a native community, and persists but does not thrive with a little natural or human disturbance
Non-Opportunistic, Narrow Ecological Tolerance	
6	exhibits a moderate fidelity to a more or less narrow range of ecological tolerance, typifies a stable or near climax community, and tolerates limited natural or human disturbance (unless surrogate for fire or other natural disturbance)
7	exhibits a moderate fidelity to a somewhat narrow range of ecological tolerance, typifies a stable or near climax community, and does not tolerate disturbance
8	exhibits a moderate fidelity to a narrow range of ecological tolerance, typifies a stable or near climax community, and does not tolerate disturbance
9	exhibits a high fidelity to a narrow range of ecological tolerance, typifies a stable or near climax community, and does not tolerate disturbance
10	exhibits a very high fidelity to a very narrow range of ecological tolerance that typifies a stable or near climax community and does not tolerate disturbance

Table 2: Montana Natural Heritage Program, Coefficients of Conservatism for Montana Species

Calculations: Surveyed plants for both transects and calculations for Mean C and Floristic Quality Index are shown in Table 3. Floristic Quality Index (FQI) is a measure of overall vegetative quality of a site. FQI values 1-19 indicate low quality, 20-35 is high quality, and above 35 is exceptional.

SCIENTIFIC NAME (MTNHP)	COMMON NAME	ORIGIN IN MT	MT C-VALUE	Mean C	# Species	FQI = (Mean C) / (√(#Spp)
TRANSECT 1 (unrestored)						
Bromus inermis	Smooth Brome	Exotic	0	1.36 (Mean C for native plants = 2.71)	14 (4 native, 10 exotic)	**5.08**
Cornus sericea	Red-osier Dogwood	Native	5			
Cuscuta epithymum	Clover Dodder	Exotic	1			
Eleocharis palustris	Creeping Spikerush	Native	4			
Equisetum arvense	Field Horsetail	Native	3			
Euphorbia agraria	Urban Spurge	Exotic	1			
Leucanthemum vulgare	Oxeye Daisy	Exotic	0			
Lotus corniculatus	Garden Bird's-foot-trefoil	Exotic	1			
Phalaris arundinacea	Reed Canarygrass	Exotic	0			
Poa pratensis	Kentucky Bluegrass	Exotic	0			
Salix alba	White Willow	Exotic	0			

Salix bebbiana	Bebb's Willow	Native	4			
Tanacetum vulgare	Common Tansy	Exotic	0			
Taraxacum officinale	Common dandelion	Exotic	0			

TRANSECT 2 (restored)						
Achillea millefolium	Common Yarrow	Native	3	3.54 (Mean C for native plants = 4.25)	24 (20 native, 4 exotic)	**17.35**
Alnus incana	Speckled Alder	Native	6			
Bouteloua gracilis	Blue Gramma	Native	4			
Carex nebrascensis	Nebraska Sedge	Native	4			
Cirsium arvense	Canada Thistle	Exotic	0			
Cornus sericea	Red-osier Dogwood	Native	5			
Deschampsia cespitosa	Tufted Hairgrass	Native	7			
Elymus canadensis	Canada Wildrye	Native	5			
Elymus smithii	Western Wheatgrass	Native	4			
Elymus trachycaulus	Slender Wheatgrass	Native	5			
Festuca idahoensis	Idaho Fescue	Native	4			
Hordeum jubatum	Foxtail Barley	Native	3			
Hypericum perforatum	Common St. John's-wort	Exotic	0			
Koeleria macrantha	Prairie Junegrass	Native	4			
Melilotus officinalis	Yellow Sweetclover	Exotic	0			
Poa secunda	Sandberg Bluegrass	Native	4			
Populus angustifolia	Narrowleaf Cottonwood	Native	5			
Populus tremuloides	Quaking Aspen	Native	5			
Ratibida columnifera	Prairie Coneflower	Native	3			
Rumex crispus	Curly Dock	Exotic	1			
Salix exigua	Sandbar Willow	Native	4			
Scirpus microcarpus	Small-fruit Bulrush	Native	5			
Sorbus scopulina	Greene's Mountain-ash	Native	4			
Tanacetum vulgare	Common Tansy	Exotic	0			

Table 3: Transect plant survey data and FQI calculations.

- Difference in FQI between the two transects: 17.35 – 5.08 = 12.27
- Relative increase in FQI when restored: 17.35/5.08 = 3.42 times
- Species richness relative increase for restored transect: 24/14 = 1.71 times

Sources:

Tilt, Whitney and High Country Apps. 2011. *Flora of The Yellowstone Region: A Guide to the Wildflowers, Grasses, Shrubs, Trees and other Plants of the Greater Yellowstone Region*. In partnership with Yellowstone Forever.

Pipp, Andrea. 2017. *Coefficient of Conservatism Rankings for the Flora of Montana: Part III.* December 15. Report to the Montana Department of Environmental Quality, Helena, Montana. Prepared by the Montana Natural Heritage Program, Helena, Montana. 107 pp.

Montana Natural Heritage Program Field Guide, Montana State Library. Accessed July 30, 2023 at

https://fieldguide.mt.gov/default.aspx

SMCP 100% Construction Documents, Design Workshop, 2018.

SMCP Restoration 100% Construction Documents, Respec, 2014.

Limitations:

- Researchers are not experts in plant systematics, especially identification of grasses.
- FQI calculation for the transects does not take into account plant coverages.
- Only includes one transect for each tested condition which may contribute to a sampling effect. Additional transects would provide data to assess riparian vegetation and plant establishment throughout the river's reach through the park.
- Data was collected in July of one growing season and therefore may have missed dormant species or biennial species that could be present.

Supports at least 156 observed bird species, 16 of which are listed as Species of Concern or Potential Species of Concern in Montana.

Background: Sacajawea Audubon Society is the regional chapter of the Montana Audubon Society and was one of the local organizations that worked with the design team related to the design, restoration, and use of the nature sanctuary and throughout the park. They were also involved in the design of the formal bird observation areas where human-bird interactions were of most concern. Bird surveys have been completed by members of Sacajawea Audubon Society (SAC) for the Story Mill Community Park hotspot in eBird since 2013, primarily in the nature sanctuary area, and all data has been entered into eBird. These eBird recorded observations and surveys began after river and wetland restoration was underway by the Trust for Public Land.

Method: The research team met with bird experts from SAC on site to learn more about avian habitat and changes at the site since restoration efforts were completed. Topics such as species diversity, nesting patterns, and population were informally discussed with SAC members during a site walk for the research team to gain a better understanding of the birdlife within the site (Figure 3). eBird.com was used to analyze bird occurrences and species on site. The SMCP Hotspot on eBird includes submitted observations from, primarily, August 2019 to June 2023 (only 5 observations were submitted between May 2013 and July 2019). The top eBirders are two local citizen experts who are active members of SAC. The entire eBird species list (Appendix A) was then cross-referenced with the Montana Natural Heritage Program's Species of Concern Report (MTNHP, 2022) using Microsoft Excel.

Cassin's Finch (SOC)

Evening Grosbeaks (SOC)

Northern Saw-whet Owl

Figure 3: Birds in Story Mill Community Park (Photo credit: Lou Ann Harris).

The state of Montana definitions from the Montana Natural Heritage SOC Report for "Species of Concern," and "Potential Species of Concern" are as follows:

- "Montana Animal Species of Concern are native Montana animals that are considered to be 'at risk' due to declining population trends, threats to their habitats, and/or restricted distribution."
- "Potential Animal Species of Concern -- animals for which current, often limited, information suggests potential vulnerability or for which additional data are needed before an accurate status assessment can be made."

The Montana Natural Heritage Program assigns species-level status codes (S-Rankings) ranging from 1 (critically imperiled) to 5 (demonstrably secure), reflecting the relative degree to which they are "at-risk" (MTNHP, 2009). S-Rankings are defined as follows (MTNHP, 2022):

- S1: At high risk because of extremely limited and potentially declining numbers, extent and/or habitat, making it highly vulnerable to global extinction or extirpation in the state.
- S2: At risk because of very limited and potentially declining numbers, extent and/or habitat, making it vulnerable to global extinction or extirpation in the state.
- S3: Potentially at risk because of limited and potentially declining numbers, extent and/or habitat, even though it may be abundant in some areas.
- S4: Uncommon but not rare (although it may be rare in parts of its range), and usually widespread. Apparently not vulnerable in most of its range, but possibly cause for long-term concern.
- S5: Common, widespread, and abundant (although it may be rare in parts of its range). Not vulnerable in most of its range.

Calculations: There are 1,353 observed birds recorded for the park in eBird. Of these, there are 156 species represented (Appendix A). Table 4 shows the 16 species seen at the park that are listed as special concern or potential concern by the State of Montana's Natural Heritage Program; the remaining 140 species were not classified as species or potential species of concern.

Scientific Name	Common Name	S- Ranking	State Status

Accipiter gentilis	Northern Goshawk	S3	SOC
Ardea Herodias	Great Blue Heron	S3	SOC
Catharus fuscescens	Veery	S3B	SOC
Certhia americana	Brown Creeper	S3	SOC
Coccothraustes vespertinus	Evening Grosbeak	S3	SOC
Cygnus buccinator	Trumpeter Swan	S3	SOC
Dryocopus pileatus	Pileated Woodpecker	S3	SOC
Haemorhous cassinii	Cassin's Finch	S3	SOC
Ixoreus naevius	Varied Thrush	S3B	SOC
Lophodytes cucullatus	Hooded Merganser	S4	PSOC
Nucifraga columbiana	Clark's Nutcracker	S3	SOC
Pelecanus erythrorhynchos	American White Pelican	S3B	SOC
Pipilo chlorurus	Green-tailed Towhee	S3B	SOC
Plegadis chihi	White-faced Ibis	S3B	SOC
Spizella breweri	Brewer's Sparrow	S3B	SOC
Sterna forsteri	Forster's Tern	S3B	SOC

Table 4: SMCP observed birds listed as State species of concern (SOC) or potential species of concern (PSOC).

Sources:

Story Mill Community Park hotspot. *eBird*. https://ebird.org/hotspot/L4686166?yr=all&m=&rank=mrec. Accessed on May 10, 2023.

"Animal Species of Concern Report," 2022. *Montana Natural Heritage Program (MNHP).* Accessed on May 10, 2023 at https://mtnhp.org/SpeciesOfConcern/?AorP=a.

Harris, Lou Ann and Paulette Epple, Sacajawea Audubon Society members. Interview and site walk on June 3, 2023.

Limitations:

- Formal eBird data was not collected prior to restoration processes, meaning that pre- and post-construction comparisons were not possible to demonstrate causality of the park related to an increase in species richness or occurrences.
- Relies on observations done by citizens, who are not necessarily experts in ornithology.

Reduces temperatures at the playground with preserved trees by an average of 12% as compared to a nearby playground without preserved tree canopy. "Tree shade and canopy" was the top reason that surveyed visitors gave for preferring Story Mill Community Park over other Bozeman parks.

Background: Tree preservation was a primary goal of the design team to sustain the site's ecology, historical vegetation from past land uses, and naturalized character.

Method: To measure reduction in surface temperature, temperatures were recorded in the playground area at SMCP (Figure 4) in addition to a nearby park playground, the Dinosaur Park at the Gallatin County Regional Park (Figure 5). This comparison site was used because the whole park and playground areas are similar in size, geography, and program features including playground equipment, pavilions, benches, and a custom climbing boulder. In addition, the Dinosaur playground is one that the community often compares to the SMCP playground in terms of popularity and range of activities (Jadin, 2023). While the Dinosaur playground does contain surrounding vegetation, most of it was planted at the time of construction and does not utilize a preserved tree canopy like SMCP.

All temperatures were recorded using a Fluke 62 Max hand powered infrared thermometer with an accuracy of -/+ 1.5 degrees Celsius. See Table 5 for a list of material types and sun exposure settings. Temperature measurements were taken at the same time at each location (on July 8, 2023 between 1:47 and 2:30 p.m.), with one team member measuring at each location while communicated to one another via cell phones to ensure simultaneous readings. Two readings were taken, 12” from the material surface, and averages were calculated for each measurement location, then compared to that of the comparison site with its corresponding sampling location based on surface material and physical properties. When comparing temperatures of the two sites, shaded materials were compared to shaded materials, and materials in the sun were compared to materials in the sun at both sites.

Figure 4: Temperature sampling locations at SMCP Playground.

Figure 5: Temperature sampling locations at Gallatin County Regional Park, Dinosaur Playground.

See page 23 for Overall Survey Method. In the survey, the research team used the following questions to gather information related to park preference:

Type	Question	Response Options
Multiple Choice	Do you prefer Story Mill Community Park over other City of Bozeman parks?	Yes/No/I have never been to Story Mill Community Park
Short Answer (with display logic)	If previous answer 'yes:' Why?	Open-ended

Calculations: Surface temperatures were measured at corresponding locations within each site (Table 5). Each sampling location within SMCP was measured in comparison to another sampling location with similar physical properties within the Dinosaur Park. The research team decided to omit the swing seat and climbing boulder from the final calculations because of different colors at the two sites, which significantly impacted heat absorption and did not allow for comparison. The seat at SMCP was black, as compared to royal blue at the Dino Park. Similarly, the climbing boulder was darker gray at SMCP.

Exposure	Temp Location/Material	SMCP (Avg Celsius)	Dino (Avg Celsius)	Difference (Dino-SMCP)	% Change (Diff/Dino)
Sun	Wood play feature	31.5	46.1	14.6	31.7%
	Powder-coated steel railing	31.7	40.8	9.1	22.3%
	Mulch within play area	54.7	57.95	3.2	5.6%
	Steel bench seat/handrail	34.2	42.05	7.9	18.8%
	Wood table	52.5	55.65	3.2	5.7%
	Turfgrass	30.4	33.8	3.5	10.2%
	Concrete	42.2	46.1	4.0	8.6%
	Swing seat*	57.2	53	-4.2	-7.8%
	Climbing boulder*	54.3	48.2	-6.1	-12.7%
Shade	Mulch within play area	20.1	20.25	0.2	1.0%
	Plastic slide	21.2	25.8	4.7	18.0%
	Wood tables under pavilions	21.7	23.35	1.7	7.3%
	Turfgrass	13.7	18.1	4.5	24.6%
	Concrete	19.7	18.6	-1.1	-5.9%
	* Removed from calculations			SMCP hotter	***Avg. % Change:*** 12.3%
				SMCP cooler	

Table 5: Temperature data for SMCP and comparison site

- % Change = (Dino park average material temperature – SMCP average material temperature) / Dino park average material temperature x 100
- Average % Change = (Sum of % Change)/12
  = (55.3 degrees C / 12 materials) = 0.123 x 100 = **12.3%**

Table 7 and Figure 13 show the content analysis coding themes and results for why survey respondents prefer SMCP over other Bozeman parks. See page 31 for further discussion of survey results for this question.

Sources:

Aman, Amanda and Yalcin Yildirim. "Yanaguana Garden Methods." *Landscape Performance Series.* Landscape Architecture Foundation, 2019. https://doi.org/10.31353/cs1571

Steiner, Halina and Sarah Sanders. "Scioto Mile and Greenways Methods." *Landscape Performance Series.* Landscape Architecture Foundation, 2021. https://doi.org/10.31353/cs1731

Jadin, Addi, Parks and Recreation Department, City of Bozeman. Interview on March 31, 2023.

Limitations:

- Thermometer used may produce inaccuracies up to 1.5 degrees Celsius.
- The Dinosaur playground is approximately 20' higher in elevation (~4,740') than SMCP playground (~4,720'), which could impact temperature differences.

Sequesters an estimated 1.6 tons of atmospheric carbon annually in 132 preserved trees in the 20-acre active recreation park zone. 61% of trees previously on-site were preserved within the 20-acre active zone, where most new surfaces and furnishings are located.

Background: Tree preservation was a primary goal of the design team to sustain the site's ecology, historical vegetation from past land uses, and naturalized character throughout the site. While there are many trees in the 40-acre nature sanctuary area of the park (small woodland areas, riparian trees, and remnant trees at the homestead), the mature preserved trees within the 20-acre active area of the park are integrated with park hardscapes, play equipment, furnishings, and more heavily programmed spaces. 83% of the observed users (see Appendix D) were in the 20-acre active park.

Method: This benefit focuses on the 20-acre active park area north of the East Gallatin River because the previous data from 2016 was most thorough for this area of the property. An Excel spreadsheet and AutoCAD tree survey provided by the landscape architect, both completed in 2016, were used to assess tree preservation and removal. The Excel spreadsheet included only quantities of deciduous and coniferous trees (no species or DBH data) that were planned to be preserved, removed, and planted for the entire 60-acre park. The AutoCAD file included tree locations, species, and DBH measurements for all existing trees only north of the East Gallatin River and the homestead site. Onsite field checks were made to ensure accuracy of this data and make adjustments were necessary. These adjustments included: inconsistencies with trees actually preserved during park construction, species corrections, and growth compensation. To adjust for tree growth between 2016 and 2023, 15 preserved trees, representing a variety of species, were remeasured onsite using a DBH tape at 4.5' from the ground. The average growth rate (1.35) was then applied to all observed preserved trees from the 2016 tree survey to enter into iTree Eco to better represent current tree benefits (Figure 6). The research team updated all species identification for the preserved trees to better reflect tree benefits in iTree Eco. The 2016

tree survey's species richness was 8 for the 20-acre active park area, whereas the corrected species richness identified was 13. The research team relied on the adjusted DBH measurements from the 2016 tree survey due to time constraints for remeasuring all observed preserved trees onsite.

Structure Summary by Species

Location: Bozeman, Gallatin, Montana, United States of America
Project: SMCP Carbon Sequestration, Series: Active area trees, Year: 2023
Generated: 8/1/2023

Species	Trees Number	SE	Leaf Area (ac)	SE	Leaf Biomass (ton)	SE	Tree Dry Weight Biomass (ton)	SE	Average Condition (%)
White willow	90	±0	11.120	±0.000	3.142	±0.000	219.806	±0.000	82.50
Balsam poplar	16	±0	1.575	±0.000	0.507	±0.000	6.911	±0.000	82.50
Black cottonwood	10	±0	2.324	±0.000	0.560	±0.000	59.595	±0.000	82.50
Green ash	4	±0	0.464	±0.000	0.135	±0.000	2.850	±0.000	82.50
Lodgepole pine	4	±0	0.357	±0.000	0.306	±0.000	2.321	±0.000	82.50
Boxelder	3	±0	0.672	±0.000	0.274	±0.000	18.236	±0.000	82.50
Narrowleaf cottonwood	3	±0	0.649	±0.000	0.254	±0.000	6.220	±0.000	82.50
Quaking aspen	3	±0	0.066	±0.000	0.023	±0.000	0.947	±0.000	82.50
European aspen	3	±0	0.659	±0.000	0.212	±0.000	12.936	±0.000	82.50
Engelmann spruce	2	±0	0.187	±0.000	0.178	±0.000	1.441	±0.000	82.50
Rocky mountain juniper	1	±0	0.116	±0.000	0.144	±0.000	1.178	±0.000	82.50
Norway spruce	1	±0	0.260	±0.000	0.193	±0.000	2.500	±0.000	82.50
Balsam poplar Balsamifera	1	±0	0.027	±0.000	0.009	±0.000	0.165	±0.000	82.50
Study Area	**141**	**±0**	**18.476**	**±0.000**	**5.938**	**±0.000**	**335.105**	**±0.000**	**82.50**

Figure 6: Preserved tree composition by species

i-Tree Eco v6 was used to estimate annual carbon sequestration for the preserved trees inventoried in the 20-acre active park zone.

Calculations: To calculate carbon sequestration, the inventory of preserved trees was entered into i-Tree Eco. Tree species and DBH were used as inputs, along with the geographic location. See Appendix B for the iTree Benefits and Costs Summary for the preserved trees in the 20-acre active park area.

- From Appendix B: 3,399 lb/yr gross carbon sequestration x (1 ton / 2000 lb) = **1.6995 tons**

The percentage of preserved trees was calculated by dividing total observed preserved trees by the total trees surveyed pre-construction; only trees with a DBH of 6" or greater were included in this calculation.

- 142 observed trees preserved / 232 total trees pre-construction in 20-acre active park = 0.6121 x 100 = **61.2% of trees preserved**

Sources:

Keane, Bridget and Peter Grant. "Bendigo Hospital Methods." *Landscape Performance Serie*s. Landscape Architecture Foundation, 2022. https://doi.org/10.31353/cs1851.

Bowing, Jacky, and Guanyu (Hanley) Chen. "Te Whāriki Subdivision Phases 1 and 2 Methods." *Landscape Performance Series*. Landscape Architecture Foundation, 2021. https://doi.org/10.31353/cs1751

"i-Tree Eco | i-Tree." https://www.itreetools.org/tools/i-tree-eco.

Limitations:

- This benefit only calculates carbon sequestration for a fraction of the entire park. The calculation does not include the trees in the 40-acre nature sanctuary trees and along the river, trees under 6" DBH, or other grassland and shrubland plant coverages throughout the site.
- Tree survey data provided by the design team relied on the quality of past data. After discovering incorrect genus identified, all observed preserved trees in the 20-acre active park zone were inventoried onsite and corrected for species.
- Adjusting DBH of preserved trees based on the average growth rate of the 15 referenced applies the same growth rate to all species, when in reality, different species grow at different rates and depending on site conditions and microclimates.
- *Related observation (not a limitation)*: While inventorying species of preserved trees, the research team observed poor tree health in numerous trees that were planted in 2019, likely due to a combination of management/irrigation issues and abiotic factors across the City of Bozeman after winter 2023, especially seen in maple species. The research team performed a tree assessment of the entryway areas from the main parking lot (Appendix C) to document current conditions in this "front door" area of the park. Because this area has low species diversity (majority of trees are *Acer x freemanii 'Autumn Blaze'*, Autumn Blaze Maple), loss of several trees significantly impacts the designed allées.

- ***Reuses 15,000 cu yds of excavated soil and 500 cu yds of rubble from river and wetland restoration to create topographic site features, saving 620 trips to the nearest landfill.***

Method: To determine the soil reuse, information was obtained from the design firm that accounted for all repurposed soil and rubble excavated from river and wetland restoration work. To estimate the number of trips saved to a landfill or organic waste site, a generic dump truck size was chosen (25 cubic yards).

Calculations: To calculate the reduction in disposal trips, the following equation was used:

- Generic dump truck capacity = 25 cubic yards (cy)
- (15,000 cy excavated soil + 500 cy rubble) / 25 cubic yards per truck load = 620 trips

Sources:

"Story Mill Community Park, Bozeman, MT. 100% Construction Documents." Provided by Design Workshop. April 23, 2018.

Limitations:

- Quantity of reused soil relies on past data of design partners and was not independently verified by research team.

Social Benefits

Overall SOPARNA Method: Manual visitor observation and counts were performed on site using momentary time sampling techniques outlined by the SOPARNA method (Sasidharan and McKenzie, 2014). The SOPARNA protocol included coding for overall physical conditions, recreation activity types, observed sex, age, race, level of physical activity, and contextual factors and comments. A coding sheet (Appendix D) was developed with the coding categories to use for data collection. Infant/toddler was added to the age categories to further differentiate 'child,' since a goal was to analyze whether the park accommodates multiple ages.

The park area was divided into 17 target areas based on the recreational features and activity use (Figure 7) for doing observational scans of park users from a stationing point(s). Furthermore, target area 6 was divided into 7 subtarget areas for scanning accuracy and to do statistical analysis within the different playground zones (Figure 8). Instead of using SOPARNA's method for path coding on the trails inside the park, these users were observed and recorded within the target areas, which was tested during a pilot of the protocol to ensure comprehensive observation of trail users throughout the park.

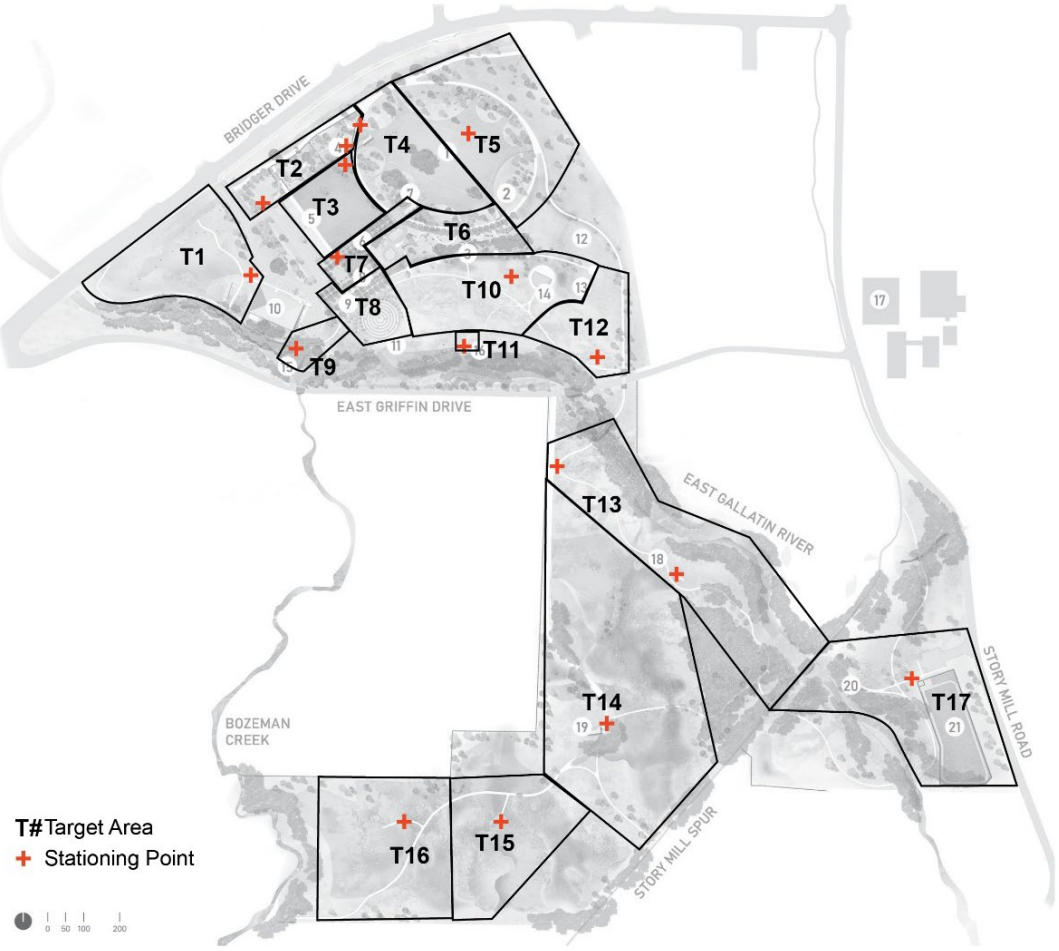


Figure 7: Target areas and stationing points map

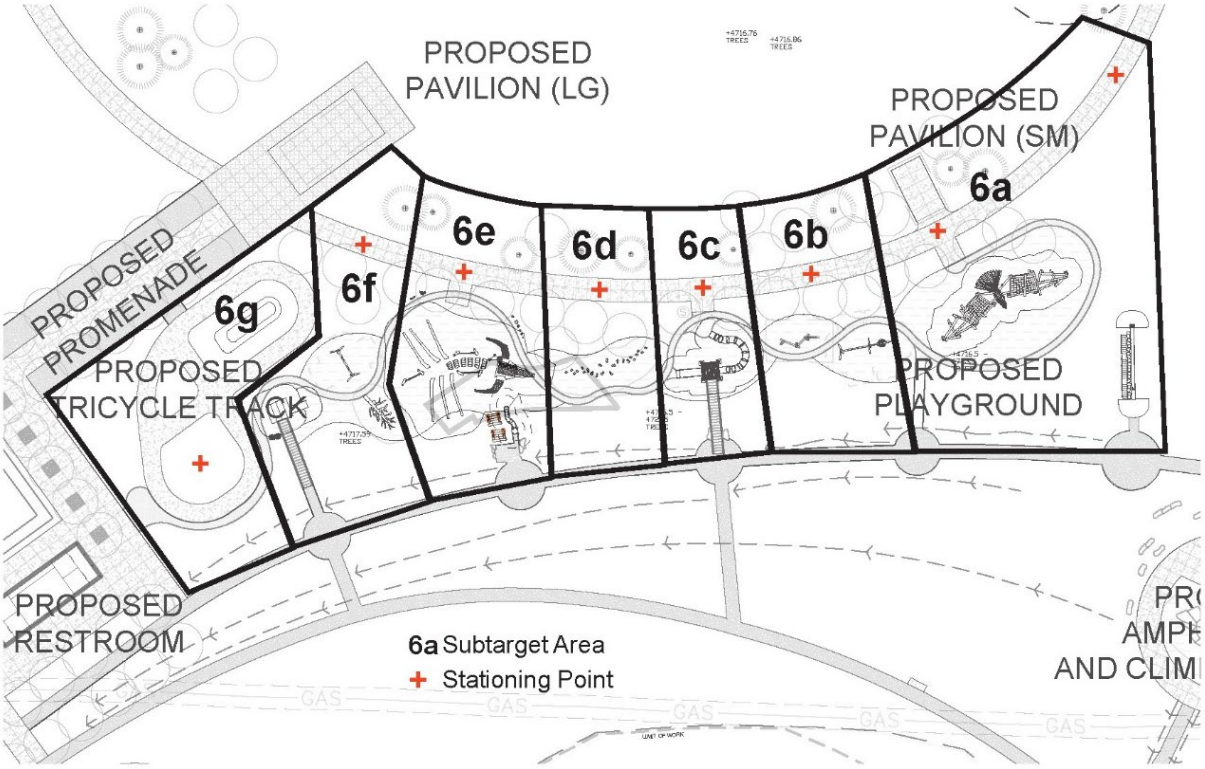


Figure 8: Sub-target areas and stationing points map for the playground

The observation schedule included 2 weekend days (June 17 and July 8) and 2 weekdays (July 7 and July 13), with scanning periods starting at 9:30 a.m., 12:30 p.m., 3:30 p.m., and 6:30 p.m. on each day.

Two observers (research fellow and research assistant) reviewed the SOPARNA protocols prior to observation periods, and a pilot scanning period was completed to test target zone boundaries and inter-coder reliability. Scanning at each target or sub-target area started promptly at each period, and observers moved between target areas in the same pre-determined order each time as they recorded users from a designated station point. Data from the scanning sheets was entered into an Excel spreadsheet for analysis and calculations. At Sub-target Areas 6a-6g, coding of females and males was divided among the two observers to ensure accuracy, since these areas typically had more users.

See Appendix D for sample scanning sheet and summary data collected.

Overall SOPARNA Limitations:

- Observer error – observations are subject to errors such as miscounting, or incorrect assignment of sex, age, or race
- Observation schedule was not representative of comprehensive use week-to-week, as observation was limited to four days (two weekend days, two weekdays). For example, known educational or community events such as camps, learning garden events, and great lawn programming were not observed due to observation schedule.
- Protocol does not distinguish between those moving through the park and those that recreate longer (into multiple scanning periods). This may result in multiple counts of these users.

- Observation period is limited; only captures portion of year (June-July). Usage and activity type may vary if observation was conducted within multiple seasons.
- Some features were not currently in operation such as outdoor showers and one water fountain. Had these features been in operation, usage and counts may have varied in these target areas.

Overall Survey Method: The research team developed a digital and paper survey for residents, on-site park users, and past survey participants from the community engagement process. The anonymous survey included 13 questions - 3 demographic questions, 10 questions on users' experience, preferences, and behaviors. To reduce survey fatigue and response time, only three questions were open-ended short answer (two with skip logic). The digital survey was created and distributed using Qualtrics (Appendix E), and questions and multiple-choice answer options were randomized where skip-logic was not required. The paper survey (Appendix E) reformatted the questions to fit on one 8.5"x11" sheet of paper, front and back. Two versions of the paper survey were created to randomize multiple-choice answer options.

Distribution and recruitment included three strategies. First, the research team sent the digital survey link and an example post language and image (Figure 9) to several project partners and design team members to share with their constituents through social media outlets, emails, and/or newsletters. The social media post image was created using Adobe Express.

Figure 9: Digital survey advertising image shared with project partners and design team.

Second, the research team recruited survey participants in person on July 10-13 between 10:00 a.m. – 1:00 p.m. A table was set up at the primary parking lot (Figure 10) off a major arterial street that provides access to both north and south sections of the park. Signs with project information were affixed to the tables, and the research team asked people if they'd like to fill out a survey as they entered the park. The research team also walked in the playground and asked people sitting on benches. Third, portable sandwich board signs were placed at the Bridger Drive and Story Mill Road parking lots. The sign was printed on vinyl to be weatherproof and included project information and the QR code to the digital survey (Figure 10). The signs were placed on-site 24 hours a day, from July 10-July 18.

Figure 10: On-site survey participant recruitment table.

The digital survey received 133 completed submissions and 33 surveys were collected on site, for a total of 166 recorded responses. Of these, three digital submissions were removed because they had not been to Story Mill Community Park (skip logic question at the beginning of the survey), for a total of 163 surveys used in this analysis. The data from the paper surveys was entered into Excel and imported into Qualtrics using a .cvs file, so that the combined data was ready for analysis. The average response rate across categorical questions was 88.0%.

All categorical survey data was analyzed using both Qualtrics and Microsoft Excel. Written short answer survey data were iteratively coded for patterns and eventually higher-order themes, based on the grounded theory method (Glaser & Strauss, 1967).

See Appendix F for the Survey Results Report, including summary data tables and visualizations.

Overall Survey Sources:

Glaser, B. G., & Strauss, A. L., 1967. *The Discovery of Grounded Theory: Strategies for qualitative research*. New York, NY: Aldine de Gruyter.

Sasidharan, V. and T.L. McKenzie, 2014. *SOPARNA: System for Observing Physical Activity and Recreation in Natural Areas, Description and Procedures Manual*. Accessed on May 1, 2023 at https://activelivingresearch.org/sites/activelivingresearch.sdsc.edu/files/SOPARNA_Protocols_04.30.14_0.pdf

Overall Survey Limitations:

- Survey was limited to site visitors, and therefore did not survey Bozeman community members who do not go to SMCP or prefer to use other parks. Therefore, some of the data may be biased by surveying people who already attend the park.
- Some survey questions were skipped, partially completed, misinterpreted, or answered incorrectly by responders, and response rates varied per question.
- Survey was not conducted on children, therefore the data is not representative of this age group.
- Due to time limitations, on-site survey collection was limited to three days, with 2-3 hours of collection time each day.
- Digital survey design and internet access may have limited reaching respondents of all abilities and collecting an economically diverse sample.
- The grounded theory method used for short-answer content analysis inherently may have coder bias. Where inter-coder discrepancies existed, researchers discussed coding categorization for consensus.
- *Related note (not a limitation)*: 39% of survey respondents live 2-5 miles from the park and 36% live more than 5 miles from the park. Still, it is suspected that most if not all survey participants are Bozeman area residents since 80% were completed digitally with online distribution going to Bozeman listservs and organization members. While the survey was intended for Bozeman area residents, there are also a fair number of tourists and out-of-town visitors to the park on the daily basis and capturing their experience would be interesting to investigate what makes a park a destination spot. For example, on July 7 and 13, the research team identified license plates from 13 different states in the main parking lot.

Attracts an estimated 11,600 visitors per week in summer months, including over 260 that participate in new community center programming. The park's pavilions received 396 rentals over a period of 1 year.

Background: SMCP is the City of Bozeman's largest public park, and the new community center at the park is now the operating hub for the Parks and Recreation department and its youth camps and community programming throughout the year. The city sought to create a 'flagship park' for the community. With the park's diversity of features and the community center's indoor and outdoor facilities, a diversity of visitors and organizations utilize the site. One of the project goals was also to

provide 'nearby nature' for people as Bozeman continues to grow at record paces. Neither the City or Trust for Public Land (TPL) have performed formal visitation counts, so this project will provide a baseline for information on the people and organizations who benefit from the park each year as well as the extent of outdoor facilities use.

Method: Two methods were utilized related to this benefit: first, the SOPARNA method (see page 21 for Overall SOPARNA Method); second, an existing data set on program participants and facilities use.

Existing data shared by the City of Bozeman Parks and Recreational department (Table 6) was used to report users enrolled in City of Bozeman events and extent of facility use. The data included the number of people that participated in City-organized summer programming (i.e. camps and workshops) and frequency of park rentals for 2022.

Calculations: The research team used the following calculations to estimate total visitors during each week of the summer. Target and sub-target area scans took 45 minutes at each scheduled period. The park's hours are listed as 5:00 a.m.-11:00 p.m., for a total of 18 hours each day. The research team decided this would result in an overestimate of weekly park users, since the calculation would assume the same number of users during every operating hour of the day, which realistically is not the case. So, the research team used 8:00 a.m.-8:00 p.m. as the primary hours that most users are at the park, for a total of 12 hours.

- **Multiplier to Extrapolate Total Daily Users:**
    - 12 hours (primary park use hours)/0.75 hours (observation time) = **16**
- **Total Weekly Users During the Summer:**
  = [5 weekdays * Daily weighted average of observed users on a weekday] + [2 weekend days * Daily weighted average for observed users on weekend day]
  = $[5*(16*((W_1+W_2)/2))] + [2*(16*((E_1 + E_2)/2))]$
    - Where,
        - W_1: (sum of observed people (both sexes) in all target areas for all observation period scans for weekday July 7)/4
        - W_2: (sum of observed people (both sexes) in all target areas for all observation period scans for weekday July 13)/4
        - E_1: (sum of observed people (both sexes) in all target areas for all observation period scans for June 17)/4
        - E_2: (sum of observed people (both sexes) in all target areas for all observation period scans for July 8)/4

  = [5*(16*((78.8+155.0)/2))] + [2*(16*((73.5 + 69.0)/2))]
  = 11,632 Total users per week in the summer (rounded to 11,600 for reporting).

See Appendix D for daily totals and averages by other coding categories.

Participants in Community Center Programming, Summer 2022	Rental Frequencies, 2022
6/13-6/18 = 61 6/20-6/24 = 58 6/27-7/1 = 48 7/11-7/15 = 38 7/18-7/22 = 34 7/25-7/29 = 37 Total = **264**	Pavilions = **397** Community Center gymnasiums = 184 Other (great lawn, amphitheater, etc.) = 10

Table 6: Data shared by the Bozeman Parks and Recreation department.

Sources:

Steiner, Halina and Sarah Sanders. "Scioto Mile and Greenways Methods." *Landscape Performance Series*, Landscape Architecture Foundation, 2021. https://doi.org/10.31353/cs1731

Parks and Recreation Department, City of Bozeman. Data shared by email on June 26, 2023.

Limitations:

- See page 22 for Overall SOPARNA Limitations.
- The City of Bozeman dataset relies on their record keeping; it may not have captured every group using the site, only those who formally reserve facilities.

Encourages active recreation and alternative modes of transportation, with 34% of 147 surveyed visitors reporting that the park has contributed to an increase in their household's biking. Respondents who live within 2 miles report biking, walking, or running to get to the park 61% of the time.

Background: Transportation and trail planning were important elements of the park's design, and several of the community's goals for the park involved how the park would be used to make connections to other neighborhood and regional trails, as well as provide better bicycling routes for commuters or residents to go downtown. During the community engagement process in 2015, survey respondents chose bicycling and driving equally (bike, 41%, 73/179; car, 41%, 74/179) as their most likely mode of transportation to access the park (Design Workshop, 2015). The research team wanted to understand user behaviors post-construction related to bicycling, access, and trail use.

The trails within SMCP connect to several surrounding city and regional trails. In the southeast, the park connects to the Story Mill Spur Trail which runs south to the central business district and Main Street. Along the north and northeast, the park connects to a regional trail, the 'Path to the M,' which was constructed over the same time period as the park. This trail connects the city limits to two population trailheads, the M and Drinking Horse and connecting US Forest Service trails. Prior to the SMCP trail inside the park, users would have to bike directly on Bridger Drive without a designated bike lane. The park has meaningfully changed the user experience for this portion of the bike ride between Main Street

and the 'M' Trailhead and facilitates people cutting through the park and using the park as a stopping point along their route. To the west, the park trail entrances are within about two blocks of trails at the East Gallatin Recreation Area as well as along Oak Street.

Method: In the survey, the research team used the following questions to gather information related to how the park impacted users bicycling behaviors and mode of transportation to access the park.

Type	Question	Response Options
Multiple Choice	Has the park contributed to an increase in your household's bicycling?	Yes/No/Not applicable – I don't own a bike or use bikes in the park
Multiple Choice	What percent of your visits do you bike, walk, or run to get to the park?	0-100%
Multiple Choice	Approximately, how close do you live to SMCP?	Less than 0.5 miles/0.5-1 miles/1-2 miles/2-5 miles/More than 5 miles

The research team also made a list of all businesses near park entrances using a combination of Google Maps, search engines and company websites, and the City of Bozeman GIS Online viewer. An email was sent describing the project along with one question, "How has the park benefited your tenants, employees, customers, sales, services and/or property?" In addition, the research team made direct contact with 6 newer businesses adjacent to the park and asked the same question in person.

Calculations: The percentage of respondents who agreed that the park contributed to an increase in their household's bicycling was calculated as the following:

- (50 'Yes' responses / 147 total responses) x 100 = **34.0%**

To calculate survey participants' access transportation modes, the following calculations were performed:

- Total # respondents who live up to 2 miles = (8 live Less than 0.5 miles from park) + (9 live 0.5-1 miles from park) + (20 live 1-2 miles from park) = **37**
- Average of %s for the 37 respondents who live up to 2 miles from park = **61.3%**

9 responses were received from business owners and employees. 5 respondents noted the value of the park and trail connections for their customers', workers', and their own recreational experience. Below are responses:

- "I bike to work from home on the trail through the park 80% of the time! We take walks and phone calls in the park. It greatly contributes to our excitement about being in this area."
- "The park has been a wonderful addition to the area. It is a much needed green space and recreation area for locals. I would like to see more spaces like this, especially on the north and west sides of Bozeman."
- "Our employees use the park to take bike rides on their breaks or commuting to work."

- "The park provides a beautiful view from the restaurant and it looks like we are a part of it. You can't see many other buildings when you look over there."
- "We receive customers after they visit the park and we see an uptick in customers when the park hosts community events. We love the idea of being next to and supporting the community resource."

Additional observations on trail use:
One of the most common uses of the park trail system was by adults and seniors doing fitness walking in a loop around the 20-acre active recreation area. Extending walks into the 40-acre nature sanctuary is rare, and ~75% of trail users overall in the park are using the trails north of E. Griffin Drive.

Data from a trail counter was provided by a local trails organization. The trail counter is located on the Path to the M at a street approximately 2 blocks from the northeast corner of the park. Data was analyzed using Excel. Adjustments were made to reflect actual observed trail use during the 88 direct observation hours in the park, as well as trail options. Researchers estimate about 20-30% of Path to the M trail users are getting to it by way of SMCP in some way. About 50% access the Path to the M via the Spur Mill Trail – this trail abuts the park in the southeast corner, but technically it is not part of the park property – and about 25% access the Path to the M from other connections from the west and south. The average daily number of trail counts using the Path to the M is 157 [17-80 in winter months (November-March) and 74-158 in summer and shoulder season months (April-October)]. So approximately 40 Path to the M trail users daily are using SMCP to get there (=157 * 0.25).

Sources:
Design Workshop, 2015. *Story Mill Community Park Combined Survey Results.* Nov. 9, 2015.

Gallatin Valley Land Trust, trail counter data for Path to the M. February 2022-December 2023 data.

Limitations:
- Survey questions on biking and park access involve self-reporting and perceptions rather than actual tracked data.
- Additional research methodologies were needed to capture representative data from businesses near the park.
- Qualitative responses from businesses do not directly measure park benefits from their business operations.

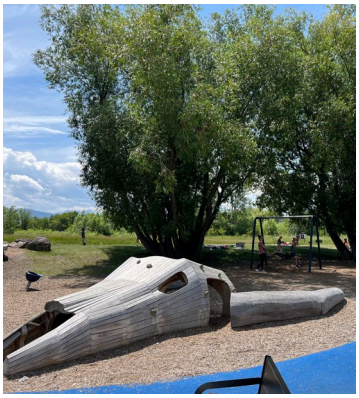
Provides unique educational and cultural value, with a high proportion of 145 surveyed visitors agreeing that hand-illustrated signage (67%), custom playground equipment (52%), and place-based sculptures (52%) have helped them understand the site's ecological and/or cultural heritage.

Background: An important goal that emerged from the community engagement process was that the park design should incorporate education and art amenities that highlight Bozeman's ecology and

history. The design resulted in place-based interpretive signs (Appendix G), sculptures, and playground equipment that were either made by local artists or custom-manufactured pieces (Figure 11). The research team wanted to learn whether these place-based features are successful in telling the site's stories.

Hand-illustrated interpretive sign

Local upcycled ski chairlift swing



Bison skull climbing and exploratory play structure

'Flourish' sculpture by Montana State University art professor Jim Zimpel

Figure 11: Examples of place-based custom features in park.

Method: See page 23 for Overall Survey Method.

In the survey, the research team used the following question to gather information related to how successful the place-based features were at helping users gain an understanding of the site. Photos of the features were not incorporated into the survey question to reduce survey bias, so the responses were based on people's memory and use of the features while experiencing the park.

Type	Question	Response Options
Multiple Choice	Have the following features helped you to understand the park site's ecological and/or cultural heritage? 3 statements: Interpretive signs with drawings done by local artist/Custom playground equipment/Place-based sculptures.	Yes/No/I don't know

Calculations: The percentage of respondents who agreed that features contributed to their understanding of the park site's ecological and/or cultural heritage was calculated as the following:

- (# 'Yes' responses for Interpretive signs / Total # responses for item) = 96/144 x 100 = **66.7%**
- (# 'Yes' responses for Playground equipment / Total # responses for item) = 75/145 x 100 = **51.7%**
- (# 'Yes' responses for Sculptures / Total # responses for item) = 75/145 x 100 = **51.7%**

Limitations:

- See page 25 for overall survey limitations.

- Relies on survey participants who know what/where these elements are and have experienced them on site. For example, 16.7%-18.6% of responses answered, 'I don't know.' If these were removed from the above calculations, the percentages of respondents who answered 'yes,' would adjust to 80.0%, 62.5%, and 63.6% respectively.
- Replies on self-reporting vs. actual, measured learning that may have occurred from use of/experience of the feature.

Positively impacts visitors' physical and mental health. Of 105 surveyed visitors, 26% described active recreation uses, 21% described psychological aspects, and 18% described socialization as the top ways the park has benefitted their life.

Method: See page 23 for Overall Survey Method.

Calculations: Table 7 and Figure 12 show survey results for the open-ended questions, "How has SMCP benefitted your life?" See Appendix F for complete survey responses and additional visualizations.

Theme	Frequency	% Theme
Recreation value - active	47	26.1%
Psychological, experiential (to the individual - safety, relaxing, a feeling, peaceful, convenient for parents, improves mental health)	37	20.6%
Socialization (connects people, quality time with others)	32	17.8%
Accessible nature(close by, access nature, get outside)	27	15.0%
Recreation value - passive (practice hobbies, motor skills)	19	10.6%
Aesthetic, beauty (aesthetically pleasing)	10	5.6%
Educational	5	2.8%
Exploration, engage with nature ("escape", participate)	3	1.7%
Total occurrences:	*180*	*100.0%*

Table 7: Coded theme frequency and % by occurrence for the questions, "How has SMCP benefitted your life?"

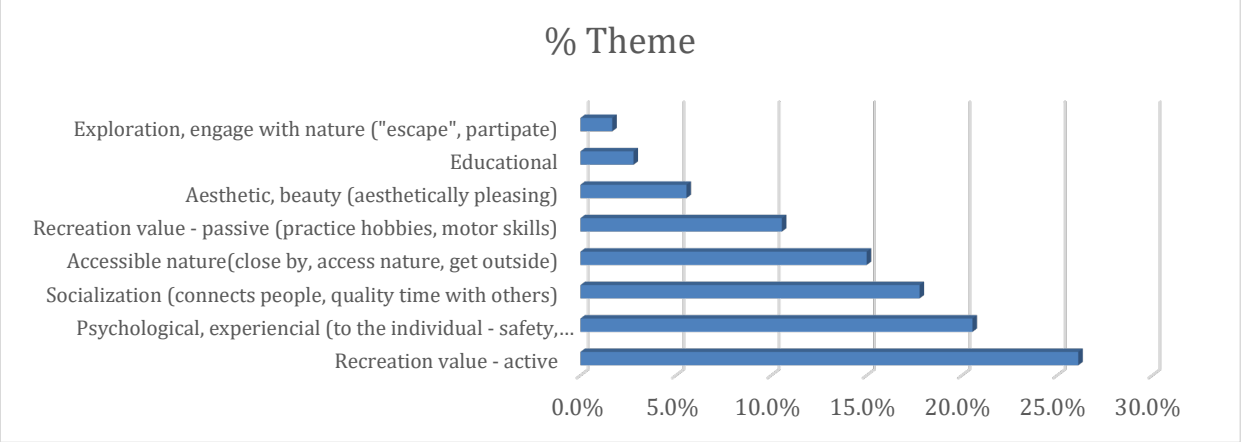


Figure 12: Theme % for how SMCP has benefitted park users surveyed.

Representative survey answers for the most frequent coding themes are below.

- Recreation value – active:
    - "We love this park! The structures are so fun, gathering pavilions are perfect for parties. We walk the creek on hot days, climb on the rock to see how daring we can be. My daughter bikes the circle (she calls it Circle Park!) the shade is amazing in the summer, but we still use the park year-round. Story Mill is the crown jewel of Bozeman parks!"
- Psychological, experiential to the individual:
    - "The Natural area is a birding hotspot that has enhanced my recreational time. Having an area dedicated to "natural processes or activities" is vital to my mental health."
- Socialization:
    - "Great spot to meet up w/ friends. Helps socialize my kids and meet new kids."
- Accessible nature:
    - "The park has allowed me to access nature and get outside without having to leave town. Much more accessible than most other 'natural' areas around Bozeman."

Limitations:

- See page 25 for overall survey limitations.

Celebrates naturalized views and character, with mountain views and ecological character cited as top aspects that attract people to the park according to 137 surveyed visitors.

Background: Preserving the site's cultural and ecological character in the site design, including views to the Story hills and Bridger mountain range, was an important goal that came from the community and design team.

Method: See page 23 for Overall Survey Method. In the survey, the research team used the following questions to gather information related to what draws people to SMCP or why they prefer SMCP over other Bozeman parks:

Type	Question	Response Options
Ranking	What attracts you to SMCP?	• Historical and cultural features • Learning garden / urban agriculture • River and pond access • Wildlife and habitat viewing • Something for everyone • Playground equipment • Ecological and naturalized character • Places to socialize or gather • Mountain and scenic views • Trails and connecting community trails
Short Answer (display logic setting with from	Why do you prefer SMCP over other	• Open-ended writing

"Do you prefer SMCP over other Bozeman parks?" – 'Yes')	Bozeman parks?

Calculations: See Appendix F for the Survey Results Report with additional data and visualizations. Mean rankings (Table 8) were calculated using Qualtrics by averaging the total values 0-10 assigned for each of the ten items by survey respondents (n=137). The table sorts the calculated means from 10-1, with a question scale of 1 = most important to 10 = least important.

137 Responses

Field	Min	Max	Mean	Standard Deviation
Historical and cultural features	1.0	10.0	8.0	2.1
Learning garden / urban agriculture	1.0	10.0	7.1	2.5
River and pond access	1.0	10.0	5.5	2.4
Wildlife and habitat viewing	1.0	10.0	5.4	2.9
Something for everyone	1.0	10.0	5.1	2.6
Playground equipment	1.0	10.0	4.9	3.7
Ecological and naturalized character	1.0	10.0	4.9	2.5
Places to socialize or gather	1.0	10.0	4.8	2.7
Mountain and scenic views	1.0	10.0	4.7	2.3
Trails and connecting community trails	1.0	9.0	3.6	2.3

Table 8: Mean weighted rankings for reasons why visitors are drawn to SMCP.

Summary results for why survey respondents prefer SMCP over other Bozeman Parks are shown in Table 13 and Figure 17: Theme by percent of occurrences for survey question, "Why do you prefer SMCP over other Bozeman parks?" Some of the most frequent coding themes by percent of occurrences also relate to celebrating the site's natural character (9.2%) and aesthetics (13.3%). Some representative survey answers for these top themes include:

- "The fact that so much of the space is slightly 'unmanaged' (I know it is in fact managed by the city) in that ecosystem isn't overly manicured
- "The mountain views are great in this park and the location is nice with proximity to the trail system to the M."
- "Beautiful setting, lots of space and many different things to do."
- "Big, beautiful, natural - more to do."
- "The natural ecosystems are preserved and trails connect well to other trails."
- "…more natural feel…"

Limitations:

- See page 25 for overall survey limitations.

Provides park access within a 10-minute walk (half-mile) for 317 housing units and 172 businesses. 80% of these residences do not have another playground within a half-mile, and 56% of the businesses do not have another park within a half-mile.

Background: The Trust for Public Land's program Parks for People has the explicit goal that all people will be within a 10-minute walk, approximately a half-mile, from a public park. The design team capitalized on SMCP's property location within the city and community growth patterns for its ability to serve as nearby nature for the northeast neighborhoods, which have continued to experience land use change and growth.

Method: Maps were created using GIS data and aerial photographs available through the City of Bozeman's online viewer. The maps included an aerial base with layers for roads and parcel boundaries. Utilizing the online tool for line distances, lines were overdrawn on the maps to locate the ~2,640' (a half-mile was considered equivalent of a 10-minute walk) distances from all park entrances (parking lot or trail) by only utilizing existing legal paths (roads, trails, etc.). The parcels that fell within these half-mile routes were highlighted for counting (Figure 13). Parcel quantities and types were determined using a combination of GIS, Google Maps, and ground survey. Drawing the routes by hand, versus running the 'Buffer' tool via a path shapefile, ensured accuracy of built conditions and actual routes that users can take on the ground to access the park. The same process was repeated for the two other parks within 1 mile of SMCP – East Gallatin Recreation Area and the Legends at Bridger Creek (Figure 13), to determine parcels within a 10-minute walk of more than one park and to determine which parcels were previously not within a 10-minute walk to a playground.

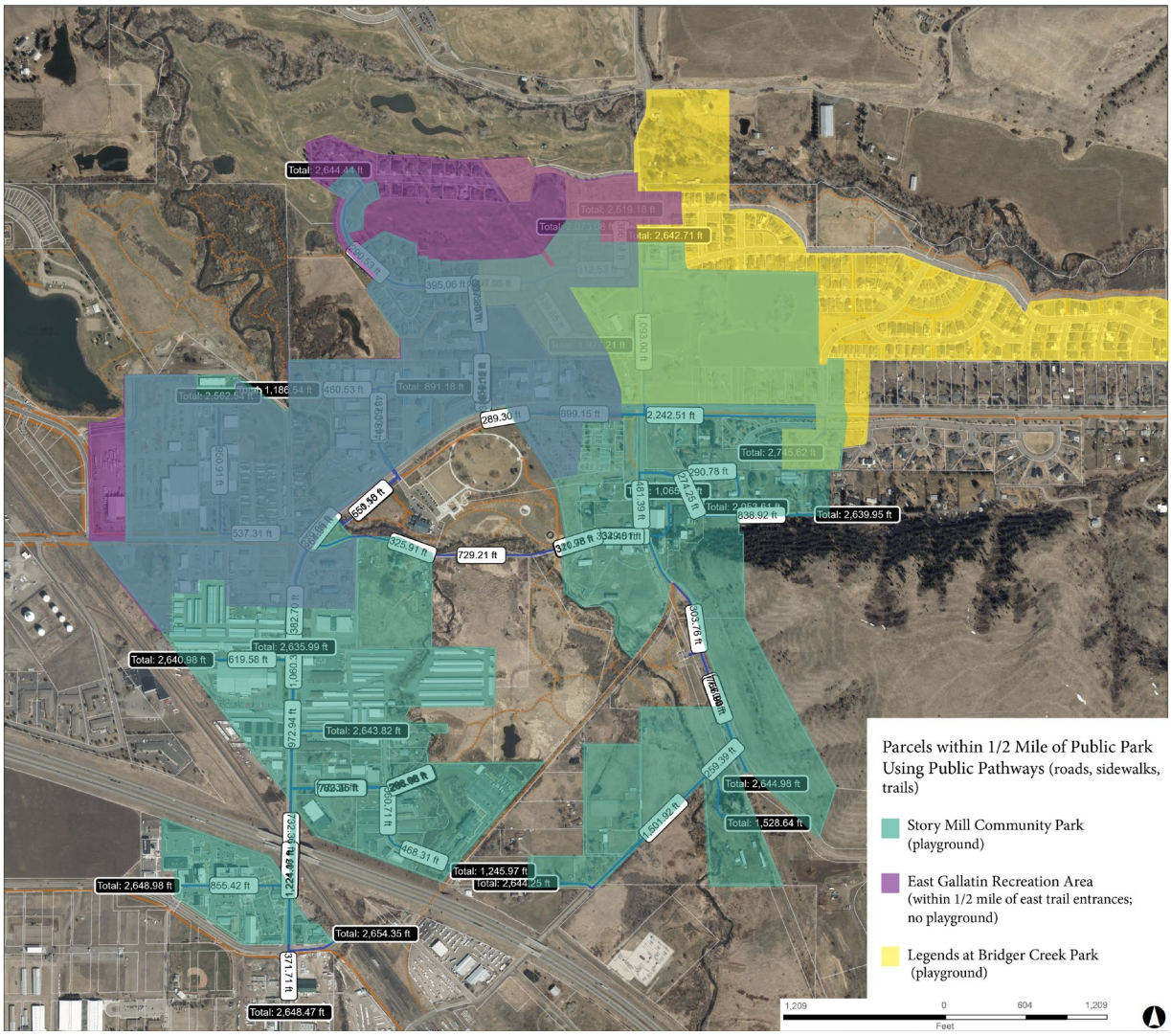


Figure 13: Park Half-Mile Walkability Assessment

Calculations: Table 9 shows the total parcels within a ½ mile from the three park assets.

	# of Parcels Within 1/2 Mile from Park Entrances	
Park	**Housing unit types:** *detached, attached, stacked flats*	**Business types:** *commercial retail or office, light industrial or manufacturing (storage, warehouse, workshops)*
SMCP	**317**	**172**
East Gallatin Recreation Area*	172	71
Legends at Bridger Creek*	63	5

** Only includes parcels that overlap SMCP walkability parcels*

Table 9: 1/2-Mile Walkable Parcels

The percent of SMCP-walkable housing units not walkable to another playground was calculated as follows:

- (# of housing units ½-mile from SMCP playground - # of the housing units ½-mile from the SMCP that are also within ½-mile from Legends playground) / # of housing units ½-mile from SMCP playground = (317-63)/317 x 100 = **80.1%**

The percent of SMCP-walkable businesses not walkable to another park was calculated as follows:

- ((# of businesses ½-mile from SMCP park) – (# of the businesses ½-mile from the SMCP that are also within ½-mile from EGRA and Legends)) / # of businesses ½-mile from SMCP park = (172-(71+5))/172 x 100 = **55.8%**

Supports multigenerational use, with 99% of 144 surveyed visitors agreeing that the park accommodates all ages, especially through diversity of programming, trail design, and seating. Over 4 summer days, each age category made up at least 10% of the 1,505 people observed recreating in the park, and all ages were observed engaging with the playground.

***Background*:** One of the consistent goals that emerged from the community design processes was that the park accommodate multiple generations. This goal was also listed in the Parks and Recreation Department's presentation to the City commission that won approval for the land acquisition and park construction. The design team wanted to investigate the efficacy of this goal and further understand what park characteristics contribute to whether or not the users perceive the park as accommodating all ages.

Method: The research team utilized three approaches: 1. Descriptive statistics of categorical survey data; 2. Content analysis of short-answer survey data; and, 3. Descriptive statistics of SOPARNA data. See page 23 for Overall Survey Method. In the survey, the research team used the following questions to gather information related to multiple generations.

Type	Question	Response Options
Multiple Choice	Does the park effectively accommodate people of all ages?	Yes/No
Short Answer (with display logic)	If previous answer 'yes:' What characteristics or features enable the park to accommodate people of all ages?	Open-ended writing

See page 21 for Overall SOPARNA Method.

Data collected for all target and subtarget zones was used to determine the distribution of ages and activities for people observed across the entire park. Data collected for the subtarget zones 6a-6g was used to assess the distribution and characteristics of park users at the playground.

Calculations: The percentage of respondents who thought SMCP effectively accommodates multiple ages was calculated as the following:

- (# 'Yes' responses for question / # Total responses for question) x 100
- = (142 / 144) x 100 = **98.6%**

The characteristics or features that survey respondents (n=90) described for how the park accommodates people of all ages are summarized by frequency and percent in Table 10. The themes highlighted in light green are those mentioned the most of the total 192 content occurrences (Figure 14).

Theme	Frequency	Grouping Frequency	% Theme
Diversity of programming/features - playground equipment	37	65	33.9%
Diversity of programming/features - trails/paths	19		
Diversity of programming/features - other	9		
Trails/paths - materials and grading	29	31	16.1%
Trail/paths - connectivity	2		
Seating (benches, flat grassy areas, picnic tables)	22	→	11.5%
Accessibility design (play features, parking, restrooms, pathways, wheelchairs, signage easy to understand)	15	21	10.9%
Park layout (feature proximity, many access points/entrances)	6		
Protection from the elements - shade, tree canopy	12	18	9.4%
Protention from the elements - covered structures	6		
Public health - cleanliness and facilities (restrooms, showers, drinking fountain)	9	→	4.7%
Gathering spaces (community events, picnics)	6	→	3.1%
Nature viewing	5	→	2.6%
Openness	4	→	2.1%
Learning garden	4	→	2.1%
Parking	3	→	1.6%
Natural water access	3	→	1.6%
Dog-free zones	1	→	0.5%
	Total occurrences: *192*		*100.0%*

Table 10: Coding theme data for survey question, "What characteristics or features enable the park to accommodate people of all ages?"

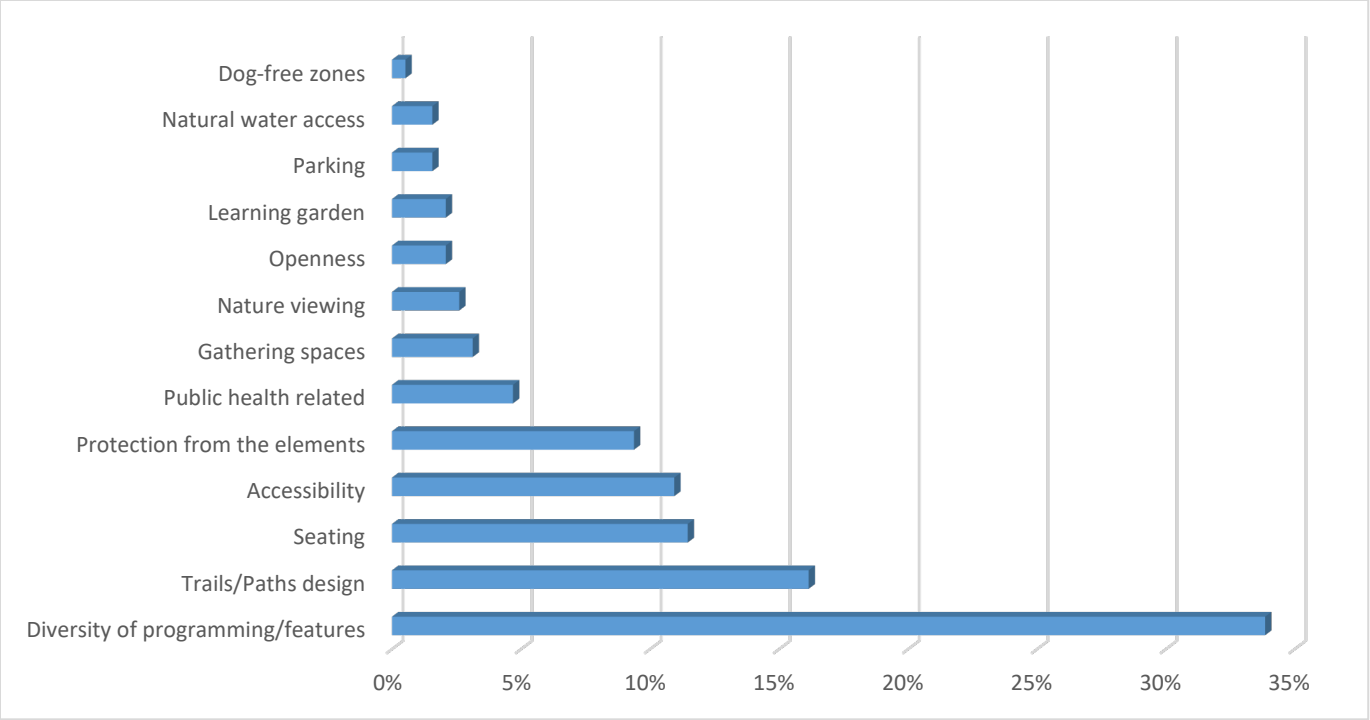


Figure 14: Coding themes by % occurrence for what characteristics or features enable the park to accommodate all ages.

Representative survey answers for the most frequent coding themes are below.

- Diversity of programming/features:
  - "There is something for everyone to enjoy and space for everyone of different ages to utilize the spaces how they'd like. The wide variety of elements (trails, pavilions, playground, learning garden, ping pong, picnic tables, river access)."
  - "Wide range of trails, seating, shade, and playground equipment for large range of ages. Easily interpretable signage."
  - "The play structure make me wish I was a kid - so fun and engaging! The trails are great for folks of all ages to meander or exercise. I have taken my elders to bird watch. It truly has something for everyone."
- Trails/paths – materials and grading:
  - "Wide paved walkways, level ground and trails, easy access to equipment and features."

The research team used the following calculations to determine the observed distribution of park users by age category. The age categories included infant/toddler, child, teen, adult, and senior. No weighted/multiplier was used because the distribution does not relate to total estimated users for an entire day or week.

- **Distribution of Observed Users at Park by Age**
  Percent Infant/Toddlers = $(U_{Toddler}/U) \times 100$
  Percent Child = $(U_{Child}/U) \times 100$
  Etc.

- Where,
  - U: sum of observed people in all target areas for all observation periods on all four observation days
  - $U_{Toddler}$: sum of observed people categorized as infant/toddler in all target areas for all observation periods on all scheduled observation days
  - U_{Child}: sum of observed people categorized as infant/toddler in all target areas for all observation periods on all scheduled observation days
  - Etc.

Age Category	All Observed Users	% Total
Toddler (0-3)	164	10.9%
Child (4-12)	471	31.3%
Teen (13-21)	181	12.0%
Adult (22-64)	537	35.7%
Senior (65+)	152	10.1%
Total Users Observed	*1505*	

Table 11: Observed Users at Park by Age Category

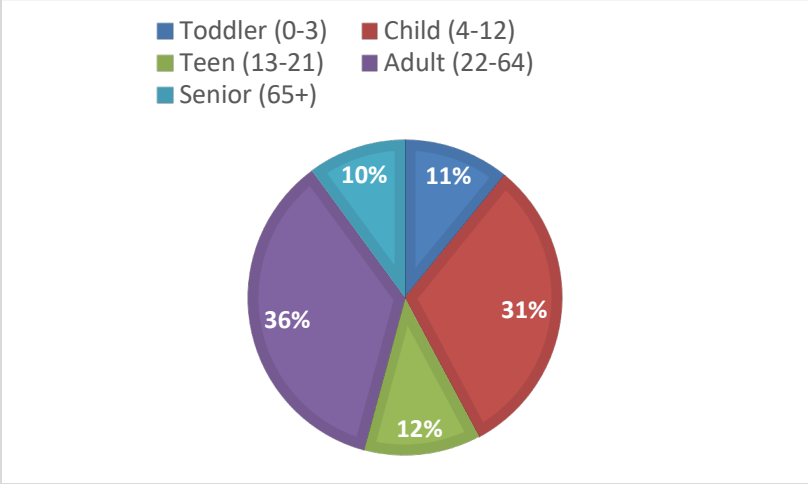


Figure 15: Observed Users at Park by Age Category

- **Distribution of Observed Users at Playground Subtarget Areas by Age**

  % Age Category = Total weekly users by age category / Total weekly users of all age categories at the playground
  - Where,
    - Total weekly users by age category = [5 weekdays *(16(Average of toddlers (or other age category) users on a weekday scanning period))] + [2 weekend days * (16(Average of toddlers (or other age category) on weekend day scanning period))]
    - Total weekly users of all age categories at the playground = [5 weekdays *(16(Average of all users on a weekday scanning period))] + [2 weekend days * (16(Average of all users on weekend day scanning period))]

Distribution of age categories and subtarget areas are shown below in Table 12.

	Playground Subtarget Areas								
	6a	**6b**	**6c**	**6d**	**6e**	**6f**	**6g**		
Average Users by Age Category Each Scanning Period	Hill slide, custom osprey climber, pavilion, benches	Log climber, nest swing	Custom fire tower structure, benches	Spinners small hill slide, hillside logs	Bison skull, nest swing, seat swings benches	Grain mill structure, toddler swings, bars	Tricycle track, grass mounds	***Total Weekly Users by Age***	***% Age***
Toddler (0-3)	4	1	6	4	3	5	3	*762*	*17%*
Child (4-12)	11	5	10	7	5	5	5	*1610*	*37%*
Teen (13-21)	4	0	1	1	1	2	1	*304*	*7%*
Adult (22-64)	11	2	12	5	5	6	6	*1460*	*33%*
Senior (65+)	2	1	2	0	1	1	1	*232*	*5%*
Total Weekly Users by Subtarget Area	*1094*	*314*	*866*	*522*	*422*	*608*	*542*	***4368***	
% at each Subtarget Area	*25%*	*7%*	*20%*	*12%*	*10%*	*14%*	*12%*		***100%***

Table 12: Observed users at playground subtarget areas by age.

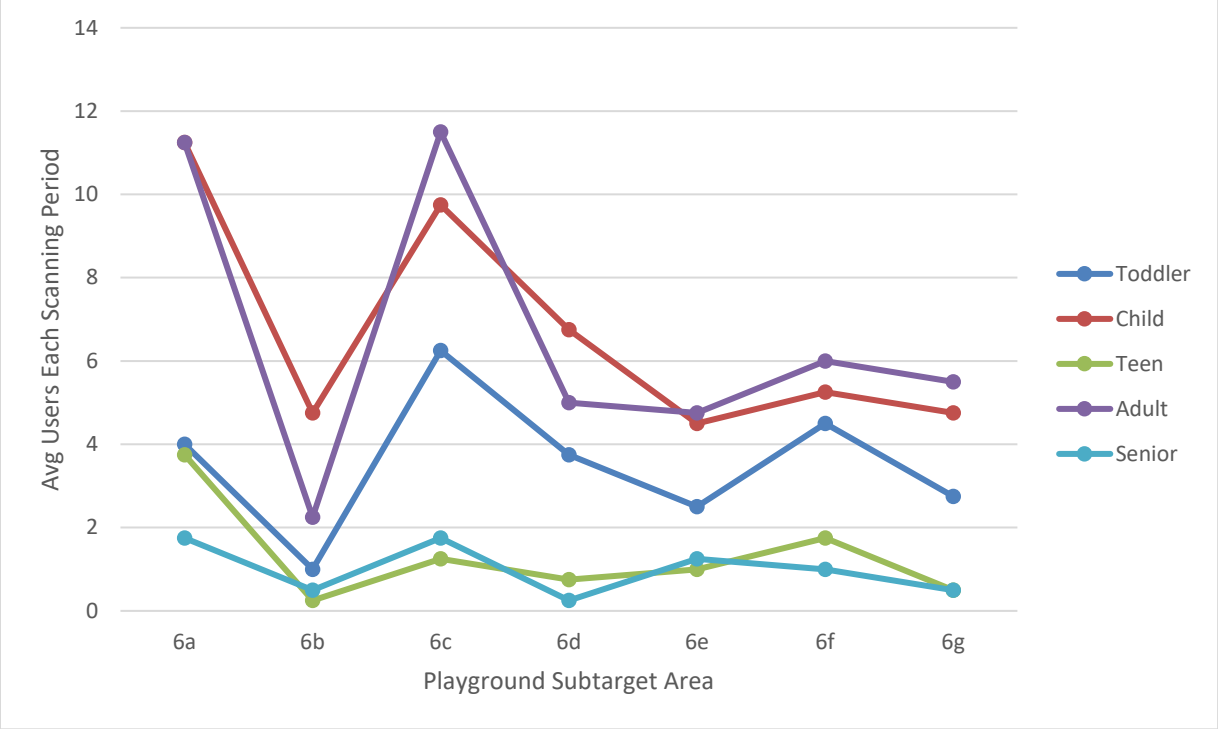


Figure 16: Observed users at playground by age.

Although the playground equipment was laid out as a continuum from younger to older moving southwest to northwest, the research team observed mixing of all age categories throughout the

subtarget areas. The most popular subtarget areas for all age groups were 6a and 6c, which featured custom locally inspired playground equipment as well as formal seating (Table 12). The linear space and design elements such as the arced sidewalk and rubber river path encourage movement throughout the space and users were observed frequently sampling different playground equipment, as well as moving to adjacent programming such as the climbing boulder, great lawn, and river access points. There was a consistent, dynamic interaction among toddlers, children, and teens at the playground equipment and adults and seniors at the adjacent pavilions, bench nooks, great lawn seating, and grassy hillside seating. This enhanced intergenerational socializing and play.

Limitations:

- See page 22 for overall SOPARNA limitations.
- See page 25 for overall survey limitations.

Serves as an exemplary park, with 66% of survey participants preferring Story Mill over other Bozeman parks for its trees, aesthetic qualities, and playground design. An adjacent residential development features the park in 40% of its website's marketing photos.

Background: An important goal for the City and project partners was to create a flagship park that would "define the City of Bozeman." The park, a residential neighborhood development (Bridger View) completed over 2022-2023, a 24-acre mixed-use development (Canyon Gate) approved by the City Commission in April 2023, and a growing number of new businesses along Bridger Drive have built up density and helped to solidify recognition of the Story Mill area as a defined neighborhood or district. Bridger View was made possible by the Trust for Public Land (TPL) setting aside a portion of the land they purchased to develop Story Mill Community Park to reconcile with the mobile home parks that defined this northeast portion of the site prior to 2012. Bridger View shares its western property line with the park and includes 31 market-rate homes and 31 homes ensured to be priced below market rates.

Method: The research team utilized three approaches: 1. Descriptive statistics of categorical survey data; 2. Content analysis of short-answer survey data; and, 3. Image analysis of advertising documents.

1 & 2. See page 23 for Overall Survey Method. In the survey, the research team used the following questions to gather information related to park preference and impacts.

Type	Question	Response Options
Multiple Choice	Do you prefer Story Mill Community Park over other City of Bozeman parks?	Yes/No/I have never been to Story Mill Community Park
Short Answer (with display logic)	If previous answer 'yes:' Why?	Open-ended writing
Short Answer	How has Story Mill Community Park benefited your life?	Open-ended writing

3. The research team used the Bridger View Neighborhood's website to analyze which images featured Story Mill Community Park. The website pages that included images are: 'The Neighborhood,' 'Community Amenities,' 'About Us,' 'Gallery,' and 'News.' Three of the images are hand illustrated perspectives of the schematic design, 30 are aerial and on-the-ground photographs, and 1 is a hand illustrated plan image. The still/preview image shown for posted videos were not included in the analysis.

Calculations: The percentage of respondents who preferred Story Mill Community Park over other Bozeman Parks was calculated as the following:

- % that preferred Story Mill Community Park = (# 'Yes' responses for question / # Total responses for question) x 100
- = (97 / 148) x 100 = **65.5%**

For the content analysis of the open-ended question, the themes and their frequencies that emerged from coding are shown in Table 13 and Figure 17. Appendix F includes all responses for the related question.

Theme	Frequency	Grouping Frequency	% Theme
Trees - canopy, shade	28	→	14.4%
Aesthetic qualities - views	14	26	13.3%
Aesthetic qualities - uniqueness, character	8		
Aesthetic qualities - less manicured, more naturalized	4		
Playground design (artful, unique, rubber path)	25	→	12.8%
Nature characteristics - natural areas	10	18	9.2%
Nature characteristics - natural water access	5		
Nature characteristics - wildlife viewing	3		
Connectivity - close to home/easily accessible	9	18	9.2%
Connectivity - community location (less urban, still central)	6		
Connectivity - linking trails	3		
Social characteristics - social spaces and programming (gathering capability, local programming)	4	15	7.7%
Social characteristics - less crowded	3		
Social characteristics - like to see kids having fun	3		
Social characteristics - cleanliness (not trashed, respected by public)	3		
Social characteristics - feels safe	1		
Social characteristics - intergenerational interaction	1		
Program diversity	14	→	7.2%
Size	13	→	6.7%
Trail design (ease of walking, grading)	12	→	6.2%

Layout (openness, design, placement of programming)	8	→	4.1%
Dog restricted areas/fewer dogs	5	→	2.6%
Public health facilities (bathrooms, water fountains, trash)	4	→	2.1%
Dog park/ designated areas	3	→	1.5%
Furnishings - seating and pavilions	3	→	1.5%
Parking	2	→	1.0%
Learning garden	1	→	0.5%
Total occurrences:	*195*		*100.0%*

Table 13: Coding theme data for survey question, "Why do you prefer SMCP over other Bozeman parks?"

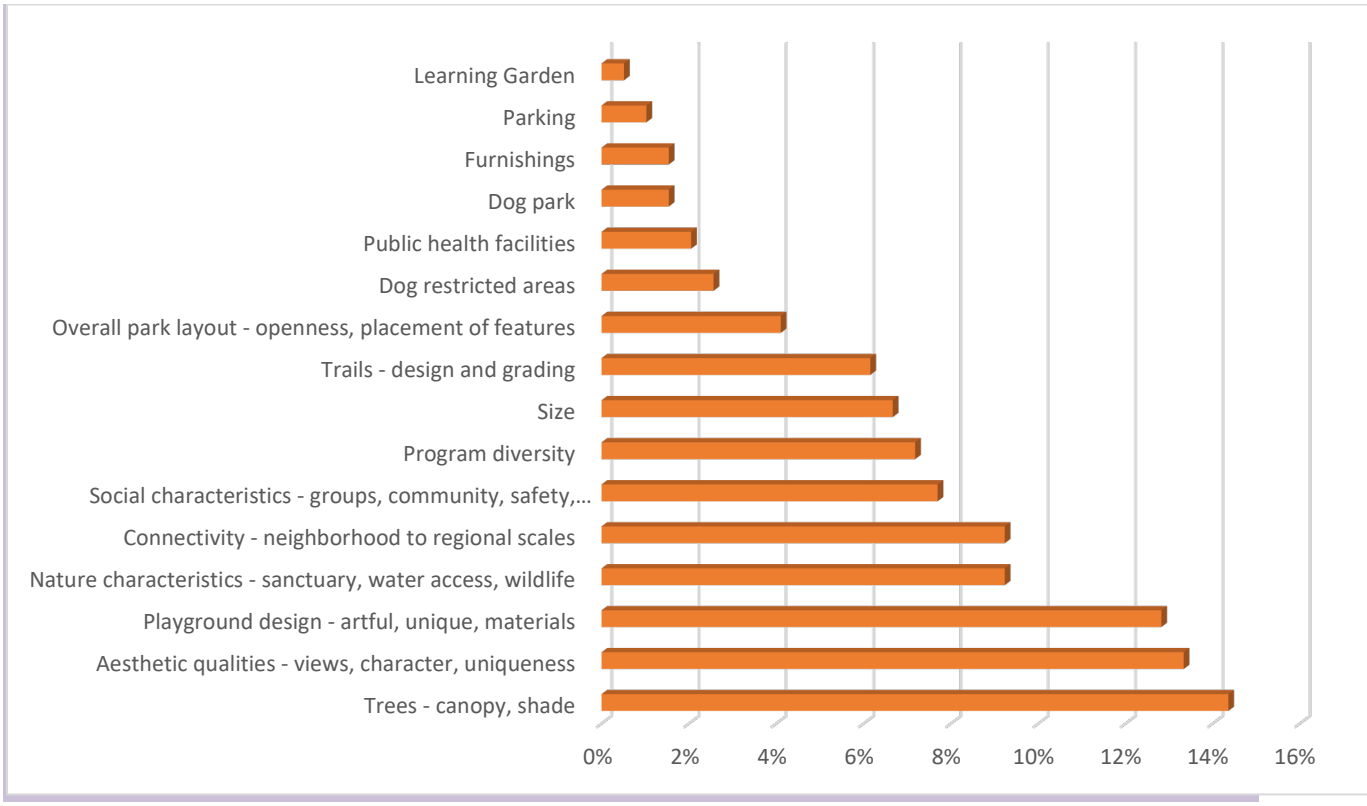


Figure 17: Theme by percent of occurrences for survey question, "Why do you prefer SMCP over other Bozeman parks?"

Representative survey answers for the most frequent themes are below.

- Trees – canopy, shade:
  - "It has the widest variety of options/activities/things to do. Also each part of the park feels different, almost like multiple parks in one section. The tree canopy is also something that really draws me into the park, as I really don't enjoy spending time in places without a nice tree canopy."
- Aesthetic qualities:
  - "It's planned so well, has great views and celebrates our community in its design and function."

- Playground design:
    - “It has plenty of shade and a unique playground that incorporates historical and natural elements. I also appreciate the long, wide, paved path for little kids to safely bike.”

To determine the percentage of website images that featured Story Mill Community Park, first the images on the Bridger View website were categorized for ‘park’ or ‘no park’ (Figure 18). If any portion of the park was showing in the foreground to background, the image was categorized as ‘park.’

Figure 18: Categorization of Bridger View Neighborhood website images

- = (# 'park' images/ # total images) x 100 = % of Images Featuring Story Mill Community Park
- = (12 / 30) x 100 = **40.0%**

Sources:
"The Neighborhood, Community Amenities," "About Us," "Gallery," and "News." *Bridger View Neighborhood* website. January 10, 2023. https://bridgerview.org/gallery/. Accessed on May 9, 2023.

Limitations:
- See page 25 for overall survey limitations.
- Image analysis only analyzed photos shown on the neighborhood's websites at the time of access. These photos and photos used in marketing could vary.

Economic Benefits

Helped catalyze 65 new properties within a half-mile of the park which contributed over $580,000 in city and county tax revenue in 2022, almost three times the tax revenue from these same parcels before the park was built in 2018.

Method: See page 35 for details on how parcels within a half-mile of the park were identified. Development history was assessed using City of Bozeman aerial photos on the GIS Online viewer from 2012, 2015, and 2021 to determine when structures were added. Parcels that had buildings added from 2015 and 2022 were included in the analysis, since by 2012 the parkland was acquired and by 2015 the restoration activities had begun. Once properties were identified with new structures since the park was planned, parcel and tax data was looked up at tax records available online through the State of Montana, Gallatin County. The Gallatin County property tax history was referred to for property tax values for the two years that were compared, 2018 and 2022. These two years were chosen because, a) this was the year that the entire park design was constructed, and b) the County tax data had the most complete data on record for all the parcels.

Calculations: 14 summarizes the inventoried parcel data from the City of Bozeman online GIS data and Gallatin County tax records (city + county).

Property Type	# Properties	2018 Property Tax ($)	2022 Property Tax ($)
Residential	44	47,124	147,526
Commercial/Industrial	16	60,777	129,554
Mixed Use	5	102,899	303,073
Totals	***65***	***$210,800***	***$580,153***

Table 14: Parcel and property tax data for properties developed 2015-2022

- Percent increase in tax revenue between 2018 and 2022: ($580,153-210,800)/$210,800 x 100 = **175.2%**

Sources:
GIS, City of Bozeman, Montana online viewer. Accessed in June-July, 2023.

Gallatin County, State of Montana, Online tax records for parcels, tax history. Accessed on July 27, 2023 at https://itax.gallatin.mt.gov/list.aspx

Limitations:

- Increase in tax revenue/rates is due to many factors like Bozeman's growth, property improvements, and infrastructure changes, rather than direct causality of the park itself.
- Benefit does not quantify or analyze tax revenue of all parcels within ½ mile of the park, but only newly developed parcels since the park was planned.

Accounts for 22% of the City's total annual rental income from Bozeman's parks. Just 2 years after opening it was the highest earning Bozeman park for outdoor facilities rental income.

Method: Existing data shared by the City of Bozeman Parks and Recreational department was used to analyze earned income for parks in 2022, when the park was in full operation. The income was calculated using only rental fees for pavilions and outdoor areas.

Calculations:

Park	**2022 Rental Income (USD)**
Beall Park	1,356.00
Bogert Park	5,226.10
Bozeman Ponds	9,266.74
Burke Park	80.70
Christie Fields	1,719.29
Glen Lake Rotary Park	6,759.37
Kirk Park	990.00
Lindley Park	10,832.59
North Grand Fields	661.00
Norton Ranch Park	35.00
Oak Springs	315.00
Sandan Park	25.00
Softball Complex	2,335.71
Southside Park	40.00
Story Mill Community Park	**11,598.05**
Sunset Hills/Highland Glen Trails	591.80
The Lakes at Valley West	775.00
Westlake Park	395.00
West Babcock Fields	385.00
Westlake Park	525.00

Percent of facilities fees from SMCP:
= SMCP total earned fees / All Bozeman Parks total earned fees
= ($11,598.05/$53,912.35) x 100

= **21.5%**

Sources:
Parks and Recreation Department, City of Bozeman. Data shared by email on June 26, 2023.

Limitations:

- Relies on external data provided by City.

Spurred development of 31 below-market rate homes within a 5-minute walk to the park, increasing the total number of single family below-market-rate homes available in 2022-2023 by 100%. Bozeman's second community housing trust was established as part of the development.

Background: "From the very beginning of conceiving SMCP, an adjacent housing development was always part of the vision. We knew that we wanted it to be affordable, and help address some of Bozeman's housing needs. We also wanted it to share the values of the park; that it was an important enhancement to the community; that it was quality built, that was enduring." (Maddy Pope, Trust for Public Land Project Manager) 8 acres of the original property purchased by TPL to develop the park was set aside for a housing project that would help address affordable housing challenges in Bozeman (Tsairis, 2011).

The median single family home price in Bozeman is close to $800,000 in 2023. Bridger View Neighborhood's goal was to provide housing that options for the "missing middle" - people earning more than allowed to utilize state or federally subsidized housing programs and properties, but who still can't afford market-rate homes in Bozeman's current market. The Headwaters Community Housing Trust was established to sell and manage these below-market-rate properties. Through philanthropic and other sources of funding, the housing trust remains the owner of the land, while the home's resident owns the structure and can transfer this equity with them if they move.

In addition to Bridger View Neighborhood, Canyon Gate – a 24-acre mixed-use development currently under construction and within a half-mile of SMCP – is required to build 60 affordable housing units priced at or below households making less than 120% of the median income (Shelly, 2023).

Another project currently under construction on East Griffin Drive and within a half-mile of the park entrance are two buildings for the Human Resources Development Council (HRDC), a community action agency. One building will house outreach and educational programming including their food and nutrition programs – the food bank and pay-what-you-can restaurant – which are partners in SMCP's Learning Garden and Food Forest. The second building will be a year-round housing shelter, with designated spaces for families as well as individuals.

Headwaters Community Housing Trust is Bozeman's first community housing trust. Southwest Montana Housing Trust, a program of HRDC, was established in 1995 and as of 2023, has approximately 50 homes

in Bozeman.

Method: The research team measured both walking distance and time it takes to reach the park boundary from one location within the adjacent Bridger View Neighborhood. The walking path was chosen due to it being the farthest distance away from the current nearest park entry point (Figure 19). This was done to show the maximum distance a person living within the neighborhood would have to walk to reach the park. Only accessible walkways were used to reach the park entrance. Location and paths were chosen to replicate how a resident of the neighborhood would likely reach the park. Walking distance was timed and measured using a walking wheel tape-measure.

Figure 19: Furthest walking route from Bridger View Neighborhood to reach park.

Calculations:

- Walking time: 5.08 minutes; rounded to 5 minutes for reporting.
- Distance using measuring wheel: 1,423.3 ft x (1 mile / 5,280 ft) = 0.27 miles

Sources:

"Headwaters Community Housing Trust." *Bridger View Neighborhood* website. Accessed on May 6, 2023 at https://bridgerview.org/about-us/.

HRDC website. Accessed on July 30, 2023 at https://thehrdc.org/community-commons/

Peterson, Landon and Libby Starling. September 28, 2022. “What works in housing affordability: Creating middle-income housing with the Bridger View neighborhood.” *Federal Reserve Bank of Minneapolis*. Accessed on July 20, 2023 at https://www.minneapolisfed.org/article/2022/what-works-in-housing-affordability-creating-middle-income-housing-with-the-bridger-view-neighborhood

Shelly, Nora. April 4, 2023. “Bozeman board gives thumbs up to Canyon Gate development.” *Bozeman Chronicle.*

Tsairis, S. “A Never-Ending Story: Grappling with Growth in Bozeman.” *Trust for Public Land.* November 8, 2021. Accessed on June 27, 2023 at www.tpl.org/stories/story-mill-park-bozeman-montana

Weitz, Olivia. January 26, 2023. “Bozeman’s Bridger View neighborhood aims to be an example for sustainability and affordability.” *Yellowstone Public Radio*. Accessed on July 31, 2023 at https://www.ypradio.org/community/2023-01-26/bozemans-bridger-view-neighborhood-aims-to-be-an-example-for-sustainability-and-affordability

Limitations:

- The walking path was determined based on the existing form of the park, which value engineered out a parking lot and an additional access point into the park adjacent to Bridger View. If the parking lot is added at some point, this will make for an even closer park access point, cutting the time in almost half to reach the park from the furthest distance within the neighborhood.
- There is evidence of a desire-line path that current Bridger View residents have made to cut through the naturalized planting strip along the northeast edge of the park so that they can reach the great lawn and playground areas quicker. So, it is clear that not all residents follow the path that the research team identified to access the park. This desire line happens to be in the location where the parking lot (if eventually built) would add a new sidewalk and entry into the park.

Features

More than doubled on-site wetlands from 6.6 to 13.9 acres and restored over 1 linear mile of riparian zone.

Method: The research team used wetland and river restoration construction documents and maps to identify the square feet of existing and created wetland areas (Figure 20). Some of these site measurements were already reported by consultants and some were confirmed or remeasured using scaled maps in AutoCAD. Similarly, river restoration construction documents were referenced for the locations of restoration activities (i.e. riprap removed, regrading, lifts, erosion control strategies, planting using woody plant stock and seed), and the linear distance was measured in the City of

Bozeman GIS online viewer to calculate extent (Figure 21).

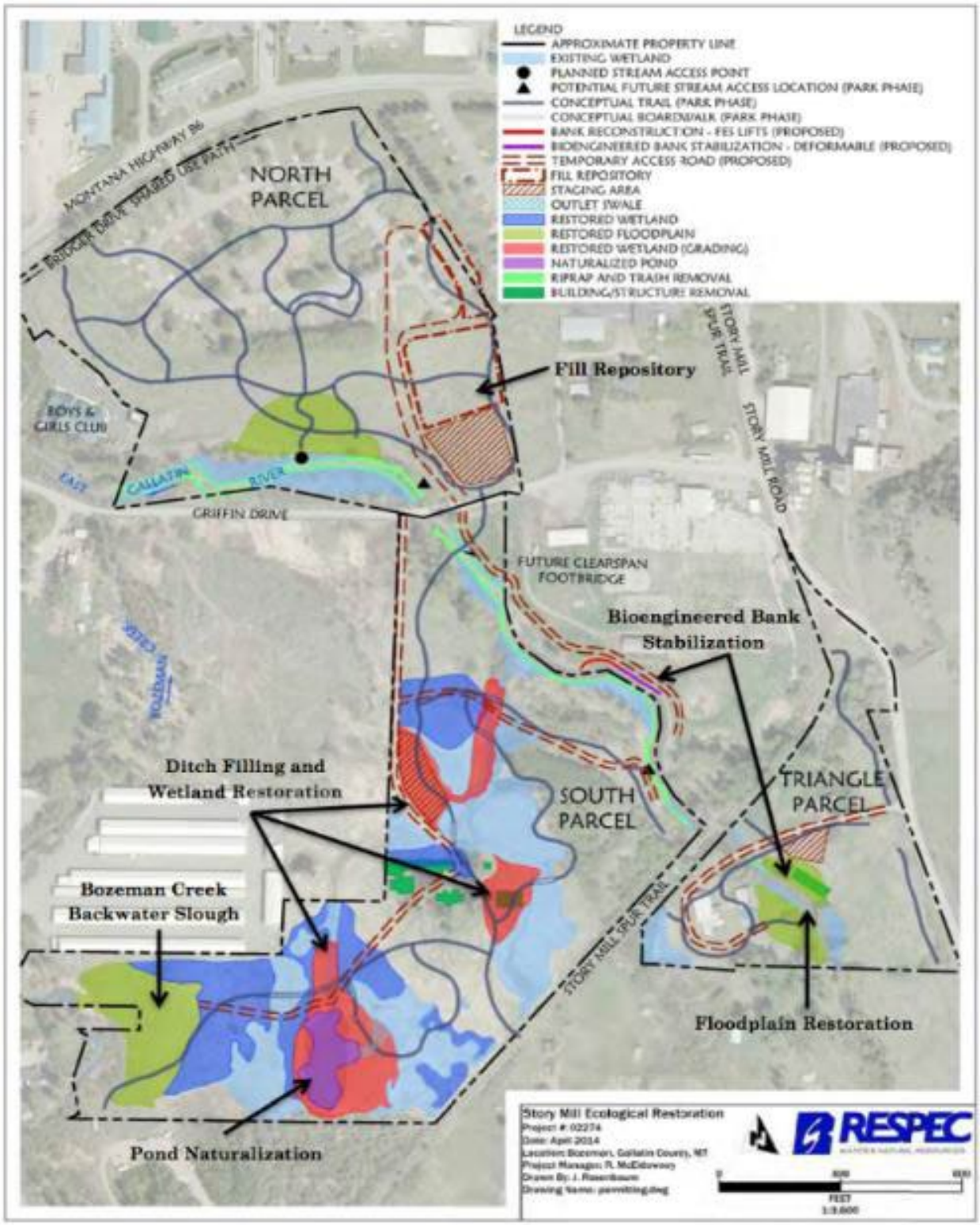


Figure 20: River, wetland, and floodplain restoration work map (RESPEC, 2014)

Figure 21: River Restoration Extent Measurement

Calculations: The area for existing wetlands (6.6 ac) and restored wetlands (7.3 ac) were provided by the water resource consultant and landscape architect.

- Total wetlands onsite = 6.6 + 7.3 ac = 13.9 ac

The linear distance of riparian restoration is 2,782 ft. This was doubled to represent both sides of the river.

- 2,782 ft x 2 = 5,564 ft
- 5,564 ft x (1 mile / 5,280 ft) = 1.05 mile of shoreline

Sources:

"Story Mill Ecological Restoration, Bozeman, Gallatin County, Montana 100% Construction Documents." Prepared by Respec Water & Natural Resources for The Trust for Public Land. May, 2014.

"Story Mill Ecological Restoration Map." Respec Water & Natural Resources. April, 2014.

"Story Mill Community Park - Fact Sheet." *Design Workshop*. September 20, 2016.

City of Bozeman Geographic Information System Online Viewer. Accessed on May-July 2023 at https://www.bozeman.net/departments/strategic-services/gis-mapping

Limitations:

- Calculations rely on past data when restoration activities were done in 2014-2015, rather than current assessment of conditions.

Appendix A: eBird Species List

Species by common name, downloaded from eBird 5/22/2023

Snow Goose
Cackling Goose
Canada Goose
Trumpeter Swan
Wood Duck
Blue-winged Teal
Cinnamon Teal
Northern Shoveler
Gadwall
American Wigeon
Mallard
Green-winged Teal
Redhead
Aythya sp.
Bufflehead
Common Goldeneye
Hooded Merganser
duck sp.
Wild Turkey
Ruffed Grouse
Dusky Grouse
grouse sp.
Gray Partridge
Ring-necked Pheasant
Pied-billed Grebe
Eared Grebe
Rock Pigeon
Eurasian Collared-Dove
Mourning Dove
Common Nighthawk
Calliope Hummingbird
Selasphorus sp.
hummingbird sp.
Virginia Rail
Sora
American Coot
Sandhill Crane
Killdeer
Marbled Godwit
Least Sandpiper
peep sp.
Wilson's Snipe
Wilson's Phalarope
phalarope sp.
Spotted Sandpiper
Solitary Sandpiper
Willet
gull sp.
Forster's Tern
American White Pelican
Great Blue Heron
White-faced Ibis
Turkey Vulture
Osprey
Golden Eagle
Northern Harrier
Sharp-shinned Hawk
Cooper's Hawk
Sharp-shinned/Cooper's Hawk
Northern Goshawk
Accipiter sp.
Bald Eagle
Swainson's Hawk
Red-tailed Hawk
Rough-legged Hawk
Buteo sp.
eagle sp.
Great Horned Owl
Northern Saw-whet Owl
Belted Kingfisher
kingfisher sp.
Williamson's Sapsucker
Red-naped Sapsucker
Downy Woodpecker
Hairy Woodpecker
Downy/Hairy Woodpecker
Pileated Woodpecker
Northern Flicker
woodpecker sp.
American Kestrel
Merlin
Prairie Falcon
falcon sp.
Olive-sided Flycatcher
Western Wood-Pewee
Willow Flycatcher
Least Flycatcher
Dusky Flycatcher
Hammond's/Dusky Flycatcher
Cordilleran Flycatcher
Empidonax sp.
Western Kingbird
Eastern Kingbird
Cassin's Vireo
Warbling Vireo
Red-eyed Vireo
Northern Shrike
Steller's Jay
Blue Jay
Black-billed Magpie
Clark's Nutcracker
American Crow
Common Raven
Black-capped Chickadee
Mountain Chickadee
chickadee sp.
Northern Rough-winged Swallow
Tree Swallow

Violet-green Swallow
Bank Swallow
Barn Swallow
Cliff Swallow
swallow sp.
Ruby-crowned Kinglet
Golden-crowned Kinglet
Red-breasted Nuthatch
White-breasted Nuthatch
Brown Creeper
House Wren
Marsh Wren
Wren sp.
American Dipper
European Starling
Gray Catbird
Mountain Bluebird
Townsend's Solitaire
Varied Thrush
Veery
Swainson's Thrush
Hermit Thrush
Catharus sp.
American Robin
Bohemian Waxwing
Cedar Waxwing
Bohemian/Cedar Waxwing
House Sparrow
Evening Grosbeak
Pine Grosbeak
House Finch
Cassin's Finch
Common Redpoll
Red Crossbill
Pine Siskin
American Goldfinch
Chipping Sparrow
Clay-colored Sparrow
Brewer's Sparrow
American Tree Sparrow
Fox Sparrow
Dark-eyed Junco
White-crowned Sparrow
Harris's Sparrow
White-throated Sparrow
Vesper Sparrow
Savannah Sparrow
Song Sparrow
Lincoln's Sparrow
Green-tailed Towhee
Spotted Towhee
New world sparrow sp.
Yellow-breasted Chat
Yellow-headed Blackbird
Western Meadowlark
Bullock's Oriole
Red-winged Blackbird
Brown-headed Cowbird
Brewer's Blackbird
Common Grackle
Blackbird sp.
Northern Waterthrush
Orange-crowned Warbler
MacGillivray's Warbler
Common Yellowthroat
American Redstart
Yellow Warbler
Yellow-rumped Warbler
Townsend's Warbler
Wilson's Warbler
Western Tanager
Black-headed Grosbeak
Lazuli Bunting
Passerine sp.

Benefits and Costs Summary of Individual Trees

Location: Bozeman, Gallatin, Montana, United States of America
Project: SMCP Carbon Sequestration, Series: Active area trees, Year: 2023
Generated: 8/1/2023

						Annual benefits									
Tree ID	Species Name	DBH (in)	Replacement Value ($)	Carbon Storage (lb)	Carbon Storage ($)	Gross Carbon Sequestration (lb/yr)	Gross Carbon Sequestration ($/yr)	Avoided Runoff (gal/yr)	Avoided Runoff ($/yr)	Carbon Avoided (lb/yr)	Carbon Avoided ($/yr)	Pollution Removal (oz/yr)	Pollution Removal ($/yr)	Energy Savings ($/yr)	Total Annual Benefits ($/yr)
1	White willow	16.2	2,442.10	717.1	61.15	16.0	1.36	152.1	1.36	N/A	N/A	14.4	0.96	N/A	3.68
2	White willow	16.2	2,442.10	717.1	61.15	16.0	1.36	152.1	1.36	N/A	N/A	14.4	0.96	N/A	3.68
3	White willow	16.2	2,442.10	717.1	61.15	16.0	1.36	152.1	1.36	N/A	N/A	14.4	0.96	N/A	3.68
4	White willow	10.8	1,258.56	262.1	22.35	8.8	0.75	75.4	0.67	N/A	N/A	7.1	0.48	N/A	1.90
5	White willow	24.3	5,105.07	1,962.2	167.33	29.0	2.48	175.6	1.57	N/A	N/A	16.6	1.11	N/A	5.15
6	White willow	21.6	4,099.06	1,464.7	124.90	24.4	2.08	182.4	1.63	N/A	N/A	17.3	1.15	N/A	4.86
7	White willow	21.6	4,099.06	1,464.7	124.90	24.4	2.08	182.4	1.63	N/A	N/A	17.3	1.15	N/A	4.86
8	White willow	32.4	8,648.95	4,010.4	341.99	44.6	3.80	270.2	2.41	N/A	N/A	25.6	1.70	N/A	7.92
9	White willow	32.4	8,648.95	4,010.4	341.99	44.6	3.80	270.2	2.41	N/A	N/A	25.6	1.70	N/A	7.92
10	White willow	32.4	8,648.95	4,010.4	341.99	44.6	3.80	270.2	2.41	N/A	N/A	25.6	1.70	N/A	7.92
11	White willow	16.2	2,442.10	717.1	61.15	16.0	1.36	152.1	1.36	N/A	N/A	14.4	0.96	N/A	3.68
12	White willow	48.6	15,708.92	10,976.3	936.01	24.3	2.07	439.0	3.92	N/A	N/A	41.6	2.77	N/A	8.77
13	White willow	24.3	5,105.07	1,962.2	167.33	29.0	2.48	175.6	1.57	N/A	N/A	16.6	1.11	N/A	5.15
14	White willow	24.3	5,105.07	1,962.2	167.33	29.0	2.48	175.6	1.57	N/A	N/A	16.6	1.11	N/A	5.15
15	White willow	24.3	5,105.07	1,962.2	167.33	29.0	2.48	175.6	1.57	N/A	N/A	16.6	1.11	N/A	5.15
16	White willow	27.0	6,229.43	2,549.0	217.37	34.0	2.90	206.0	1.84	N/A	N/A	19.5	1.30	N/A	6.04
17	White willow	27.0	6,229.43	2,549.0	217.37	34.0	2.90	206.0	1.84	N/A	N/A	19.5	1.30	N/A	6.04
18	White willow	27.0	6,229.43	2,549.0	217.37	34.0	2.90	206.0	1.84	N/A	N/A	19.5	1.30	N/A	6.04
19	White willow	27.0	6,229.43	2,549.0	217.37	34.0	2.90	206.0	1.84	N/A	N/A	19.5	1.30	N/A	6.04
20	White willow	27.0	6,229.43	2,549.0	217.37	34.0	2.90	206.0	1.84	N/A	N/A	19.5	1.30	N/A	6.04
21	White willow	21.6	4,099.06	1,464.7	124.90	24.4	2.08	182.4	1.63	N/A	N/A	17.3	1.15	N/A	4.86
22	White willow	18.9	3,211.41	1,051.5	89.66	20.0	1.71	176.4	1.58	N/A	N/A	16.7	1.11	N/A	4.40
23	White willow	18.9	3,211.41	1,051.5	89.66	20.0	1.71	176.4	1.58	N/A	N/A	16.7	1.11	N/A	4.40
24	White willow	18.9	3,211.41	1,051.5	89.66	20.0	1.71	176.4	1.58	N/A	N/A	16.7	1.11	N/A	4.40
25	White willow	18.9	3,211.41	1,051.5	89.66	20.0	1.71	176.4	1.58	N/A	N/A	16.7	1.11	N/A	4.40
26	White willow	16.2	2,442.10	717.1	61.15	16.0	1.36	152.1	1.36	N/A	N/A	14.4	0.96	N/A	3.68
27	White willow	16.2	2,442.10	717.1	61.15	16.0	1.36	152.1	1.36	N/A	N/A	14.4	0.96	N/A	3.68
28	White willow	10.8	1,258.56	262.1	22.35	8.8	0.75	75.4	0.67	N/A	N/A	7.1	0.48	N/A	1.90
29	White willow	10.8	1,258.56	262.1	22.35	8.8	0.75	75.4	0.67	N/A	N/A	7.1	0.48	N/A	1.90
30	White willow	16.2	2,442.10	717.1	61.15	16.0	1.36	152.1	1.36	N/A	N/A	14.4	0.96	N/A	3.68
31	White willow	8.1	844.32	128.4	10.95	5.7	0.49	41.3	0.37	N/A	N/A	3.9	0.26	N/A	1.12
32	White willow	24.3	5,105.07	1,962.2	167.33	29.0	2.48	175.6	1.57	N/A	N/A	16.6	1.11	N/A	5.15

Benefits and Costs Summary of Individual Trees

Location: Bozeman, Gallatin, Montana, United States of America
Project: SMCP Carbon Sequestration, Series: Active area trees, Year: 2023
Generated: 8/1/2023

						Annual benefits									
Tree ID	Species Name	DBH (in)	Replacement Value ($)	Carbon Storage (lb)	Carbon Storage ($)	Gross Carbon Sequestration (lb/yr)	Gross Carbon Sequestration ($/yr)	Avoided Runoff (gal/yr)	Avoided Runoff ($/yr)	Carbon Avoided (lb/yr)	Carbon Avoided ($/yr)	Pollution Removal (oz/yr)	Pollution Removal ($/yr)	Energy Savings ($/yr)	Total Annual Benefits ($/yr)
33	White willow	24.3	5,105.07	1,962.2	167.33	29.0	2.48	175.6	1.57	N/A	N/A	16.6	1.11	N/A	5.15
34	White willow	24.3	5,105.07	1,962.2	167.33	29.0	2.48	175.6	1.57	N/A	N/A	16.6	1.11	N/A	5.15
35	White willow	24.3	5,105.07	1,962.2	167.33	29.0	2.48	175.6	1.57	N/A	N/A	16.6	1.11	N/A	5.15
36	White willow	24.3	5,105.07	1,962.2	167.33	29.0	2.48	175.6	1.57	N/A	N/A	16.6	1.11	N/A	5.15
37	White willow	24.3	5,105.07	1,962.2	167.33	29.0	2.48	175.6	1.57	N/A	N/A	16.6	1.11	N/A	5.15
38	White willow	32.4	8,648.95	4,010.4	341.99	44.6	3.80	270.2	2.41	N/A	N/A	25.6	1.70	N/A	7.92
39	White willow	32.4	8,648.95	4,010.4	341.99	44.6	3.80	270.2	2.41	N/A	N/A	25.6	1.70	N/A	7.92
40	White willow	32.4	8,648.95	4,010.4	341.99	44.6	3.80	270.2	2.41	N/A	N/A	25.6	1.70	N/A	7.92
41	White willow	32.4	8,648.95	4,010.4	341.99	44.6	3.80	270.2	2.41	N/A	N/A	25.6	1.70	N/A	7.92
42	White willow	32.4	8,648.95	4,010.4	341.99	44.6	3.80	270.2	2.41	N/A	N/A	25.6	1.70	N/A	7.92
43	White willow	32.4	8,648.95	4,010.4	341.99	44.6	3.80	270.2	2.41	N/A	N/A	25.6	1.70	N/A	7.92
44	White willow	10.8	1,258.56	262.1	22.35	8.8	0.75	75.4	0.67	N/A	N/A	7.1	0.48	N/A	1.90
45	White willow	10.8	1,258.56	262.1	22.35	8.8	0.75	75.4	0.67	N/A	N/A	7.1	0.48	N/A	1.90
46	White willow	18.9	3,211.41	1,051.5	89.66	20.0	1.71	176.4	1.58	N/A	N/A	16.7	1.11	N/A	4.40
47	White willow	16.2	2,442.10	717.1	61.15	16.0	1.36	152.1	1.36	N/A	N/A	14.4	0.96	N/A	3.68
48	White willow	18.9	3,211.41	1,051.5	89.66	20.0	1.71	176.4	1.58	N/A	N/A	16.7	1.11	N/A	4.40
49	White willow	40.5	12,406.10	6,995.5	596.55	48.5	4.14	374.0	3.34	N/A	N/A	35.4	2.36	N/A	9.84
50	White willow	40.5	12,406.10	6,995.5	596.55	48.5	4.14	374.0	3.34	N/A	N/A	35.4	2.36	N/A	9.84
51	White willow	40.5	12,406.10	6,995.5	596.55	48.5	4.14	374.0	3.34	N/A	N/A	35.4	2.36	N/A	9.84
52	Balsam poplar	16.0	2,611.21	761.7	64.95	16.8	1.43	282.7	2.53	N/A	N/A	26.8	1.78	N/A	5.74
53	Balsam poplar	16.5	2,758.11	820.9	70.01	17.6	1.50	305.0	2.73	N/A	N/A	28.9	1.92	N/A	6.15
54	Balsam poplar	8.1	890.09	145.2	12.38	6.4	0.54	45.2	0.40	N/A	N/A	4.3	0.29	N/A	1.23
55	Balsam poplar Balsamifera	8.1	890.09	164.8	14.06	5.6	0.48	43.3	0.39	N/A	N/A	4.1	0.27	N/A	1.14
56	Balsam poplar	10.8	1,351.40	292.5	24.94	9.6	0.82	100.7	0.90	N/A	N/A	9.5	0.64	N/A	2.35
57	Balsam poplar	10.8	1,351.40	292.5	24.94	9.6	0.82	100.7	0.90	N/A	N/A	9.5	0.64	N/A	2.35
58	Balsam poplar	10.8	1,351.40	292.5	24.94	9.6	0.82	100.7	0.90	N/A	N/A	9.5	0.64	N/A	2.35
59	Balsam poplar	10.8	1,351.40	292.5	24.94	9.6	0.82	100.7	0.90	N/A	N/A	9.5	0.64	N/A	2.35
60	Balsam poplar	10.8	1,351.40	292.5	24.94	9.6	0.82	100.7	0.90	N/A	N/A	9.5	0.64	N/A	2.35
61	Balsam poplar	16.2	2,669.43	785.1	66.95	17.1	1.46	291.5	2.60	N/A	N/A	27.6	1.84	N/A	5.90
62	Balsam poplar	16.2	2,669.43	785.1	66.95	17.1	1.46	291.5	2.60	N/A	N/A	27.6	1.84	N/A	5.90
63	Balsam poplar	16.2	2,669.43	785.1	66.95	17.1	1.46	291.5	2.60	N/A	N/A	27.6	1.84	N/A	5.90
64	Balsam poplar	16.2	2,669.43	785.1	66.95	17.1	1.46	291.5	2.60	N/A	N/A	27.6	1.84	N/A	5.90

Benefits and Costs Summary of Individual Trees

Location: Bozeman, Gallatin, Montana, United States of America
Project: SMCP Carbon Sequestration, Series: Active area trees, Year: 2023
Generated: 8/1/2023

						Annual benefits									
Tree ID	Species Name	DBH (in)	Replacement Value ($)	Carbon Storage (lb)	Carbon Storage ($)	Gross Carbon Sequestration (lb/yr)	Gross Carbon Sequestration ($/yr)	Avoided Runoff (gal/yr)	Avoided Runoff ($/yr)	Carbon Avoided (lb/yr)	Carbon Avoided ($/yr)	Pollution Removal (oz/yr)	Pollution Removal ($/yr)	Energy Savings ($/yr)	Total Annual Benefits ($/yr)
65	Balsam poplar	8.1	890.09	145.2	12.38	6.4	0.54	45.2	0.40	N/A	N/A	4.3	0.29	N/A	1.23
66	Balsam poplar	8.1	890.09	145.2	12.38	6.4	0.54	45.2	0.40	N/A	N/A	4.3	0.29	N/A	1.23
67	Balsam poplar	8.1	890.09	145.2	12.38	6.4	0.54	45.2	0.40	N/A	N/A	4.3	0.29	N/A	1.23
68	Balsam poplar	8.1	890.09	145.2	12.38	6.4	0.54	45.2	0.40	N/A	N/A	4.3	0.29	N/A	1.23
69	Quaking aspen	10.8	1,407.10	315.6	26.91	10.5	0.89	34.6	0.31	N/A	N/A	3.3	0.22	N/A	1.42
70	Quaking aspen	10.8	1,407.10	315.6	26.91	10.5	0.89	34.6	0.31	N/A	N/A	3.3	0.22	N/A	1.42
71	Quaking aspen	10.8	1,407.10	315.6	26.91	10.5	0.89	34.6	0.31	N/A	N/A	3.3	0.22	N/A	1.42
72	European aspen	32.4	9,581.60	5,299.5	451.92	58.9	5.02	345.8	3.09	N/A	N/A	32.7	2.18	N/A	10.29
73	European aspen	29.7	8,271.08	4,268.4	363.99	51.7	4.41	349.3	3.12	N/A	N/A	33.1	2.20	N/A	9.73
74	European aspen	27.0	6,887.14	3,368.4	287.24	44.9	3.83	344.0	3.07	N/A	N/A	32.6	2.17	N/A	9.07
75	White willow	10.8	1,258.56	262.1	22.35	8.8	0.75	75.4	0.67	N/A	N/A	7.1	0.48	N/A	1.90
76	White willow	16.2	2,442.10	717.1	61.15	16.0	1.36	152.1	1.36	N/A	N/A	14.4	0.96	N/A	3.68
77	White willow	27.0	6,229.43	2,549.0	217.37	34.0	2.90	206.0	1.84	N/A	N/A	19.5	1.30	N/A	6.04
78	White willow	24.3	5,105.07	1,962.2	167.33	29.0	2.48	175.6	1.57	N/A	N/A	16.6	1.11	N/A	5.15
79	White willow	24.3	5,105.07	1,962.2	167.33	29.0	2.48	175.6	1.57	N/A	N/A	16.6	1.11	N/A	5.15
80	White willow	21.6	4,099.06	1,464.7	124.90	24.4	2.08	182.4	1.63	N/A	N/A	17.3	1.15	N/A	4.86
81	White willow	27.0	6,229.43	2,549.0	217.37	34.0	2.90	206.0	1.84	N/A	N/A	19.5	1.30	N/A	6.04
82	White willow	27.0	6,229.43	2,549.0	217.37	34.0	2.90	206.0	1.84	N/A	N/A	19.5	1.30	N/A	6.04
83	White willow	27.0	6,229.43	2,549.0	217.37	34.0	2.90	206.0	1.84	N/A	N/A	19.5	1.30	N/A	6.04
84	White willow	16.2	2,442.10	717.1	61.15	16.0	1.36	152.1	1.36	N/A	N/A	14.4	0.96	N/A	3.68
85	White willow	18.9	3,211.41	1,051.5	89.66	20.0	1.71	176.4	1.58	N/A	N/A	16.7	1.11	N/A	4.40
86	White willow	37.8	11,204.20	5,888.2	502.12	51.2	4.37	338.6	3.03	N/A	N/A	32.0	2.14	N/A	9.53
87	White willow	43.2	13,557.52	8,221.8	701.12	44.4	3.79	359.2	3.21	N/A	N/A	34.0	2.27	N/A	9.26
88	White willow	48.6	15,708.92	10,976.3	936.01	24.3	2.07	439.0	3.92	N/A	N/A	41.6	2.77	N/A	8.77
89	White willow	48.6	15,708.92	10,976.3	936.01	24.3	2.07	439.0	3.92	N/A	N/A	41.6	2.77	N/A	8.77
90	White willow	32.4	8,648.95	4,010.4	341.99	44.6	3.80	270.2	2.41	N/A	N/A	25.6	1.70	N/A	7.92
91	White willow	40.5	12,406.10	6,995.5	596.55	48.5	4.14	374.0	3.34	N/A	N/A	35.4	2.36	N/A	9.84
92	White willow	16.2	2,442.10	717.1	61.15	16.0	1.36	152.1	1.36	N/A	N/A	14.4	0.96	N/A	3.68
93	White willow	16.2	2,442.10	717.1	61.15	16.0	1.36	152.1	1.36	N/A	N/A	14.4	0.96	N/A	3.68
94	White willow	10.8	1,258.56	262.1	22.35	8.8	0.75	75.4	0.67	N/A	N/A	7.1	0.48	N/A	1.90
95	White willow	21.6	4,099.06	1,464.7	124.90	24.4	2.08	182.4	1.63	N/A	N/A	17.3	1.15	N/A	4.86
96	Green ash	18.9	4,218.60	1,034.3	88.20	15.0	1.28	231.7	2.07	N/A	N/A	21.9	1.46	N/A	4.81

Benefits and Costs Summary of Individual Trees

Location: Bozeman, Gallatin, Montana, United States of America
Project: SMCP Carbon Sequestration, Series: Active area trees, Year: 2023
Generated: 8/1/2023

						Annual benefits									
						Gross Carbon Sequestration		Avoided Runoff		Carbon Avoided		Pollution Removal		Energy Savings	Total Annual Benefits
Tree ID	Species Name	DBH (in)	Replacement Value ($)	Carbon Storage (lb)	Carbon Storage ($)	(lb/yr)	($/yr)	(gal/yr)	($/yr)	(lb/yr)	($/yr)	(oz/yr)	($/yr)	($/yr)	($/yr)
97	Green ash	16.2	3,169.56	748.1	63.79	12.6	1.07	199.7	1.78	N/A	N/A	18.9	1.26	N/A	4.12
98	Black cottonwood	29.0	7,899.62	3,370.4	287.41	41.8	3.57	348.8	3.12	N/A	N/A	33.0	2.20	N/A	8.88
99	Black cottonwood	24.0	5,504.02	2,106.5	179.63	31.6	2.69	328.0	2.93	N/A	N/A	31.0	2.07	N/A	7.69
100	Black cottonwood	42.0	14,485.01	8,482.7	723.37	51.4	4.38	273.9	2.45	N/A	N/A	25.9	1.73	N/A	8.56
101	Black cottonwood	29.0	7,899.62	3,370.4	287.41	41.8	3.57	348.8	3.12	N/A	N/A	33.0	2.20	N/A	8.88
102	Black cottonwood	16.0	2,611.21	769.8	65.65	17.3	1.48	177.9	1.59	N/A	N/A	16.8	1.12	N/A	4.19
103	Black cottonwood	27.0	6,887.14	2,822.1	240.66	37.6	3.21	344.0	3.07	N/A	N/A	32.6	2.17	N/A	8.45
104	Black cottonwood	62.1	22,449.69	16,534.7	1,410.00	17.9	1.53	603.5	5.39	N/A	N/A	57.1	3.81	N/A	10.73
105	Black cottonwood	64.8	23,282.20	16,534.7	1,410.00	17.9	1.53	663.1	5.93	N/A	N/A	62.8	4.18	N/A	11.64
106	Black cottonwood	32.4	9,581.60	4,440.1	378.63	49.3	4.21	345.8	3.09	N/A	N/A	32.7	2.18	N/A	9.48
107	Narrowleaf cottonwood	18.9	3,526.15	1,314.3	112.08	25.0	2.14	262.9	2.35	N/A	N/A	24.9	1.66	N/A	6.14
108	Narrowleaf cottonwood	24.3	5,635.01	2,452.8	209.16	36.3	3.10	380.5	3.40	N/A	N/A	36.0	2.40	N/A	8.90
109	Narrowleaf cottonwood	24.3	5,635.01	2,452.8	209.16	36.3	3.10	380.5	3.40	N/A	N/A	36.0	2.40	N/A	8.90
110	White willow	21.6	4,099.06	1,464.7	124.90	24.4	2.08	182.4	1.63	N/A	N/A	17.3	1.15	N/A	4.86
111	White willow	32.4	8,648.95	4,010.4	341.99	44.6	3.80	270.2	2.41	N/A	N/A	25.6	1.70	N/A	7.92
112	White willow	37.8	11,204.20	5,888.2	502.12	51.2	4.37	338.6	3.03	N/A	N/A	32.0	2.14	N/A	9.53
113	White willow	37.8	11,204.20	5,888.2	502.12	51.2	4.37	338.6	3.03	N/A	N/A	32.0	2.14	N/A	9.53
114	White willow	21.6	4,099.06	1,464.7	124.90	24.4	2.08	182.4	1.63	N/A	N/A	17.3	1.15	N/A	4.86
115	White willow	24.3	5,105.07	1,962.2	167.33	29.0	2.48	175.6	1.57	N/A	N/A	16.6	1.11	N/A	5.15
116	White willow	32.4	8,648.95	4,010.4	341.99	44.6	3.80	270.2	2.41	N/A	N/A	25.6	1.70	N/A	7.92
117	White willow	8.1	844.32	128.4	10.95	5.7	0.49	41.3	0.37	N/A	N/A	3.9	0.26	N/A	1.12
119	Boxelder	54.0	16,093.22	14,539.0	1,239.82	6.0	0.51	684.9	6.12	N/A	N/A	64.8	4.32	N/A	10.95
120	Boxelder	16.2	2,260.24	1,049.0	89.45	21.0	1.79	184.4	1.65	N/A	N/A	17.5	1.16	N/A	4.60
121	Boxelder	24.3	4,681.12	2,648.4	225.85	35.4	3.02	190.8	1.71	N/A	N/A	18.1	1.20	N/A	5.93
122	Rocky mountain juniper	16.2	3,278.67	1,177.8	100.44	15.9	1.36	183.4	1.64	N/A	N/A	17.4	1.16	N/A	4.15
123	Lodgepole pine	16.2	3,230.18	610.9	52.10	10.6	0.90	152.4	1.36	N/A	N/A	14.4	0.96	N/A	3.22
124	Lodgepole pine	16.2	3,230.18	610.9	52.10	10.6	0.90	152.4	1.36	N/A	N/A	14.4	0.96	N/A	3.22
125	Lodgepole pine	18.9	4,302.54	846.6	72.20	12.8	1.09	186.7	1.67	N/A	N/A	17.7	1.18	N/A	3.93
126	Lodgepole pine	10.8	1,580.39	252.2	21.50	6.4	0.55	71.1	0.64	N/A	N/A	6.7	0.45	N/A	1.63
127	Green ash	16.2	3,169.56	748.1	63.79	12.6	1.07	199.7	1.78	N/A	N/A	18.9	1.26	N/A	4.12
128	Engelmann spruce	18.9	4,470.40	1,247.0	106.34	10.0	0.85	251.3	2.25	N/A	N/A	23.8	1.59	N/A	4.68
129	Engelmann spruce	8.1	1,027.38	193.7	16.52	3.5	0.30	43.8	0.39	N/A	N/A	4.1	0.28	N/A	0.97

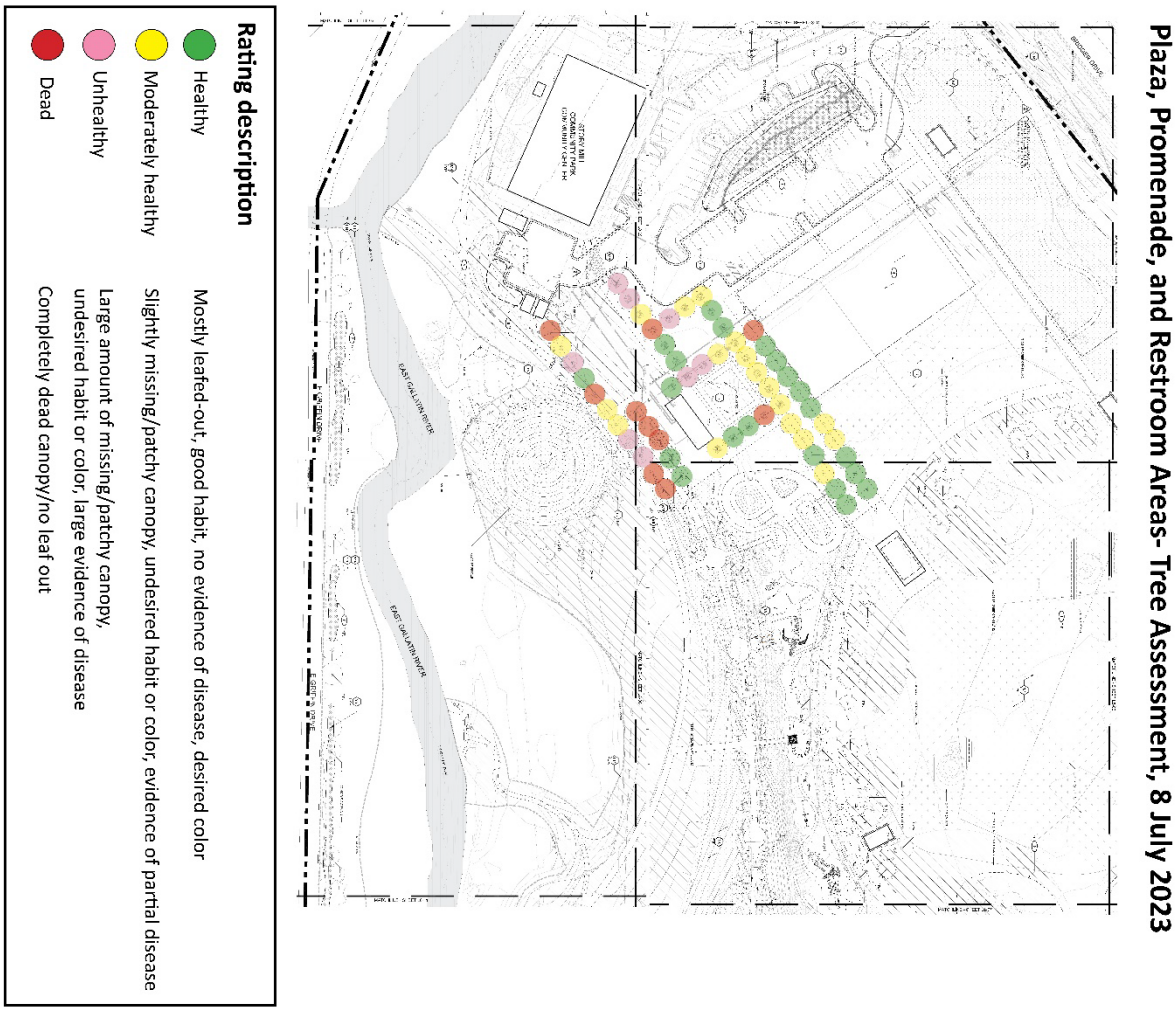
Benefits and Costs Summary of Individual Trees

Location: Bozeman, Gallatin, Montana, United States of America
Project: SMCP Carbon Sequestration, Series: Active area trees, Year: 2023
Generated: 8/1/2023

						Annual benefits									
Tree ID	Species Name	DBH (in)	Replacement Value ($)	Carbon Storage (lb)	Carbon Storage ($)	Gross Carbon Sequestration (lb/yr)	Gross Carbon Sequestration ($/yr)	Avoided Runoff (gal/yr)	Avoided Runoff ($/yr)	Carbon Avoided (lb/yr)	Carbon Avoided ($/yr)	Pollution Removal (oz/yr)	Pollution Removal ($/yr)	Energy Savings ($/yr)	Total Annual Benefits ($/yr)
130	Norway spruce	24.0	7,053.73	2,499.5	213.15	16.3	1.39	409.8	3.66	N/A	N/A	38.8	2.59	N/A	7.64
131	Green ash	10.8	1,555.64	319.0	27.20	7.9	0.67	101.3	0.90	N/A	N/A	9.6	0.64	N/A	2.22
132	Black cottonwood	18.9	3,526.15	1,164.1	99.27	22.2	1.89	231.4	2.07	N/A	N/A	21.9	1.46	N/A	5.42
133	White willow	8.1	844.32	128.4	10.95	5.7	0.49	41.3	0.37	N/A	N/A	3.9	0.26	N/A	1.12
134	White willow	8.1	844.32	128.4	10.95	5.7	0.49	41.3	0.37	N/A	N/A	3.9	0.26	N/A	1.12
135	White willow	8.1	844.32	128.4	10.95	5.7	0.49	41.3	0.37	N/A	N/A	3.9	0.26	N/A	1.12
136	White willow	10.8	1,258.56	262.1	22.35	8.8	0.75	75.4	0.67	N/A	N/A	7.1	0.48	N/A	1.90
137	White willow	10.8	1,258.56	262.1	22.35	8.8	0.75	75.4	0.67	N/A	N/A	7.1	0.48	N/A	1.90
138	White willow	10.8	1,258.56	262.1	22.35	8.8	0.75	75.4	0.67	N/A	N/A	7.1	0.48	N/A	1.90
139	White willow	10.8	1,258.56	262.1	22.35	8.8	0.75	75.4	0.67	N/A	N/A	7.1	0.48	N/A	1.90
140	White willow	16.2	2,442.10	717.1	61.15	16.0	1.36	152.1	1.36	N/A	N/A	14.4	0.96	N/A	3.68
141	White willow	24.3	5,105.07	1,962.2	167.33	29.0	2.48	175.6	1.57	N/A	N/A	16.6	1.11	N/A	5.15
142	White willow	32.4	8,648.95	4,010.4	341.99	44.6	3.80	270.2	2.41	N/A	N/A	25.6	1.70	N/A	7.92
	Total		**724,229**	**335,105**	**28,576**	**3,399**	**290**	**29,139**	**260**	**N/A**	**N/A**	**2,758**	**184**	**N/A**	**734**

Carbon storage and gross carbon sequestration value is calculated based on the price of $0.08528 per pound.
Due to limits of available models, i-Tree Eco will limit carbon storage to a maximum of 7,500 kg (16,534.7 lbs) and not estimate additional storage for any tree beyond a diameter of 254 cm (100 in). Whichever limit results in lower carbon storage is used.
Avoided runoff value is calculated by the price $0.009/gal. The user-designated weather station reported 10.2 inches of total annual precipitation. Eco will always use the hourly measurements that have the greatest total rainfall or user-submitted rainfall if provided.
Energy saving value is calculated based on the prices of $112.30 per MWH and $7.89 per MBTU. Trees less than or equal to 10ft/3m tall or further than 60ft/18m away from buildings do not provide energy benefits to nearby buildings.
Pollution removal value is calculated based on the prices of $0.70 per pound (CO), $0.08 per pound (O3), $0.02 per pound (NO2), $0.00 per pound (SO2), $2.15 per pound (PM2.5), $3.28 per pound (PM10*).
Replacement value is the estimated local cost of having to replace a tree with a similar tree.
A value of zero may indicate that ancillary data (pollution, weather, energy, etc.) is not available for this location or that the reported amounts are too small to be shown.

Appendix C: Plaza, Promenade & Restroom Building Tree Assessment



SOPARNA – Observation Form

DATE: _____ Observer ID: _____ Park ID: SMCP PERIOD: AM / Lunch / PM / Evening

SUB/TARGET AREA: _____ START TIME: _____ END TIME: _____

CONDITIONS:

Accessible *Not locked or rented to others*	**Usable** *Not excessively wet or windy*	**Equipped** *Balls/Frisbees provided by park*	**Supervised** *Park staff or leader present*	**Organized** *Guided tour, sport event*	**Dark** *Insufficient lighting*	**Empty** *No one in area*	**Recreation Supports** D = *Dog* H = *Horse* M = *Motorized* N = *Non-Motorized*
Yes	Yes	Yes	Yes	Yes	Yes	Yes	
No	No	No	No	No	No	No	

COMMENTS:

PEOPLE	ACTIVITY TYPE	ACTIVITY LEVEL			AGE GROUP					ETHNICITY			
(observed)	*(codes included below)*	**Sed**	**Mod**	**Vig**	**Todd (0-3)**	**Child (4-12)**	**Teen (13-20)**	**Adult (21-64)**	**Senior (65+)**	**White**	**Latino**	**Black**	**Other**
FEMALE	F S G R O												
MALE	F S G R O												

Activity Type Codes

Fitness:	**S**port:	Active **G**ame:	Sedentary **R**ecreation:	**O**ther:
Aerobic (dance/step) Fitness stations Walk/jog/run/hike/bike Strengthening exercises	Baseball, Basketball, Dance Football, Climbing, Volleyball Soccer, Tennis/racquet Gymnastics	Chess, Reading, Jumping (rope, hopscotch), Manipulatives (frisbee), Play area, tetherball. Horseshoes, Tag/Chasing games	Lying down/standing Sitting Picnic (food involved) Hanging out/observing	Park maintenance, ATV/Motorized vehicles, Hunting, Fishing, Horseback riding, Birding, Photography, Interpretive tours

	Activity Level			Age Group					Race/Ethnicity			
By Coding Day (all time periods)	Sedentary	Moderate	Vigorous	Toddler	Child	Teen	Adult	Senior	W	L	B	O
Weeday 1, July 7	98	178	32	35	114	16	111	39	297	4	4	7
Weekday 2, July 13	239	304	74	59	235	98	170	58	598	9	9	4
WeekEnd 1, June 17	74	165	51	29	58	51	136	20	272	7	0	0
WeekEnd 2, July 8	100	152	22	41	64	16	120	35	240	8	16	9
Total Observed Users	*511*	*799*	*179*	*164*	*471*	*181*	*537*	*152*	*1407*	*28*	*29*	*20*
% within Theme	*34.3%*	*53.7%*	*12.0%*	*10.9%*	*31.3%*	*12.0%*	*35.7%*	*10.1%*	*94.8%*	*1.9%*	*2.0%*	*1.3%*

Target Area (all coding days/time periods)	1	2	3	4	5	6a	6b	6c	6d	6e	6f	6g
Sum of all observed users	111	89	57	163	48	128	35	122	66	56	74	56
% within Target Area	*7.4%*	*5.9%*	*3.8%*	*10.8%*	*3.2%*	*8.5%*	*2.3%*	*8.1%*	*4.4%*	*3.7%*	*4.9%*	*3.7%*

Target Area (all coding days/time periods)	7	8	9	10	11	12	13	14	15	16	17
Sum of all observed users	245	43	6	89	16	4	19	23	1	2	52
% within Target Area	16.3%	2.9%	0.4%	5.9%	1.1%	0.3%	1.3%	1.5%	0.1%	0.1%	3.5%

Appendix E: Qualtrics & Paper Survey

Consent Form

SUBJECT CONSENT STATEMENT FOR PARTICIPATION
IN HUMAN RESEARCH AT MONTANA STATE UNIVERSITY

Research Project: Story Mill Community Park Landscape Performance Case Study

This survey is part of a case study that is investigating the environmental, social, and economic benefits of Story Mill Community Park. The case study is a collaboration among Montana State University, Design Workshop, and the Landscape Architecture Foundation, who is the project funder.

The purpose of this survey is to understand how users interact with the park and what they think of the park post-construction. The survey will take approximately 10-15 minutes. Survey results will be integrated into the case study published by the Landscape Architecture Foundation as part of their Landscape Performance Series - a program that investigates the benefits of built landscapes.

Your participation in this study will remain anonymous, and your identity will not be reported in any reports or products. There are no foreseen risks or direct benefits from participating. Your participation is voluntary, and you may stop the survey or skip questions at any time.

Proceeding with the survey indicates your consent to participate.

Principal Investigator: Rebekah VanWieren, Associate Professor. Contact at rebekah.vanwieren@montana.edu or 406-994-7539.

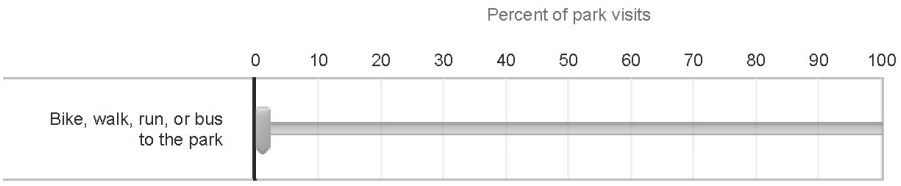
Should you have questions regarding your rights as a research participant, email irb@montana.edu or call 406-994-4706. Approved research protocol IRB #2023-612.

On average, how often do you use Story Mill Community Park?

- ◯ Less than 1 time per month
- ◯ 1-3 times per month
- ◯ 1 time per week
- ◯ More than 1 time per week
- ◯ I have never been to Story Mill Community Park

Randomized Questions

What percentage of your visits do you bike, walk, or run to get to the park?



What attracts you to Story Mill Community Park? Rank the following, where 1 is the highest and 10 is the lowest):

- Places to socialize or gather
- Ecological and naturalized character
- River and pond access
- Mountain and scenic views
- Historical and cultural features
- Something for everyone
- Trails and connecting community trails
- Playground equipment
- Learning garden / urban agriculture
- Wildlife and habitat viewing

How has Story Mill Community Park benefited your life?

Has the park made your household bicycle more?

- ○ Yes

- ○ No
- ○ Not applicable - I don't own a bike or use bikes in the park.

Have the following features helped you to understand the park site's ecological and/or cultural heritage?

	Yes	No	I don't know
Custom playground equipment	○	○	○
Interpretive signs with drawings done by local artist	○	○	○
Place-based sculptures	○	○	○

Short answer Questions - non randomized

Does the park effectively accommodate people of all ages?

- ○ No
- ○ Yes

What characteristics or features enable the park to accommodate people of all ages?

In what ways doesn't the park accommodate people of all ages?

Do you prefer Story Mill Community Park over other Bozeman parks?

- ◯ Yes
- ◯ No
- ◯ It depends

Why do you prefer Story Mill Community Park over other Bozeman Parks?

What factors impact whether you chose Story Mill Community Park over other Bozeman parks?

Demographics

What is your age?

- ◯ Under 18
- ◯ 18-24
- ◯ 25-34
- ◯ 35-49
- ◯ 50-64
- ◯ 65-79
- ◯ 80+

Approximately, how close do you live to Story Mill Community Park?

- ◯ Less than 0.5 mile
- ◯ 0.5-1 mile
- ◯ 1-2 miles
- ◯ 2-5 miles
- ◯ More than 5 miles

Do you have children or grandchildren that attend the park? If so, what are their ages? (select all that apply):

- [ ] 0-3 years old
- [ ] 4-12 years old
- [ ] 13-20 years old
- [ ] Over 21 years old
- [ ] None of these, I do not have children or grandchildren that attend the park.

Story Mill Community Park - User Survey

Refer to the provided *Subject Consent Statement for Participation in Human Research at Montana State University* for a research description and contact information. Approved research protocol IRB #2023-612.

Proceeding with the survey indicates your consent to participate.

1. On average, how often do you use Story Mill Community Park?

- ○ Less than 1 time per month
- ○ 1-3 times per month
- ○ 1 time per week
- ○ More than 1 time per week
- ○ I have never been to Story Mill Community Park

2. What attracts you to Story Mill Park? Rank the following, where 1 is the highest and 10 is the lowest.

_____ Mountain and scenic views
_____ Historical and cultural features
_____ Ecological and naturalized character
_____ Something for everyone
_____ Wildlife and habitat viewing
_____ River and pond access
_____ Trails and connecting community trails
_____ Places to socialize or gather
_____ Playground equipment
_____ Learning garden / urban agriculture

3. Has the park made your household bicycle more?

- ○ Yes
- ○ No
- ○ Not applicable - I don't own a bike or use bikes in the park.

4. Have the following features helped you to understand the park site's ecological and/or cultural heritage?

	Yes	No	I don't know
Interpretive signs with drawings done by local artist	○	○	○
Custom playground equipment	○	○	○
Place-based sculptures	○	○	○

5. Do you prefer Story Mill Community Park over other Bozeman parks?

- ○ Yes
- ○ No → How come?
- ○ It depends

(TURN OVER)

6. What percentage of your visits do you bike, walk, or run to get to the park? Circle one.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

7. Does the park effectively accommodate people of all ages?

○ No → Why or Why not?

○ Yes

8. How has Story Mill Community Park benefited your life?

9. What is your age?

- ○ Under 18
- ○ 18-24
- ○ 25-34
- ○ 35-49
- ○ 50-64
- ○ 65-79
- ○ 80+

10. Approximately, how close do you live to Story Mill Community Park?

- ○ Less than 0.5 mile
- ○ 0.5-1 mile
- ○ 1-2 miles
- ○ 2-5 miles
- ○ More than 5 miles

11. Do you have children or grandchildren that attend the park? What are their ages? (select all that apply):

- ○ 0-3 years old
- ○ 4-12 years old
- ○ 13-20 years old
- ○ Over 21 years old
- ○ None of these, I do not have children or grandchildren that attend the park.

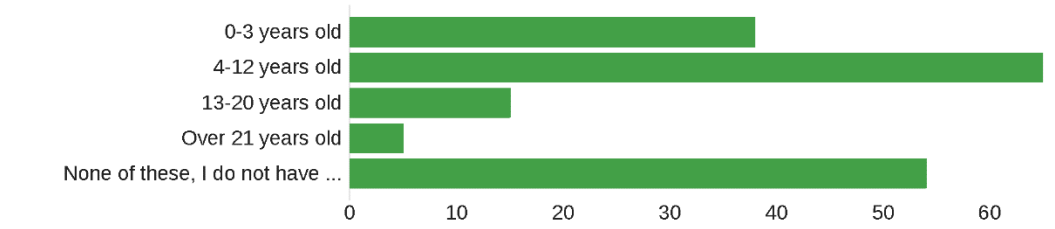
Thank you! ~MSU Landscape Design research team

Appendix F: Survey Results Report

Story Mill Community Park - Survey Results Summary, July 2023

Do you have children or grandchildren that attend the park? If so, what are their ages? (select all that apply):

145 Responses

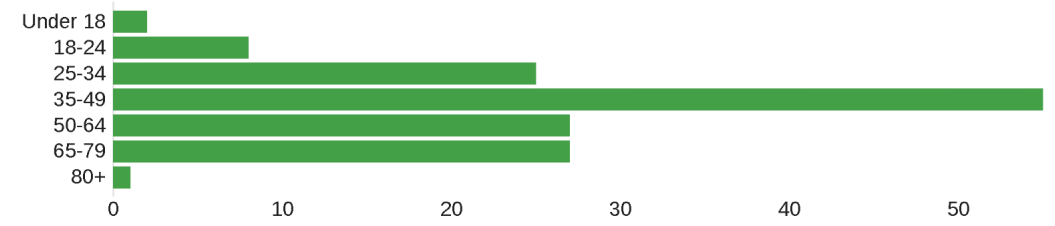


145 Responses

Field	Choice Count	
0-3 years old	21.5%	38
4-12 years old	36.7%	65
13-20 years old	8.5%	15
Over 21 years old	2.8%	5
None of these, I do not have children or grandchildren that attend the park.	30.5%	54
Total		177

What is your age?

145 Responses

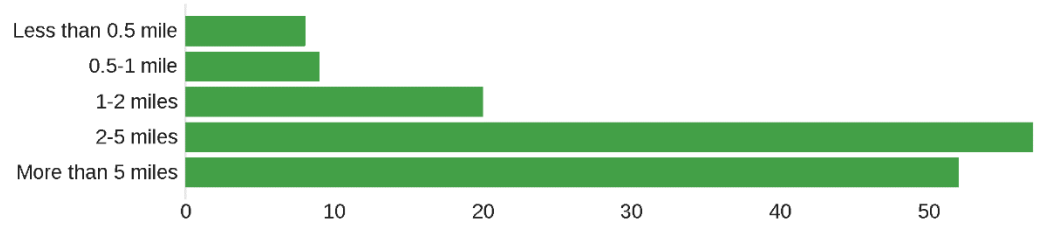


145 Responses

Field	Choice Count	
Under 18	1.4%	2
18-24	5.5%	8
25-34	17.2%	25
35-49	37.9%	55
50-64	18.6%	27
65-79	18.6%	27
80+	0.7%	1
Total		145

Approximately, how close do you live to Story Mill Community Park?

146 Responses

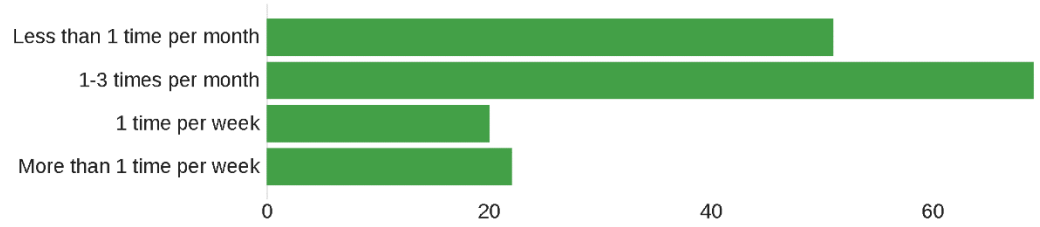


146 Responses

Field	Choice Count	
Less than 0.5 mile	5.5%	8
0.5-1 mile	6.2%	9
1-2 miles	13.7%	20
2-5 miles	39.0%	57
More than 5 miles	35.6%	52
Total		146

On average, how often do you use Story Mill Community Park?

162 Responses

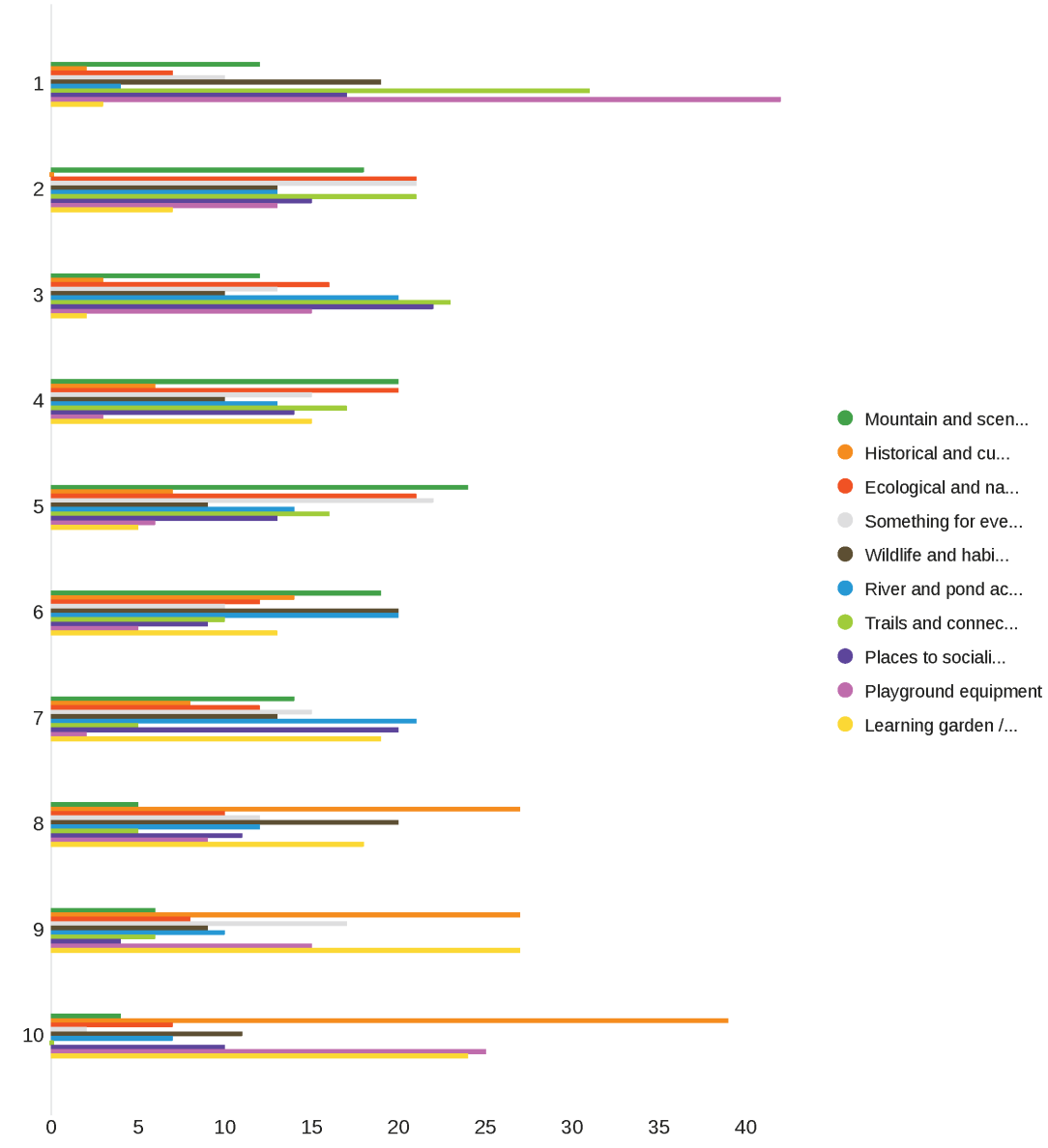


162 Responses

Field	Choice Count	
Less than 1 time per month	31.5%	51
1-3 times per month	42.6%	69
1 time per week	12.3%	20
More than 1 time per week	13.6%	22
Total		162

What attracts you to Story Mill Community Park? Rank the following, where 1 is the highest and 10 is the lowest):

137 Responses



Story Mill Community Park - Survey Results Summary, July 2023

137 Responses

Field	Min	Max	Mean	Standard Deviation	Variance	Responses
Historical and cultural features	1.0	10.0	8.0	2.1	4.4	133
Learning garden / urban agriculture	1.0	10.0	7.1	2.5	6.2	133
River and pond access	1.0	10.0	5.5	2.4	5.9	134
Wildlife and habitat viewing	1.0	10.0	5.4	2.9	8.4	134
Something for everyone	1.0	10.0	5.1	2.6	6.7	137
Playground equipment	1.0	10.0	4.9	3.7	13.4	135
Ecological and naturalized character	1.0	10.0	4.9	2.5	6.2	134
Places to socialize or gather	1.0	10.0	4.8	2.7	7.5	135
Mountain and scenic views	1.0	10.0	4.7	2.3	5.4	134
Trails and connecting community trails	1.0	9.0	3.6	2.3	5.2	134

137 Responses

Field	1	2	3	4	5	6	7	8	9	10	Total
Mountain and scenic views	12	18	12	20	24	19	14	5	6	4	134
Historical and cultural features	2	0	3	6	7	14	8	27	27	39	133
Ecological and naturalized character	7	21	16	20	21	12	12	10	8	7	134
Something for everyone	10	21	13	15	22	10	15	12	17	2	137
Wildlife and habitat viewing	19	13	10	10	9	20	13	20	9	11	134
River and pond access	4	13	20	13	14	20	21	12	10	7	134
Trails and connecting community trails	31	21	23	17	16	10	5	5	6	0	134
Places to socialize or gather	17	15	22	14	13	9	20	11	4	10	135
Playground equipment	42	13	15	3	6	5	2	9	15	25	135
Learning garden / urban agriculture	3	7	2	15	5	13	19	18	27	24	133

How has Story Mill Community Park benefited your life?

105 Responses

It is a beautiful place to picnic and have fun.

Gives me a place to take my niece

Great place to play, be outside

We are here multiple times/week walking, biking

We meet up w/ friends so often! We often cut through the park to go see friends. My daughter can actually play rather than be bored by standard equipment.

All my kids age range 10-18 months enjoy this park at the same time.

It's a fun park that's situated in a way that allows me to watch my kids play even if they are on opposite sides of the playground

Places to meet

Awesome for whole family

Great spot to meet up w/ friends. Helps socialize my kids and meet new kids.

A cool park

Beautiful views- nice space to gather- good trails- beautiful landscape

Get together and socialize

Kids are happy here :)

Grandson participates in recreation program

Love the open space, views, challenges the kids' skills

Absolutely! We use the park all year, love snow play

Good place to bring grandkids

Great walking exercise. Nature sanctuary is great to visit when dogs are not with me!

When I lived closer to downtown i would run and bicycle into story mill more frequently. However, now that I live by the university I spend less time in story mill.

It hasn't in super tangible ways but it has been a great place to gather, which I appreciate.

Its a good place to gather

Love the camp put on by Bozeman Rec Center and also enjoy picnic areas for birthday parties.

Provides a great outdoor play spot for kids. Nice place to walk and enjoy nature.

Its a beautiful park and such a gem for our community.

A place to make memories as my child grows

My kids play there multiple times per week

Activities for seniors and grandchildren

My kids love to play there! We bring out of town visitors to the park too, even when it’s cold weather.

Yes!

It provides an excellent interaction with nature on the trails as well as providing an enticing platt area for youth

Learning garden & edible forest trail connect people

It is a wonderful place to walk and take grandkids to play and my husband fishes there. Very close to home

A place to take grandkids and have family outings. Also a place for community events such as Random acts of silliness to provide community involvement.
Gave me a place to slow down and bring my family and friends to show off the best of Bozeman
It's a quiet calming space that offers the community an incredible experience
Love the trails for running/walking
A great destination to bike to and enjoy natural scenery locally without getting in the car.
Nice destination on the north side, birthday parties, random acts of silliness
Wonderful place to walk for older folk. Plowed in winter. Safe. Fun watching activities, nice by rock creek. All good
it is a great place to gather with larger groups (e.g., parties in the pavilions) and to walk with my aging parents. My kids have loved summer camps there.
Story Mill has created a Place within the NE community of Bozeman and has created a much needed relief from the housing density.
We love this park! It is super cool, but more importantly it has shade. The trees are crucial in my opinion. Many parks are WAY to hot in the summer, so we trek from the South side to play in the shade of the trees.
Walking
Part of my outdoor Bozeman experience
So much. We have kids and the park is perfect. The shade from the trees is why we choose Story every afternoon. WE WISH THERE WAS A SAFE CROSSWALK ACROSS BRIDGER CANYON TO ACCESS THE PARK. We are also really looking forward to the added splash pad.
-
The grandchildren enjoy the playground and special events
We love this park! The structures are so fun, gathering pavilions are perfect for parties. We walk the creek on hot days, climb on the rock to see how daring we can be. My daughter bikes the circle (she calls it Circle Park!) the shade is amazing in the summer, but we still Use the park year-round. Story Mill is the crown jewel of Bozeman parks!
Story Mill is a beautiful destination park for our family (we live in the west side, so it isn't our daily park). When we have friends visiting from out of town, we always take them to Story Mill because we think it represents the best of what Bozeman community parks can look and feel like.
It is recreational and educational
It has a variety of fun toys for my daughter to play on.
Dog park, water access
It has degraded that neighborhood with the type of housing that was built
Fun time with grandson
Yes, and others
Love taking my dog for a walk thre. It is clean and safe.
My kids love it.
It's (literally) my backyard. I take my kids and dog there twice per day.
I enjoy the added open space, in particular the natural area. I live south of Bozeman, so don't visit as often as I'd like.
It has served as a place for our our large family and friends to gather, a weekly stop for my son to play, city of bozeman hosted events - paly time and garden, running, cycling, etc.
One of my kids favorite parks. The shade helps a ton for longevity of play unlike other parks that have less trees.
Bird photography and dog park with access to a river

In many ways. It opened as my older child was about to turn 3, and since then we have added a second child. The Park has given us a destination on weekend mornings, a place to adventure and explore (the creek! the climbing rock!), a place for our kids to practice gross motor skills (really, climbing up to the tube slide has been a huge and good process for both kids to become comfortable with). As my older child has started school, it has also become a social place, to run into families we know and kids only she knows, giving her and us a sense of community. We have had birthday parties there, play dates there, and more. During the first months of Covid lock-down, we visited the bird sanctuary (maybe not officially a part of the park?) literally almost every day for our antsy toddler to run around. It will forever be a bright spot in a dark time.
A great playground for my kiddo, a gathering place, and a beautiful nature preserve.
A nice starting and end point for walking to the M trail head and back. I don't actually go up to the M. Just to the parking lot and back.
I love having a safe area with sufficient shade for my toddler to play. I appreciate the different zones for active play, toddler biking, socializing, and observing wildlife.
Walk the dog and have social events
Great place to take my kids
Enjoy tasking the kids
A shaded playground in the summer for kids/moms is lovely
Kids love the playground, it's a nice play to be so we enjoy it as well
My significant other and I enjoy biking to Story Mill Park and having picnics with views of the mountains.
A wonderful place to bring a young child or go for a walk
It hasn’t.
Favorite park to interact with activities and nature
I’ve loved the connected trails, river walk, and for bird photography
It is the only park I'm aware of that has wheelchair accessible walkways
Quiet place to walk early mornings or late evenings
It's increased access to nature and trails close to my home.
Running on the trails in the nature sanctuary, my office is here and I love to enjoy breaks in the park.
It is fun
The playground side is a meeting place for my family and friends, especially the ones with kids. I primarily use the trails for birdwatching didnt spring and fall migration.
I love the nature preserve with NO dogs100
I find respite in enjoying nature there, while exercising on the trails. I love bird watching there.
It’s a nice place to have a picnic lunch, meet friends, and do fly fishing casting lessons
It’s a good place to go bird watching.
Great access to play areas and natural areas as well as a dog park.
It has provided a large multi use park area for my family to visit, including many birthday parties and such.
Starts our day off with a place to exercise, run, explore, and play with friends all while enjoying the surrounding nature and wildlife.
Provides a flat green space to walk and bird
A nice walk in the park and a fine place to see birds.
Accessible park for short walks, playground time with grandchildren and dog walking when muddy elsewhere.

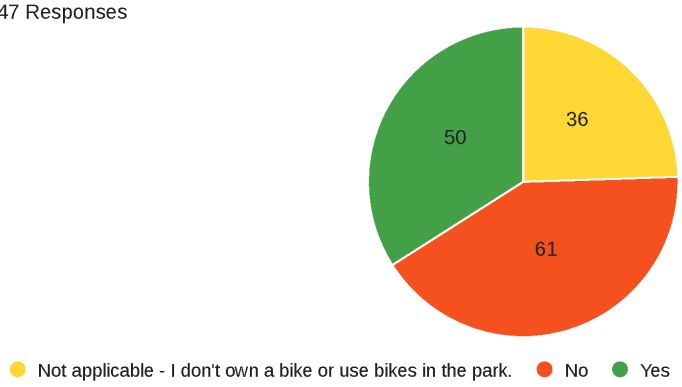
Fantastic variety of opportunities for diff ussrs. Trails bird watching dog park fishing
I love having the natural preserve area to walk through and enjoy the bird life. It's wonderful to have a peaceful natural area and birding hot spot close to our home.1
A beautiful park with the sanctuary for wildlife.
The Natural area is a birding hotspot that has enhanced my recreational time. Having an area dedicated to "natural processes or activities" is vital to my mental health.
It's a lovely place to walk my dog and appreciate nature's beauty.
Providing a fun safe place to play with family
Excellent destination for our kids while we're out running errands.
It has given me a place to walk and birdwatch, without having to deal with dogs.
More beautiful
Bird watching on bike rides
More green space and walking trails
The park has allowed me to access nature and get outside without having to leave town. Much more accessible than most other ‘natural’ areas around Bozeman.

How has Story Mill Community Park benefited your life?

105 Responses

Has the park made your household bicycle more?

147 Responses



147 Responses

Field	Min	Max	Mean	Standard Deviation	Variance	Responses
Has the park made your household bicycle more?	1	3	2	1	1	147

147 Responses

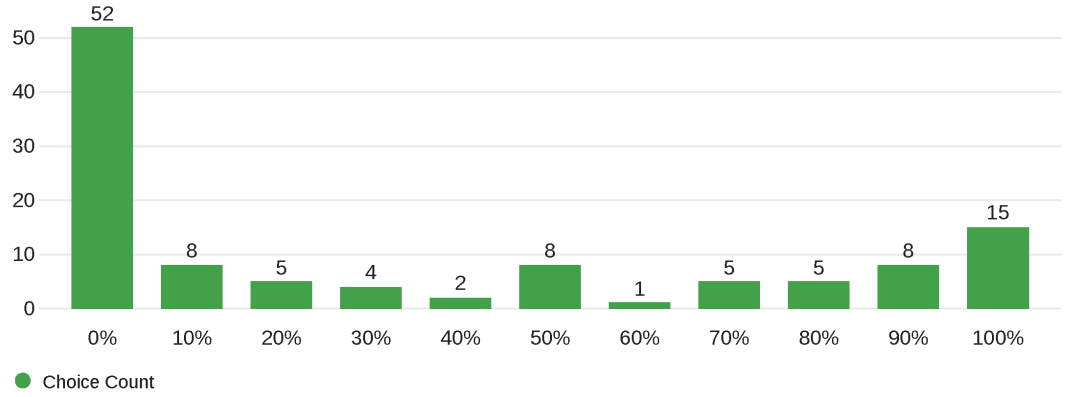
Field		Choice Count
Yes	34.0%	50
No	41.5%	61
Not applicable - I don't own a bike or use bikes in the park.	24.5%	36
Total		147

What percentage of your visits do you bike, walk, run to get to the park?

113 Responses

Field	Min	Max	Mean	Standard Deviation	Variance	Responses	Sum
Bike, walk, run, or bus to the park	0.0	100.0	33.7	39.5	1557.9	113	3810.0

113 Responses



Does the park effectively accommodate people of all ages?

144 Responses

Field	Choice Count	
No	1.4%	2
Yes	98.6%	142
Total		144

144 Responses

What characteristics or features enable the park to accommodate people of all ages?

90 Responses

Places for grandparents to sit and lots for young people to do

Flat and play

Play equipment for littles and wheelchair accessible and plenty of benches and restrooms!

Different age playground equipment and nice walking trails and green space and great shade

There's different play equipment for all ages

Different size equipment good shade. Needs more parking or signs to additional parking.

Walking space is great. Parking can be an issue at times!!

You can go wild or just sit and watch

Good play structures

I like that there is open space to play- love the big trees- if I had been on the planning commitee I would have made the palyground area more visible from the picnic area- more round not so long

Plenty of places for parents babysitters to sit/play if they want to

Level walking. Many options for different levels of play

Shade

Easy walking for us oldsters.

It seems it does because there are people of different ages here

the trails and picnic areas

Accessible paths, playground equipment for various ages.

Cushioned bike path for tots, bathrooms and water fountains for all, nice grassy areas for moms to lay a blanket and nurse their babes, garden area for any age, playground equipment for toys through teens, paths to river for all ages… etc

Variety of features throughout the park

Play areas

Bathrooms ,parking ,shade , benches ,level walkways community activities , picnic tables

The playground equipment has things for all levels- plus the trees and hillside for digging/playing.

ADA access baby

Trails, benches,playground equipment water access

Wide paved walkways, level ground and trails, easy access to equipment and features.

Playground for young families, birding in wetlands typically older folks

Level trails and play equipment

Benches, playground variety, picnic areas

Paved and gravel paths

Playground equipment for all ages, benches, walking paths, bathrooms

Playground for children

The play structed make me wish I was a kid - so fun and engaging! The trails are great for folks of all ages to meander or exercise. I have taken my elders to bird watch. It truly has something for everyone.
Playground equipment; paved, flat walking paths; lots of benches; open fields; picnic locations
Walking paths , playgrounds
The playground is great for younger kids, and the trails are accessible and easy for folks of all ages.
Room to spread out, areas to play, areas to connect/travel through.
The walkways
Tables, paved sidewalks and play equipment.
Walking path, multiple play structures. Shade availability.
-
walking trails, picnic tables, events
Ramp, smooth paths, parking options. Covered spaces, plenty of benches. Interests like the community garden, informative signs, and scaled play equipment.
Variety of activity types
It's level
Variety of play equipment. Shaded picnic areas
Easy trails
Benches and level atea
Something for everyone
Level walking paths
Walkways
Tables
Paved sidewalk, benches, covered seating
close parking, path, restrooms, clean and open space.
Just the playground equipment and day use spaces as well as the accessible bathrooms are so helpful!
Accessible paths and bathroom are a huge asset.
Flat
Variation in size and complexity of playground equipment, paved and rubber paths in addition to gravel.
Range of options
A variety of components
The path ways through the park allows for nice walks and views.
Mobility friendly, playground equipment for various ages, toddler bike track, picnic shelters, paved paths
Flat paved walkways
Many access points, and large space to gather.
Accessible trails, different areas to enjoy
The basket swing is a favorite for grandpa
Varied sized slides, several swing types
Wheelchair accessable walkways. Picnic area in close proximity to parking lot. Plenty of benches. Handicapped, wheelchair accessable bathrooms (but half the time the are closed). Shaded areas.
Paved pathways cleared in the winter, playground equipment and bouldering wall, bird viewing area

easy trails, benches, shade structures, playground equipment
There is something for everyone to enjoy and space for everyone of different ages to utilize the spaces how they'd like. The wide variety of elements (trails, pavilions, playground, learning garden, ping pong, picnic tables, river access)
Everything
It's trail
Almost everything is ADA accessible.
Disabled parking and benches and shade
Paved pathways
Wide sidewalks, many benches, shade, gentle trail grades,
I have no idea. I'm 28.
Flat trails
Parking, paved or gravel trails, restrooms, playground
Playground for children/families, pavilions for all ages, passive enjoyment of walking or biking trails for all ages, birdwatching and enjoying the bird feeders for all ages, the learning garden, and the trail to the M is a big ammentity for the community
Trails, benches, and keeping dogs out of the sanctuary and on leash at all times except the dog park.
Playground and picnic area are highly accessible. The Natural Area is also accessible but allows for a more "natural experience".
Excellent playground equipment for all ages. Shaded spaces to rest for mobility/health challenged (trees, covered shelters)
I see all ages there.
Accessibility
Easy walking paths and trails.
Easy access
Programming previously described in Survey
wide level paths
Wide range of trails, seating, shade, and playground equipment for large range of ages. Easily interpretable signage.

90 Responses

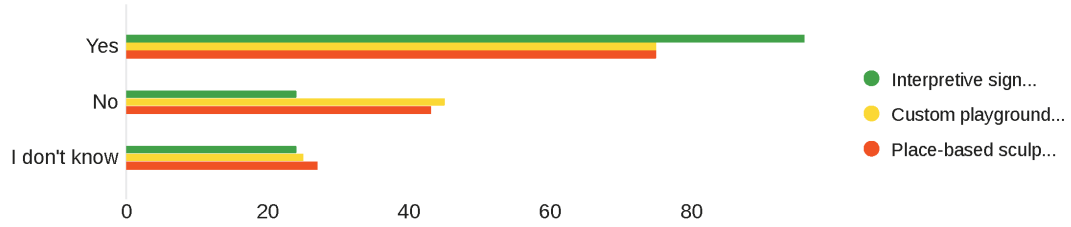
In what ways doesn't the park accommodate people of all ages?

3 Responses

In what ways doesn't the park accommodate people of all ages?
More parking please
Anything for teens/ older kids?
There is so little parking. On a busy day, that's a hinderance.

Have the following features helped you to understand the park site's ecological and/or cultural heritage?

147 Responses

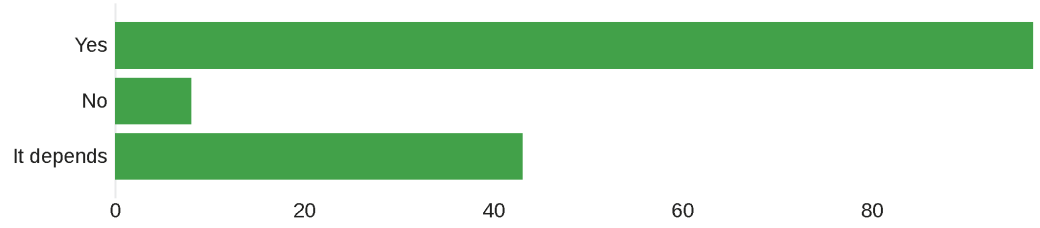


147 Responses

Field	Yes		No		I don't know		Total
Interpretive signs with drawings done by local artist	66.7%	96	16.7%	24	16.7%	24	144
Custom playground equipment	51.7%	75	31.0%	45	17.2%	25	145
Place-based sculptures	51.7%	75	29.7%	43	18.6%	27	145

Do you prefer Story Mill Community Park over other Bozeman parks?

148 Responses



148 Responses

Field	Choice Count
Yes	65.5% 97
No	5.4% 8
It depends	29.1% 43
Total	148

Why do you prefer Story Mill Community Park over other Bozeman Parks?

83 Responses

Beautiful and fun equipment

Pretty and unique and shady and fun and variety

It works best for us

Love the montessori style playground and trails!

Bathrooms and trash and gardens and shade

Beauty and proximity and trails and art

It is large enough to be quiet. The trees shade the play area. The foam path.

Big and close to home

1. Shade 2. Diversity and abundance of play opportunity

Great shade & play equipment. Great spaces for meeting up w/ friends and groups

Great shade and open field and fun play equipment (climbing) and sidewalks (bikes and rollerblades)

Shady trees!

Shade and Sun- DIversity of features and good mix of engineered and natural features. Awesome playground!!!

Story mill provides the most shade compared to other parks. It also has quality equipment for all ages.

Great play area in shade.

It has the best park and the kiddos I watch prefer it over other parks

There's such an unusual variety of playground equipment and neat curved trails and shade.

Lots of open space and shade and unique play structures
The park structures that are more nature/wood/imagination/ creative
Cool surrounds- artful play equiptment- the shade trees
Good playground for grandkids good place to run/access M/Drinking horse
Very close. Easy to walk w/ pets esp. in winter. Relaxing, enjoyable watching kids play.
it has an incredible amount of green space and many different ways to enjoy the park
Its a great field space
Beautiful setting, lots of space and many different things to do.
The variety of things to do to and from the park as we live out of town so it's quite the trip for a park well worth it
Its planned so well, has great views and celebrates our community in its design and function
Bigger
Beautiful views, huge play area for the kids, creek access
Shade, benches , picnic tables bathrooms parking
The shaded playground equipment, the rubber "trail", and we bring bikes for the "road". So many different things to play on.
It's just a great place to take the kids. The landscape design is top notch. The designers did a great job linking built features to nature. Trails. It's good
The natural ecosystems are preserved and trails connect well to other trails
Because there is something for everyone
Variety and shade
There are so many different places to discover if one part of the park is busy
Closest park to our house and so many things to do/see from there
Best size and views
Natural spaces
Creative playscape, shade, creek
? It just works; layout, evenness of path, openness, room for all ages
Its not just a grass "block"
The cool equipment and the shade of the trees!
Cleaner
Location and accommodations
Close to home, not crowded
Shade offerings, River access, bathrooms
We live a block from Bogert but will bike or drive to Story Mill to mix up our play. The all-day shade is perfect in the summer, and summer lunch program punctuates the day.
Diverse park features, breathtaking views, and local programming (Random Acts of Silliness, etc)
Closer for me to get to
Unique features
Everything - location, playground structures, benches, parking All of it!
It is clean. People clean up after their dogs. Love seeing the children in the play area.
Beautiful and shady

Lication
Just the playground equipment and day use spaces as well as the accessible bathrooms are so helpful!
Unique
Birds and dog park
Proximity, size, shade!!, views. Also, the fact that so much of the space is slightly 'unmanaged' (I know it is in fact managed by the city) in that ecosystem isn't overly manicured
It has plenty of shade and a unique playground that incorporates historical and natural elements. I also appreciate the long, wide, paved path for little kids to safely bike.
The pavillions, more natural feel and play equipment
Big, beautiful, natural - more to do
Best playground - design and spread out
Variety of activities
Something for everyone
Larger
Larger so less adjacent city structures, longer trails, and more wildlife
It allows for more intergenerational interaction
Close to my home
The mountain views are great in this park and the location is nice with proximity to the trail system to the M
Because it is bigger and has mor stuff
Because the nature preserve does not allow dogs
trails into natural areas - wth no dogs allowed!
It's not in the center of town, so it doesn't get overpopulated or crowded. We are able to enjoy our space and time without much interruption. It provides additional trails to run on and the river provides water during the warmer months for my dogs to swim in. And the views.
Both natural areas and dog areas
The nature preserve with wildlifee
It is beautifully designed and most people who use it respect it.
No dogs in the Nature Sanctuary.
I like a trail to walk on. It feels safe and it's spacious. Fun to see the kids enjoying play area.
It's large and often shaded. Would love a water feature though!
No dogs allowed in the nature preserve.
Fewer dogs, more nature trails, easy access
It has the widest variety of options/activities/things to do. Also each part of the park feels different, almost like multiple parks in one section. The tree canopy is also something that really draws me into the park, as I really don’t enjoy spending time in places without a nice tree canopy.

Why do you prefer Story Mill Community Park over other Bozeman Parks?

83 Responses

What factors impact whether you chose Story Mill Community Park over other Bozeman parks?

39 Responses

Dog park is essential for us. This is a beautiful park!

Love the trees and shade in the summer.

It's more crowded here but big. And I do find it hard to keep my eyes on kids @ all times because of size.

If we want to play in h20- not the park for us. I would love to see more parking- hard for moms w/ lots of little people- also hard to access the picnic area with coolers & little kids

They're all pretty great

(No) I don't appreciate the road noise and and I prefer trees and shade when I visit parks in town

Bit further from my house so I don't come here for ease of access

the play structure is great and covered picnic area

When i want to walk a quiet trail and see birds

Number of people.

Time, weather,

Sometimes we'll choose a park closer to home, or a park with better water for swimming. Often we end up biking on trail systems that are more connected via natural trails to our westside neighborhood.

-

The grandchildren's preference at the moment

Dog park and creek access

If I'm biking to the M, I pass through the park. That's the only time I go there

Distance

A few other parks have kid pump tracks

I live on the west side of town so if we want a quick park visit I won't go there. But a more extended visit would take me there. And wanting to see birds.

Distance

To start a walk/hike to the M parking lot.

I can't take my 2 young kids solo because the playground is too spread out for me to keep an eye on both at the same time

Story mill is far from my house, easy to lose my kids with the sprawling play structures, but it's shady so we choose it sometimes

We live between Lindley and Story Mill Park. Biking to Story Mill Park is easier and safer.

Looking for shade, near coffee shop, has a trail

It's close to home so I like to walk to the dog park and let my pup can run around - just wish to leash free area was bigger.

Which season it is and what activities I'm pursuing

Dog access

It depends if I want to be in nature or on manicured lawn space. The north side of the park should not have any natural area, it should all be irrigated and mowed turf. That's what the nature preserve is for.

What I plan to do. If picnicking then story mill
I like quiet nature experiences.
purpose of my visit. Picnic areas are great for gathering, play structures are good for small kids. Trails get me to town, creek for fishing, dog park for dog
Proximity to home. I live near another large city park
Story Mill and Glen Lake Rotary are the only parks with longer walking trails. I switch off which one I go to.
distance from my house
Location, time of day, business
Birds
Sport courts
near my residence

Appendix G: Interpretive Signage Index