Summative Evaluation
of the
Science Museum of Minnesota's
Big Back Yard

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EXECUTIVE SUMMARY

I. Principal Findings: Tracking Study

Tracking took place daily from August 13, 2004, to September 2, 2004 during all hours that the Big Back Yard was open. The principal findings for the tracking study are based on the 323 visitors that were tracked during this period.

Visitor Demographics

- There were slightly more male visitors (52.0%) than female visitors (47.1%).
- The largest group of visitors was between 25-44 years of age (38.1%).
- Most visitors were Caucasian (89.8%).
- A majority of visitors were with groups of three or more people (79.6%) and the most frequent type of groups tracked were composed of adults and children (82.7%).

Visitor Experience (Golfers, Non-golfers with golfers, Non-golfers not with golfers)

- The most frequent type of visitor experience in the Big Back Yard was "golfers" (51.7%).

Total Time in Big Back Yard

- The highest median total times in the Big Back Yard based on type of visitor experience were for golfers (42 minutes) and non-golfers, with golfers (43 minutes).
- The groups of visitors with the highest median total time were groups composed of both adults and children (34 minutes).
- Overall, the shortest amount of time a visitor spent in the Big Back Yard was less than a minute and the longest amount of time was 2 hours and 28 minutes.

Tee Times

- Of the 323 visitors tracked in the Big Back Yard, 194 were golfing or with a golfing group. Of these golfing visitors, 23.7% had to wait for tee times.
- Visitors had to wait a median of 9 minutes, 13 seconds for their tee time. The longest period a visitor had to wait for a tee time was 59 minutes, 39 seconds.
- Over half (65.2%) of the 46 visitors waiting for tee times spent all or part of their waiting time visiting exhibit components. The most popular exhibit to visit while waiting for tee times was Panning for Gems.

- There was a significant difference between the total time golfing groups spent in the Big Back Yard based on if tee times were in use or not (median of 53 minutes when tee times used, median of 40 minutes when tee times not being used).

Holes

- The holes where golfing groups had the highest median times were Hole 4 (3 minutes, 39 seconds) and Hole 5 (3 minutes, 8 seconds).
- Hole 4 had the highest percentage of visitors waiting for their group to golf (38.1% of the 189 visitors to Hole 4), while Hole 9 had the smallest percentage (11.8% of the 186 visitors to Hole 9).
- The hole with the most non-golfers, not with golfer visitors was Hole 9 (34.8%). The holes where non-golfing groups had the longest median times were Hole 3 (39 seconds) and Hole 6 (37 seconds).
- Visitors were most likely to see and interact with staff at Hole 3 (staff present for 25.6% of the 215 visits to Hole 3).

Labels

- Of the 39 labels in the Big Back Yard, the most labels a visitor looked at was 29 labels. Golfers looked at the most labels (median of 4 labels). Non-golfers, not with golfers looked at the least labels (median of zero labels).
- Label 27 "Pollution's Secret Passage", located at the beginning of Hole 4, was looked at by the most visitors (24%). This was also the label where the most interactions with another visitor took place.
- Three of the two-sided labels "Food Webs" or "Can a Park Be a Garden?" had the least number of visitors look at them.

Stand-Alone Exhibits (3D Map of the World, Erosion Recorder, Braided River, Dam Removal)

- The Braided River was the most frequently visited exhibit with 60.7% of visitors spending time there. Of the four stand-alone exhibits, it also had the longest maximum time (38 minutes, 6 seconds).
- Visitors spent the highest median time at the Dam Removal exhibit (54 seconds).
- Golfers were the most frequent visitors to the stand-alone exhibits. There was a significant difference between the number of different visitor types (golfers, non-golfers, with golfers, and non-golfers, not with golfers) who visited the Erosion Recorder, Braided River, and Dam Removal exhibits.
- Of the 81 visitors to the 3D Map of the World, 34.6% interacted with the map. 80.2% of the visitors who glanced or looked at the map did so without looking at any of the labels for the exhibit.
- Of the 138 visitors to the Erosion Recorder, 48.6% manipulated the exhibit, which was defined as moving the lever or tank. Museum staff were present while 1 of the 138 visitors was at the Erosion Recorder although there was no visitor-staff interaction.
- Of the 196 visitors to the Braided River, 23.5% manipulated the exhibit, which was defined as moving water spouts, making dams, moving sand, and/or moving pipes. Museum staff was present when 59 of the 196 visitors were at the Braided River. Of these 59 visitors, 13 interacted with the staff.
- Of the 150 visitors to Dam Removal, 49.3% manipulated the exhibit, which was defined as moving the dam. Museum staff was present when 2 of the 150 visitors were at the Dam Removal exhibit. Of these two visitors, one interacted with the staff.

Other Big Back Yard Features (Prairie Maze, Panning for Gems, Erosion Recorder, Dam Removal)

- Panning for Gems was visited the most frequently of the four features with 60.1% of the visitors visiting this exhibit. This exhibit also had the longest maximum time of 42 minutes, 58 seconds.
- The exhibit with the highest median time was the Science House where visitors spent a median of 3 minutes, 22 seconds.

II. Principal Findings: Exit Interviews

Group exit interviews took place between August 13, 2004 to September 2, 2004. A total of 92 interviews were conducted, with 271 participants (145 adults and 126 children under age 18). Note: Visitors interviewed were not necessarily the same visitors who were observed in the tracking portion of this study.

Overall Impressions of the Big Back Yard

- Overall, the visitor response to the Big Back Yard was very positive. Eighty-three of the 92 groups knew of the exhibit prior to visiting the museum on the day they were interviewed. In 63 of the group interviews, visitors noted that they enjoyed and appreciated the combination of the educational content with the fun and recreation of miniature golf.
- Interview findings indicate that the addition of miniature golf did not overwhelm the educational content of the exhibit. Visitors were able to relate some aspect of the educational content in all but eight of the group interviews conducted. Many visitors reported that rather than overwhelm, the addition of mini-golf actually helped them grasp some of the concepts presented.

Perceptions of Main Ideas Presented in Earthscapes Minigolf

Earth's Changing Surface

- In 55 interviews at least one member of the group expressed some aspect of the processes that shape the Earth's surface. However, the themes that emerged from these responses provided evidence that there were variations in the level of understanding or awareness of visitor responses
    - Source to Sink. Nine of the groups (6 adult and 3 child comments) gave responses during the interview that indicated an awareness of the overall idea of source to sink, including the processes of erosion, transport, and deposition.
    - Erosion. Erosion came up frequently in the interviews with 27 groups mentioning something about erosion (36 adult, 6 teenage, and 2 child comments). Although some visitors talked about erosion as one of the processes that shape the Earth's surface, a majority of the comments about erosion were couched in terms of environmental concerns. The responses indicated that these visitors saw erosion as a primarily negative event aggravated by human activities, which consequently required human intervention to be slowed or stopped.

- Transport and Deposition. Mention of the transport or deposition of sediment occurred less frequently than erosion. Sixteen groups spoke about sediment transport or deposition (14 adult, 1 teenage, and 5 child comments).
- Types of Rivers. Twenty-two groups referred to the meandering river, part of Hole 7, either by name or description (15 adult, 5 teen and 5 child comments.) Twenty groups referred to the braided river, either by name or description (17 adult, 3 teen and 3 child comments). Where the meandering river was a form many visitors recognized as something they had seen in Minnesota, the braided river was less familiar. There was a clearer distinction between the responses made by people who had previous knowledge of braided rivers and those that did not.

Interactions between Humans and the Landscape

Over half of the groups interviewed (53 groups with 70 adult, 3 teen, and 16 child comments) indicated that they thought general environmental concern was one of the main ideas of the exhibit. Some comments were more specifically tied to the content presented in the exhibit. Of those comments, dams were referred to most frequently (28 groups), followed by storm sewers (26 groups), and field drainage and hard surface runoff (19 groups).

Factors Affecting Visitor Experience

Group Composition

- Sixty-one of the groups interviewed were comprised of adults and children of various ages. During the interviews, we witnessed several examples of adult-child interactions, which referred to instructional conversations that had taken place earlier in the Big Back Yard.
- There was a clear difference in the types of experiences non-golfing groups and golfing groups reported. Only 2 of the 14 non-golfing groups reported investigating the Big Back Yard in any depth. One group expressed surprise at being allowed to do any exploring as they had not paid to play golf.

Tee-times

- People commented that they didn't feel they could stop too long to read the signs because there were other golfers behind them. These comments occurred whether tee times were being used or not.

OVERVIEW

This report presents the findings of the summative evaluation of the Science Museum of Minnesota's Big Back Yard (BBY), with a specific focus on Earthscapes Miniature Golf. Mary McEathron, Amy Grack, and Stacey Grimes, graduate students in the Evaluation Studies program at the University of Minnesota, carried out the evaluation during the summer of 2004.

The purposes of the evaluation were to understand visitors' experiences in the Big Back Yard and the quality of awareness or understanding acquired as a result of that experience. The evaluation was conducted to answer the following evaluation questions:

1. How do visitors interact with the various components (exhibits, labels, holes) of the Big Back Yard?
2. To what extent does the Big Back Yard increase visitors' awareness and understanding of the Earth's changing surface?
3. How do experiences in the Big Back Yard vary for different types of visitors?
4. To what extent do factors such as tee times or group composition affect a visitor's experience in the Big Back Yard?

Methodology

To answer these questions, data were collected by two primary methods: observational tracking and group exit interviews.

Observational Tracking

In order to gain an understanding of how visitors utilized and interacted with the various components of the Big Back Yard, a tracking study was conducted. For this study, individual visitors were unobtrusively tracked throughout their entire visit to the Big Back Yard. For each individual observed, a tracker recorded the visitor's demographic information, whether or not he/she golfed, which components (exhibits, labels, holes) of the Big Back Yard were visited and for how long, behaviors at these various components, behaviors during tee times, and total time spent in the Big Back Yard. All behaviors were recorded based solely on sight. Listening to visitors' interactions was determined to be an unreliable data collection method due to the outdoor location of the exhibit – next to a busy road and train tracks – which made it difficult to consistently hear

what visitors were saying when observing from a comfortable distance. The elements of the Big Back Yard and the tracking sheet can be found in Appendices 1 and 2, respectively.

Seven individuals carried out the tracking study. Visitors were tracked daily from August 13, 2004, to September 2, 2004 during all hours that the Big Back Yard was open. Visitors who appeared to be nine years of age or older were eligible to be tracked. The sampling method used involved the trackers positioning themselves near the Big Back Yard's entrance. Once in position, the tracker counted to ten and then began tracking the third visitor to enter the Big Back Yard who appeared age nine or above. When trackers finished observing a visitor, they would reposition themselves near the entrance and repeat the sampling method above.

Exit Group Interviews

Semi-structured group exit interviews were conducted to explore and record visitors' impressions of their experiences in the Big Back Yard as well as their reflections about how their awareness or understanding of the Earth's evolving surface as well as the interaction between humans and landscapes may have changed or expanded.

Questions for the interview were developed based on conversations with key staff members at both the Science Museum of Minnesota and the National Center for Earth-surface Dynamics. The first two questions of the interview, "What did you find most interesting about the Big Back Yard?" and "What do you think the main ideas of the Earthscapes Mini-Golf are?" allowed visitors to give their first impressions unprompted. The interview then continued with questions about the themes presented in the exhibit as well as questions designed to elicit responses that indicated a synthesis of the ideas or information presented as a whole (see Appendix 3 for the interview protocol).

Typically, exit interviews are conducted with a singe person (or spokesperson for a group). However, during the pilot-testing phase of this interview data collection process, it became apparent that the experiences that visitors had in the Big Back Yard were so essentially "group experiences" that conducting interviews with only one spokesperson proved difficult. In addition, conducting group interviews afforded us the opportunity to record the ways that parents or adults interacted with children in their groups, in terms of reinforcing (or not) the learning experience.

The interviews were conducted over 11 days, from August 13, 2004 to September 2, 2004. Time periods covered included weekday and weekend, afternoons and evenings to ensure that the full range of experiences and visitor types were captured. The interviewers were positioned near the door to the Science Museum; visitors were asked if they would like to participate as they were exiting the exhibit. Steps were taken by the interviewers to reduce bias in selection by continuously choosing the next available group to interview. Visitors interviewed were not necessarily the same visitors who were observed in the tracking portion of this study. All interviews were recorded, with participants' permission, and transcribed for analysis.

Data Analysis

The quantitative observational data were analyzed using SPSS, a statistical analysis program. Descriptive summary statistics were calculated including frequency distributions for variables such as demographics, visitor type, and behaviors, as well as minimums, maximums, and medians for time data. Medians (the point which divides the responses in half when the data are arranged in numerical order) were used instead of means to reduce the effect of extreme data points. ANOVA was carried out to determine if there was a statistically significant relationship between the use of tee times and the total time spent in the Big Back Yard. Chi-Square was used to find out if there was a statistically significant relationship between visitor type and visits to stand-alone exhibits.

The transcribed interview data were coded thematically, aided by NVIVO, a data base program used in organizing qualitative data. Within each thematic group, responses were re-read to ensure consistency. In the second stage of analysis, supporting connections or trends between groups surfaced; findings were compared and/or contrasted with those arrived at by observational data.

I. PRINCIPAL FINDINGS: TRACKING STUDY

A total of 332 visitors were tracked from the moment they entered the Big Back Yard to when they exited. Nine tracking sheets did not provide usable data and were excluded from the results, leaving 323 observations from which analyses in this report are based. The Big Back Yard components covered in the tracking study include Earthscapes Miniature Golf (which has nine holes, four stand alone exhibits, and 39 individual text labels), Panning for Gems, Prairie Maze, Science House, and Medicine Garden. Note: The data presented in this section are based on visitors observed from August 13, 2004, to September 2, 2004.

Visitor Demographics

Trackers recorded visitor demographics based on observation only. Gender, age, and ethnicity were recorded for visitors observed and are summarized in Table 1. There were slightly more male visitors (52.0%) than female visitors (47.1%). The largest group of visitors was 25-44 years of age (38.1%). The smallest group of visitors was senior citizens 65 years of age and older (4.0%). A majority of the visitors were Caucasian (89.8%).

Table 1: Observed Visitor Demographics
(n=323)

	Percent of Visitors	Number of Visitors
Gender*		
Male	52.0 %	168
Female	47.1 %	152
Age		
Ages 9-13	28.5 %	92
Ages 14-18	10.8 %	35
Ages 19-24	6.8 %	22
Ages 25-44	38.1 %	123
Ages 45-64	11.8 %	38
Ages 65+	4.0 %	13
Ethnicity*		
Caucasian	89.8 %	290
Asian	4.3 %	14
African-American	2.5 %	8
Hispanic/Latino	1.2 %	4
Other	0.6 %	2

*Percentages do not add up to 100% for both gender and ethnicity because three data sheets (0.9%) were missing gender information and five (1.5%) were missing ethnicity information.

Both group size and group composition were recorded (see Table 2). Children were defined as anyone who appeared age 18 and younger; adults were defined as anyone who appeared age 19 and above. A majority of visitors tracked were with groups of three or more people (79.6%). Groups of three (27.9%), four (26.6%), and five or more (25.1%) were nearly equal in number. A majority of the visitors were with groups composed of both adults and children (82.7%).

Table 2: Group Size and Composition
(n=323)

	Percent of Visitors	**Number of Visitors**
Group Size		
One (alone)	1.2%	4
Two	19.2%	62
Three	27.9%	90
Four	26.6%	86
Five or more	25.1%	81
Group Composition		
Adults and children	82.7%	267
Adults only	13.6%	44
Children only	3.7%	12

Visitor Experience

Visitors were placed in one of the following categories based on their experience in the Big Back Yard:

- "Golfers" were visitors who golfed during their visit.
- "Non-golfers, with golfers" were visitors who did not golf, but followed others in their own group who were golfing.
- "Non-golfers, not with golfers" were visitors who walked around the Big Back Yard, looked at the various components, and may have watched other groups golf.
- "Did not interact with any components" were visitors who entered the Big Back Yard and may have visited the clubhouse, but returned to the museum without interacting with any exhibit components. When trackers observed someone who could be this type of visitor, they waited for fifteen minutes after the visitor went back into the museum in case the visitor returned to the Big Back Yard before recording them as this visitor type. There was the possibility that these visitors, recorded as "Did not interact with any components," returned later in the day for a reserved tee-time. If so, they may or may not have been tracked at that time.

Table 3 illustrates the number of observed visitors for each experience category. The most frequent type of visitor experience was "golfers" (51.7%).

Table 3: Type of Visitor Experience in the Big Back Yard
(n=323)

Visitor Experience	Percent of Visitors	Number of Visitors
Golfer	51.7 %	167
Non-golfer, with golfers	8.4 %	27
Non-golfer, not with golfers	28.5 %	92
Did not interact with any components	11.5 %	37

Table 4 illustrates the types of experiences of the various visitor groups. If groups composed of only adults or only children visited the Big Back Yard, they either golfed or were with a group that decided not to golf. None of these groups had individuals that did not golf but watched other

members of their group golf. Visitor groups composed of both adults and children fell into all four types of visitor experiences, with golfing being the most frequent visitor experience for this group.

Table 4: Group Composition and Type of Visitor Experience
(n=323)

Visitor experience	**Group Composition**		
	Adults only	Children only	Adults and children
Golfer	19	6	142
Non-golfer, with golfers	0	0	27
Non-golfer, not with golfers	19	6	67
Did not interact with any components	6	0	31

Total Time in Big Back Yard

The total time in the Big Back Yard was recorded for each observed visitor. Table 5 lays out the minimum, maximum, and median times in the Big Back Yard for the various visitor types. Trackers recorded entry and exit times to the nearest minute. All other times recorded on the tracking sheet, and presented in this report, are reported to the nearest second. The highest median times were for golfers (42 minutes) and non-golfers, with golfers (43 minutes). It should be expected that the median times of these two groups would be similar because they are both golfing groups. Overall, the shortest amount of time a visitor spent in the Big Back Yard was less than a minute and the longest amount of time was 2 hours, 28 minutes.

Table 5: Total Time in Big Back Yard by Type of Visitor Experience
(n=323)

Visitor Experience	Minimum	Maximum	Median
Golfer	11 min.	2 hr. 28 min.	42 min.
Non-golfer, with golfers	12 min.	1 hr. 17 min.	43 min.
Non-golfer, not with golfers	2 min.	50 min.	12 min.
Did not interact with any components	Less than 1 min.	17 min.	2 min.

Table 6 lays out the minimum, maximum, and median times in the Big Back Yard by the composition of the group. The highest median time was for groups composed of both adults and children (34 minutes). This group also had the longest maximum time of 2 hours, 28 minutes.

Table 6: Total Time in Big Back Yard by Group Composition
(n=323)

Visitor Experience	Minimum	Maximum	Median
Adults Only	1 min.	1 hr. 19 min.	14 min.
Children Only	3 min.	1 hr. 13 min.	11 min.
Adults and Children	Less than 1 min.	2 hr. 28 min.	34 min.

Earthscapes Miniature Golf: Tee Times

When the miniature golf course became busy, tee times were put in place to help control the number of visitors golfing. Visitors who wanted to golf either waited in the Big Back Yard for their tee time or went back into the museum. The length of time these groups waited and what they did with that time was collected if they remained in the Big Back Yard. Of the 323 visitors tracked in the Big Back Yard, 194 were golfing or with a golfing group. Table 7 shows that 23.7% of golfing visitors had to wait for tee times.

Table 7: Number of Visitors Waiting For Tee Times
(n=194)

Tee Times	Percent of Visitors	Number of Visitors
Using tee times	23.7%	46
Not using tee times	76.3%	148

For the 46 observed visitors who had to wait for a tee time, the median wait time was 9 minutes, 13 seconds. Wait time was defined as how long visitors had to wait for their tee time from the moment they first left the clubhouse without clubs, to when they later left the clubhouse with clubs. The longest time a visitor had to wait was 59 minutes, 39 seconds. There were some visitors that did not have to wait at all for a tee time and were able to golf right away, even though tee times were in place. For those visitors it was likely that they had received a tee time earlier and had gone back into the museum until their reserved time.

Information was collected to understand how visitors spent their time waiting for their tee times (see Table 8). If visitors left the clubhouse the immediately with clubs and did not have to wait for a tee time it was recorded as "Didn't wait, went straight to Hole 1." Some visitors waited at the picnic tables until their tee time was called, while others explored the Big Back Yard. Some visitors spent part of their time exploring and part of it waiting at the picnic tables. Over half of the observed visitors spent all or part of their wait time visiting exhibit components (34.8% visited exhibits only, 30.4% visited exhibits and waited). 23.9% of the visitors golfed right away (during tee times) so it can be assumed that they spent their wait time inside the museum.

Table 8: Visitor Behaviors While Waiting For Tee Time
(n=46)

Behavior	Percent of Visitors	Number of Visitors
Visited exhibit components only	34.8%	16
Waited at picnic table only	10.9%	5
Waited at picnic table and visited exhibit components	30.4%	14
Didn't wait, went straight to hole 1	23.9%	11

Of the 35 visitors who waited for tee times, 30 of them explored the Big Back Yard. Table 9 identifies what components of the Big Back Yard these visitors went to while waiting. The most frequently visited exhibit while waiting was Panning for Gems. The other exhibit components with the highest numbers were also exhibits in the Big Back Yard (Prairie Maze 43.3%, Braided River 40.0%, Erosion Recorder 23.3%). There were nineteen other exhibit components, not included in Table 9, that were visited by only one or two of the visitors while waiting for tee times.

Table 9: Exhibit Components Visited While Waiting For Tee Time
(n=30)

Exhibit Component	Percent of Visitors*	Number of Visitors
Panning for Gems	53.3%	16
Prairie Maze	43.3%	13
Braided River Exhibit	40.0%	12
Erosion Recorder Exhibit	23.3%	7
3D Map Exhibit	13.3%	4
Look at Hole 1	13.3%	4
Label 40: "River Just Keeps Braiding"	13.3%	4
Look at Hole 9	13.3%	4
Science House	10.0%	3
Label 6: "3D View of the World"	10.0%	3
Look at Hole 7	10.0%	3
Look at Hole 8	10.0%	3

*Percentages add to more than 100% because some visitors visited more than one exhibit component while waiting.

As shown in Table 9, a majority of the visitors waiting for tee times explored the Big Back Yard while they waited. These groups did not spend as much time exploring after they finished golfing; whereas visitors who could golf right away, tended not to do any preliminary exploring and only some post-golfing exploration. Table 10 illustrates the total amount of time observed golfing groups (golfers and non-golfers with golfers) spent in the Big Back Yard when tee times were and were not being used. When tee times were in place, golfing groups spent a median of 53 minutes in the Big Back Yard compared to a median of 40 minutes when tee times were not being used. In order to determine if this difference in median times was significant, ANOVA was carried out. The results were significant with a p-value of 0.002 (when using an alpha value of 0.05). With more time spent in the Big Back Yard during tee times overall, the groups that used that time for preliminary exploration may have experienced more of the Big Back Yard than golfing groups who did not have to wait for a tee time.

Table 10: Total Time in Big Back Yard For Golfing Groups Based on Tee Times
(n=194)

Tee Times*	Percent of Visitors	Number of Visitors	Minimum	Maximum	Median
Using tee times	23.7%	46	21 min.	1 hr. 54 min	53 min.
Not using tee times	76.3%	148	11 min.	2 hr. 28 min.	40 min.

* p = 0.002

Golf Holes

Each of the nine holes in the Earthscapes Miniature Golf Course represents a concept about landscape processes and the Earth's changing surface. During preliminary observations, it was clear that it would be difficult to decipher whether visitors' behaviors at the holes were related to the concept being represented by the hole or if they were strictly related to golfing strategies. For this reason, specific behaviors at each hole were not recorded for golfing groups. Instead, information recorded for golfers and non-golfers with golfers included what they did while waiting to golf at a hole, how much time they spent at the hole, and interactions with staff at the hole. Non-golfers were observed to determine whether they were visiting the holes, how long they were visiting, what behaviors were exhibited at the hole, and whether they were interacting with staff at the holes.

Golfers and Non-golfers With Golfers

Table 11 provides information about how many tracked visitors with golfing groups (golfers and non-golfers with golfers) visited each hole and for how long. None of the holes have all golfing groups visiting them because some visitors skipped holes. The holes with the most golfing group visitors were Holes 2, 3, and 4. The holes where golfing groups had the highest median times were Hole 4 (3 minutes, 39 seconds) and Hole 5 (3 minutes, 8 seconds). Appendix 4 contains more detailed information about the numbers of visitors, median time, minimum time, and maximum time at each hole for golfers and non-golfers with golfers.

Table 11: Number of Golfing Groups At Each Hole and Time Spent There
(n=194)

Hole	Percent of Visitors	Number of Visitors	Median Time
Hole 1: Source to Sink	97.4%	189	2 min. 12 sec.
Hole 2: Erosion	97.9%	190	2 min. 34 sec.
Hole 3: Hydraulic Jump	97.9%	190	2 min. 42 sec.
Hole 4: City Storm Sewer	97.9%	190	3 min. 39 sec.
Hole 5: Draining the Fields	96.4%	187	3 min. 8 sec.
Hole 6: City Surface Runoff	95.4%	185	2 min. 23 sec.
Hole 7: Meandering River	96.4%	187	2 min. 51 sec.
Hole 8: Lock and Dam	95.9%	186	2 min. 23 sec.
Hole 9: Gulf of Mexico	96.9%	188	1 min. 40 sec.

For each visitor, trackers recorded whether the group the visitor was with was able to golf right away at each hole or if they had to wait to golf. Table 12 lays out how many observed visitors had to wait for their group to golf at each hole. Hole 4 had the highest percentage of visitors waiting for their group to golf (38.1% of the 189 visitors to Hole 4). Hole 9 had the smallest percentage of visitors who had to wait for their group to golf (11.8% of the 186 visitors to Hole 9). Appendix 5 provides additional information regarding what visitors did while waiting to golf (waited in line and/or visited exhibit components) and what exhibit components they visited while waiting.

Table 12: Number of Visitors Who Waited to Golf at Each Hole
(n=194)

Hole	Number of Visitors to Hole*	Percent that Waited to Golf	Number that Waited to Golf
Hole 1: Source to Sink	188	18.6%	35
Hole 2: Erosion	190	22.1%	42
Hole 3: Hydraulic Jump	190	30.0%	57
Hole 4: City Storm Sewer	189	38.1%	72
Hole 5: Draining the Fields	186	35.5%	66
Hole 6: City Surface Runoff	184	16.8%	31
Hole 7: Meandering River	186	34.4%	64
Hole 8: Lock and Dam	186	29.0%	54
Hole 9: Gulf of Mexico	186	11.8%	22

*The number of visitors at each hole in this table may not match up with the number of visitors in Table 11 because there were some visitors that visited holes but ended up not golf them.

Non-golfers, Not With Golfers

Table 13 provides information about how many observed non-golfers, not with golfers visited each hole and how long they spent there. The hole with the most non-golfers, not with golfer visitors was Hole 9 (34.8%). The holes where non-golfing groups had the longest median times were Hole 3 (39 seconds) and Hole 6 (37 seconds). Hole 3 and Hole 5 was where the most non-golfing visitors watched golfers (52.0% of the 25 visitors to Hole 3, 58.3% of the 12 visitors to Hole 5). Because the holes were created to represent various concepts, visitors gained a better understanding of the messages throughout Earthscapes Miniature Golf if they not only read the labels, but also looked at the terrain of the holes. If non-golfers watched visitors golf they could possibly gain a deeper understanding by observing the path the golf ball followed through the landscape, alerting

them to features of the hole's landscape they may have otherwise missed. Appendix 4 contains more detailed information about non-golfers, not with golfers, at each hole in terms of the numbers of visitors, median time, minimum time, and maximum time at each hole. As illustrated in Tables 11 and 13, visitors with golfing groups (golfers and non-golfers with golfers) spent more time at each of the nine holes than visitors who were non-golfers, not with golfers.

Table 13: Number of Non-golfers, Not With Golfers, at Each Hole and Time Spent There
(n=92)

Hole	Percent of Visitors	Number of Visitors	Percent Watching Others Golf	Number Watching Others Golf	Median
Hole 1: Source to Sink	18.5%	17	47.1%	8	13 sec.
Hole 2: Erosion	13%	12	41.7%	5	34 sec.
Hole 3: Hydraulic Jump	27.2%	25	52.0%	13	39 sec.
Hole 4: City Storm Sewer	12.0%	11	27.3%	3	22 sec.
Hole 5: Draining the Fields	13.0%	12	58.3%	7	25 sec.
Hole 6: City Surface Runoff	15.2%	14	28.6%	4	37 sec.
Hole 7: Meandering River	26.1%	24	29.2%	7	24 sec.
Hole 8: Lock and Dam	13%	12	33.3%	4	18 sec.
Hole 9: Gulf of Mexico	34.8%	32	28.1%	9	18 sec.

Additional Findings

All visitors were observed to see whether they interacted with staff members when staff were present at the holes. Staff interactions were defined as the visitor talking to Science Museum staff or interacting with them in some other way. Table 14 shows that visitors were most likely to see and interact with staff at Hole 3 (staff present for 25.6% of the 215 visits to Hole 3) and Hole 7 (staff present 10.0% of the 211 visits to Hole 7).

Table 14: Staff Presence and Interactions at Holes
(n=323)

Hole	Number of Visitors to Hole	Percent of Visitors When Staff Present	Number of Visitors When Staff Present	Number of Interactions with Staff
Hole 1: Source to Sink	206	2.9%	6	2
Hole 2: Erosion	202	1.5%	3	0
Hole 3: Hydraulic Jump	215	25.6%	55	20
Hole 4: City Storm Sewer	201	2.5%	5	2
Hole 5: Draining the Fields	199	1.5%	3	2
Hole 6: City Surface Runoff	199	3.5%	7	2
Hole 7: Meandering River	211	10.0%	21	4
Hole 8: Lock and Dam	198	0.5%	1	0
Hole 9: Gulf of Mexico	214	2.8%	6	3

Hole 7 was unique because visitors could interact with the meandering river. Behaviors were recorded for all visitors, as shown in Table 15, in terms of their interactions with the meandering river. Of the 211 visitors to Hole 7, 21.8% of them interacted with the river, which was defined as shoveling out sand and/or placing boats or balls in water.

Table 15: Behaviors for the Meandering River at Hole 7
(n=211)

Behavior	Percent of Visitors	Number of Visitors
Manipulate	21.8%	46
Watch another visitor manipulate	37.9%	80
Assist or was assisted	3.3%	7
Motion or was motioned	4.7%	10

Labels

There were 39 individual text labels throughout the Earthscapes Miniature Golf course. These labels described what was being represented at the holes and stand-alone exhibits, as well as some of the natural features incorporated into the landscaping of the golf course, such as the rain garden and native plants. The labels provided visitors with information aimed at giving them a deeper understanding of what they were seeing in the Big Back Yard.

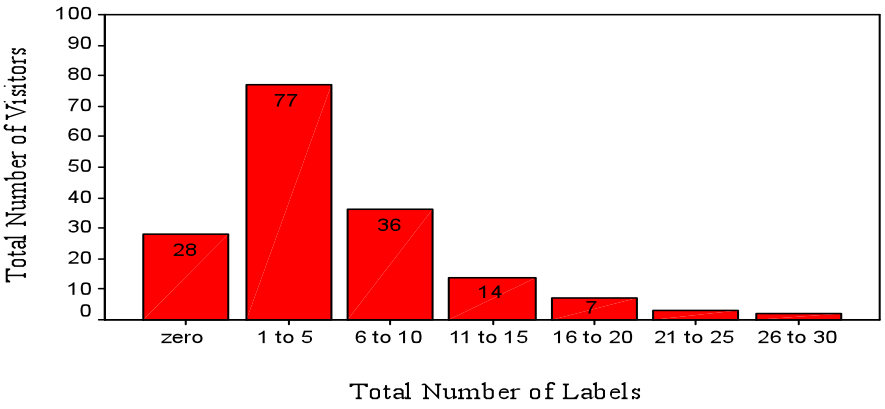
Total Number of Labels Looked At

As shown in Table 16, golfers looked at the most labels (median of 4 labels). "Looked at label" was recorded when a visitor looked at a label for three seconds or longer. Non-golfers, not with golfers, looked at a median of zero labels. The low number of labels for non-golfers, not with golfers could be attributed to the fact that most of the labels were in the miniature golf course, and visitors may have been reluctant to walk through if they were not golfing. Additionally some of the labels were placed within the area of a particular hole, so they were less accessible to visitors who were not golfing. Graphs 1, 2, and 3 illustrate how frequently observed visitors looked at labels based on visitor type.

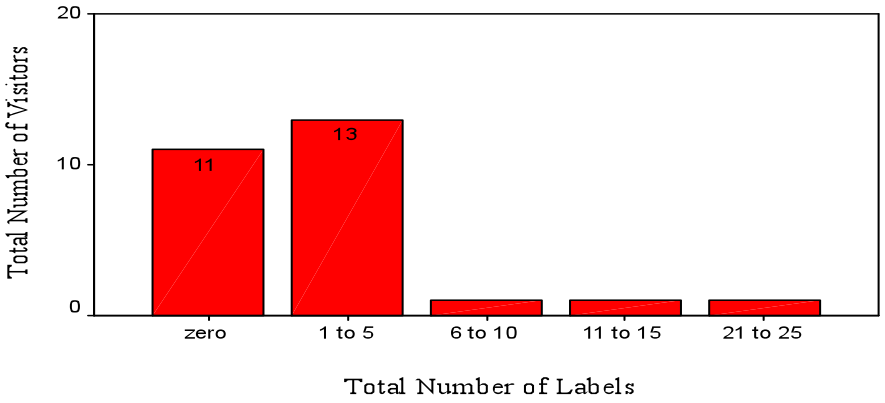
Table 16: Visitor Type and Total Number of Labels Looked At
(n=323)

Visitor experience	Minimum	Maximum	Median
Golfer	0	29	4
Non-golfer, with golfers	0	22	1
Non-golfer, not with golfers	0	24	0

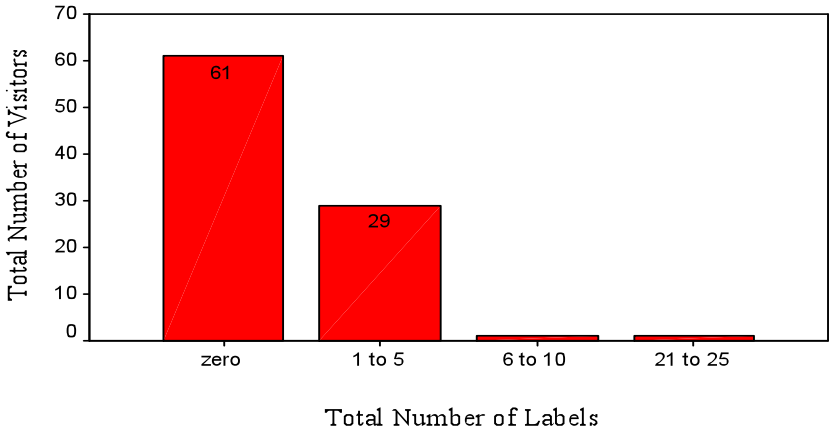
Graph 1: Total Number of Labels Looked at for Golfers
(n=167)



Graph 2: Total Number of Labels Looked at for Non-golfers with Golfers
(n=27)



Graph 3: Total Number of Labels Looked at for Non-golfers, Not With Golfers
(n=92)



Number of Visitors Who Looked at Each Label

Tables 17 and 18 list the labels and the percent of observed visitors who stopped and looked at each label. The Big Back Yard Elements Sheet (Appendix 1) contains a listing of the labels and the associated hole or exhibit. As shown in Table 19, Label 27: "Pollution's Secret Passage," located at the beginning of Hole 4, was looked at by the most visitors (23.8%). Hole 7 had the next two most popular labels, Label 51: "Meandering Rivers" (22.0%) and the interactive Label 52: "Measure Meandering Rivers" (20.1%). As shown in Table 20, three of the two-sided labels "Food Webs" or "Can a Park Be a Garden?" had the least number of visitors [Label 47 (1.9%), Labels 41 (0.9%), and Label 56 (0.9%)].

Table 17: Labels 10% or More Visitors Looked At
(n=323)

Name of Label	Percent of Visitors	Number of Visitors
Label 27: "Pollution's Secret Passage"	23.8%	77
Label 51: "Meandering River"	22.0%	71
Label 52: "Measure Meandering Rivers" Interactive	20.1%	65
Label 16: "Eroding Rock"	17.0%	55
Label 28: "Draining the City"	15.2%	49
Label 12: "Start to Finish"	14.6%	47
Label 32: "Draining the Fields"	13.9%	45
Label 44: "Hard Surface Runoff"	13.9%	45
Label 23: "Spillway"	13.6%	44
Label 40: "River Just Keeps on Braiding"	12.1%	39
Label 66: "Ready for another round of golf?"	11.5%	37
Label 48: "Hold a Truck…But Doesn't Hold Water"	10.5%	34

Table 18: Labels Less Than 10% of Visitors Looked At
(n = 323)

Name of Label	Percent of Visitors	Number of Visitors
Label 13: "From Source to Sink"	9.9%	32
Label 64: "River Delta"	9.0%	29
Label 19: "A Slice Through Earth's History"	8.7%	28
Label 17: "A Downhill Move"	8.0%	26
Label 18: "Food Webs/Can a Park Be a Garden?"	8.0%	26
Label 59: "Engineered River"	8.0%	26
Label 38: "Unraveling the Behavior of Braided Rivers"	7.7%	25
Label 34: "Two Choices: Fast or Slow"	7.1%	23
Label 65: "Out to Sea"	6.5%	21
Label 53: "Rivers on the Move"	5.9%	19
Label 55: "Restoring Urban Creeks and Streams"	5.9%	19
Label 35: "What's the Best Way?"	5.3%	17
Label 24: "Hydraulic Jump"	5.0%	16
Label 46: "Rainwater's Wayside Rest"	4.3%	14
Label 29: "One Source in a Million"	4.0%	13
Label 61: "St. Anthony Falls"	4.0%	13
Label 39: "Different Geography, Different Rivers"	3.7%	12
Label 45: "Rain Gardens"	3.7%	12
Label 60: "Engineered Obstacles"	3.7%	12
Label 6: "3D View of the World"	3.1%	10
Label 7: "Look Beneath the Oceans"	3.1%	10
Label 36: "Draining the Land, Changing the Watershed"	3.1%	10
Label 8: "Look for Changing Landscapes"	2.8%	9
Label 33: "Field of Drains"	2.8%	9
Label 47: "Food Webs/Can a Park Be a Garden?"	1.9%	6
Label 41: "Food Webs/Can a Park Be a Garden?"	0.9%	3
Label 56: "Food Webs/Can a Park Be a Garden?"	0.9%	3

Visitor Interactions at Labels

For each label, visitor interactions were recorded. "Interactions with another visitor" was defined as pointing at the label, motioning (or was motioned) over to the label, and/or pointing at the hole directly after looking at label. Table 19 provides data for the labels with the most number of visitor interactions. The full table of interactions for all the labels can be found in Appendix 6. The label where the most overall interactions with another visitor occurred was Label 27: "Pollution's Secret Passage" (6.8%). As stated earlier, Label 27 was also looked at by the most visitors. Of the 77 visitors who looked at Label 27, 28.6% interacted with another visitor in relation to the label.

Table 19: Visitor Interactions Related to Label
(n=323)

Name of Label	Percent of Visitors	Number of Visitors
Label 27: "Pollution's Secret Passage"	6.8%	22
Label 16: "Eroding Rock"	5.3%	17
Label 12: "Start to Finish"	5.0%	16
Label 51: "Meandering River"	4.3%	14
Label 13: "From Source to Sink"	3.4%	11

Behaviors at Interactive Label 52: "Measure Meandering Rivers"

Label 52: "Measure Meandering Rivers" was an interactive label where visitors used a rope to measure and compare the length of two meandering rivers. More detailed behaviors were recorded for this interactive label. As shown in Table 20, 9.6% of observed visitors manipulated the interactive label, which was defined as measuring one or both rivers with the rope.

Table 20: Behaviors at Interactive Label 52: "Measure Meandering Rivers"
(n=323)

Behavior	Percent of Visitors	Number of Visitors
Manipulate	9.6%	31
Watch another visitor manipulate	7.4%	24
Assist or was assisted	3.1%	10
Point to label	2.8%	9
Motion or was motioned	1.5%	5

Stand-Alone Exhibits

There were four stand-alone exhibits dispersed throughout Earthscapes Miniature Golf. These included the 3D Map of The World, Erosion Recorder, Braided River, and Dam Removal. Because capturing conversations was not a reliable source of data, other indicators of engagement were recorded at each of these exhibits. These indicators were the amount of time spent at each exhibit and a variety of behaviors, including manipulating the exhibit, watching another visitor or staff manipulate the exhibit, interacting with staff at the exhibit, assisting (or being assisted by) another visitor to use the exhibit, motioning (or being motioned by) another visitor to the exhibit, or pointing to something on the exhibit. Table 21 shows how many observed visitors visited the various stand-alone exhibits. The Braided River was the most visited exhibit with 60.7% of visitors spending time there. Visitors spent the longest median time at the Dam Removal exhibit (54 seconds). The exhibit that had the longest maximum time was the Braided River with one visitor staying there for 38 minutes, 6 seconds.

Table 21: Stand-Alone Exhibits
(n=323)

Exhibit	Percent of Visitors	Number of Visitors	Minimum	Maximum	Median
Braided River	60.7%	196	1 sec.	38 min. 6 sec.	37 sec.
Dam Removal	46.4%	150	2 sec.	17 min. 21 sec.	54 sec.
Erosion Recorder	42.7%	138	1 sec.	10 min. 44 sec.	26 sec.
3D Map of the World	25.1%	81	1 sec.	6 min. 48 sec.	13 sec.

Table 22 shows the breakdown of visitor types at each of the stand-alone exhibits. For all four stand-alone exhibits, golfers were the most frequent visitors. Chi-Square analyses were carried out to see whether there was a significant difference between the types of visitors who visited each exhibit. The results were significant for the Erosion Recorder, Braided River, and Dam Removal, each with a p-value of 0.000 (when using an alpha value of 0.05). The Erosion Recorder, Braided River, and Dam Removal are all within the miniature golf course area which might explain why golfing groups were more likely to visit these three exhibits than non-golfers, not with golfers.

Table 22: Types of Visitors Who Visited Stand-Alone Exhibits
(n=323)

Exhibit and Group Composition	Percent of Visitors	Number of Visitors
3D Map of the World		
Golfer	16.4%	53
Non-golfer, with golfers	1.2%	4
Non-golfer, not with golfers	7.4%	24
Erosion Recorder*		
Golfer	30.0%	97
Non-golfer, with golfers	3.7%	12
Non-golfer, not with golfers	9.0%	29
Braided River*		
Golfer	43.7%	141
Non-golfer, with golfers	7.1%	23
Non-golfer, not with golfers	9.9%	32
Dam Removal*		
Golfer	35.3%	114
Non-golfer, with golfers	4.3%	14
Non-golfer, not with golfers	6.8%	22

*p-value = 0.000

Visitor Behaviors at Stand-Alone Exhibits

For each of the four stand-alone exhibits, visitor behaviors were recorded. The behaviors recorded for the Erosion Recorder, Braided River, and Dam Removal stand-alone exhibits included whether the visitor glanced at the exhibit for less than three seconds, looked at the exhibit for three or more seconds, manipulated the exhibit, watched another visitor manipulate the exhibit, assisted (or was assisted by) another visitor to manipulate the exhibit, motioned (or was motioned by) another visitor over to the exhibit, and pointed to something on the exhibit. Behaviors for the 3D Map were slightly different than the other three stand-alone exhibits because of the nature of the exhibit (it does not have any pieces to manipulate). The behaviors recorded for the 3D Map included whether the visitor glanced at the map without looking at any of the exhibit labels, looked at the map without looking at any of the exhibit labels, went up to the map after looking at one of the exhibit labels, interacted with another visitor regarding the map such as pointed to the map or motioned (or was motioned by) a visitor over to the map, or watched another visitor interact with the map (such as pointing to the map). For each stand-alone exhibit, it was noted whether staff were present at the

exhibit and if the visitor interacted with the staff and/or watched the staff manipulate the exhibit. Staff interactions were recorded based on being able to observe the visitor talking to Science Museum staff or interacting with them in some other way.

3D Map of the World

Table 23 presents behaviors for the 3D Map of the World. Most of the visitors who glanced or looked at the map did so without looking at any of the labels for the exhibit (80.2%). Of the 81 visitors to the 3D Map of the World, 34.6% interacted with the map. Staff were not present at the 3D Map while the 81 visitors were there, so there were no staff-visitor interactions in relation to the map.

Table 23: Behaviors at 3D Map of the World
(n=81)

Behavior	Percent of Visitors	Number of Visitors
Glanced at exhibit without looking at labels	35.8%	29
Looked at exhibit without looking at labels	44.4%	36
Went up to map after looking at one of the exhibit labels	19.8%	16
Interacted with another visitor regarding exhibit (point to map, motion or was motioned to map)	34.6%	28
Watched another visitor point to map	16.0%	13

Erosion Recorder

Table 24 lays out visitor behaviors at the Erosion Recorder exhibit. Of the 138 visitors to the Erosion Recorder, 48.6% manipulated the exhibit, which was defined as moving the lever or tank. Museum staff was present when 1 of the 138 visitors was at the Erosion Recorder and that visitor watched the staff member manipulate the exhibit.

Table 24: Behaviors at Erosion Recorder
(n=138)

Behavior	Percent of Visitors	Number of Visitors
Glanced At exhibit	15.9%	22
Looked at exhibit	84.1%	116
Manipulate exhibit	48.6%	67
Watch another visitor manipulate	26.8%	37
Assist or was assisted	10.1%	14
Motion or was motioned	11.6%	16
Point to exhibit	24.6%	34

Braided River

Of the 196 visitors to the Braided River, 23.5% manipulated the exhibit, which was defined as moving water spouts, making dams, moving sand, and/or moving pipes (see Table 25). Museum staff were present when 59 of the 196 visitors were at the Braided River. Of these 59 visitors, 13 interacted with the staff and 9 watched staff manipulate the exhibit.

Table 25: Behaviors at Braided River
(n=196)

Behavior	Percent of Visitors	Number of Visitors
Glanced At exhibit	19.4%	38
Looked at exhibit	80.6%	158
Manipulate exhibit	23.5%	46
Watch another visitor manipulate	35.7%	70
Assist or was assisted	10.7%	21
Motion or was motioned	8.7%	17
Point to exhibit	11.7%	23

Dam Removal

Of the 150 visitors to the Dam Removal exhibit, 49.3% manipulated the exhibit, which was defined as moving the dam (see Table 26). Museum staff was present when 2 of the 150 visitors were at the Dam Removal exhibit. Of these two visitors, one interacted with the staff.

Table 26: Behaviors at Dam Removal
(n=150)

Behavior	Percent of Visitors	Number of Visitors
Glanced At exhibit	7.3%	11
Looked at exhibit	92.7%	139
Manipulate exhibit	49.3%	74
Watch another visitor manipulate	35.3%	53
Assist or was assisted	14.0%	21
Motion or was motioned	16.0%	24
Point to exhibit	36.0%	54

Other Big Back Yard Features

This evaluation's primary focus was Earthscapes Miniature Golf, but visitors were observed to see whether they also visited some of the other features in the Big Back Yard. These features were Panning for Gems, Prairie Maze, Science House, and Medicine Garden. Table 27 lays out the number of visitors who visited each of the four features and the minimum, maximum, and median times spent at the features. Panning for Gems was the most visited of these four features with 60.1% of the visitors visiting this exhibit. Panning for Gems also had the longest maximum visiting time of 42 minutes, 58 seconds. The exhibit with the highest median time was the Science House where visitors spent a median of 3 minutes, 22 seconds.

Table 27: Number of Visitors and Time Spent at Four Features of the Big Back Yard
(n=323)

Big Back Yard Feature	Percent of Visitors	Number of Visitors	Minimum	Maximum	Median
Panning for Gems	60.1 %	194	1 sec.	42 min. 58 sec.	1 min. 45 sec.
Prairie Maze	26.3 %	85	1 sec.	11 min. 24 sec.	2 min. 18 sec.
Science House	19.5 %	63	2 sec.	21 min. 31 sec.	3 min. 22 sec.
Medicine Garden	5.6 %	18	2 sec.	5 min. 25 sec.	1 min. 21 sec.

II. PRINCIPAL FINDINGS: EXIT INTERVIEWS

A total of 92 group exit interviews were conducted by two interviewers, with 271 participants (145 adults and 126 children under age 18). Ninety-six interviews were initiated with four concluded early with no resulting data because it was realized after the first question that the visitors had not yet interacted with any of the components of the Big Back Yard.

The interviews were conducted at the museum, in the Big Back Yard, as people were exiting the exhibit area. Although steps were taken to ensure completeness and thoroughness in the interview process, there was a need to respect visitors' time and level of comfort with the questions. Some of the questions were designed to probe levels of understanding; therefore, interviewers were careful not to leave visitors with the feeling that they had somehow "failed" as a museum visitor. Interviews typically lasted five to ten minutes. In exchange for taking the time to participate in the interview, visitors were provided with chocolate "Earthballs" and bottled water.

Each interview was a unique combination of people: adults with children, young adults, couples on a date, or grandparents with grandchildren. Sometimes everyone would participate in responding to the questions, sometimes only one or two visitors in the group acted as spokespersons. The types of responses – and when they would occur in the interview – also varied. In some interviews, visitors responded quite thoroughly and eloquently, from the opening question. For others, the most interesting comments would come at the very end of the interview, quite by surprise. For these reasons, we analyzed the interviews by looking at themes that emerged from each group interview as a whole. In the following presentation of findings, themes are grouped by how they pertained to the main ideas of the exhibit and the evaluation questions posed. Each theme is briefly described followed by quotes, edited for clarity, to illustrate the finding.

Demographics

Gender, age, and ethnicity were collected for visitors that participated in the interview process (see Table 28). Gender and ethnicity were recorded by the interviewer and participants were asked their age at the end of the interview, with some adults choosing to give their decade, such as 40s or 50s. The largest age group participating in the interviews was 5-13 years of age (38.0%). In the tracking study only children who appeared to be at least nine years old were tracked; younger children were included in the interview process because of the group discussion nature of the interview. The

second largest age group was 30-44 years of age (24.0%). A majority of the visitors interviewed were Caucasian (92.2%).

Table 28: Interview Participant Demographics
(n=271)

	Percent of Visitors	Number of Visitors
Gender		
Male	51.3%	139
Female	48.7%	132
Age		
Ages 5-13	38.0%	103
Ages 14-18	8.9%	24
Ages 19-29	12.2%	33
Ages 30-44	24.0%	65
Ages 45-64	13.3%	36
Ages 65+	3.7%	10
Ethnicity		
Caucasian	92.2%	250
Asian	3.3%	9
African-American	2.2%	6
Hispanic/Latino	1.1%	3
Other	1.1%	3

Adults with children of various ages were the most common group composition with 76.0% of the 92 group interviews being comprised of adults with children (see Table 29). Of the visitor groups interviewed, 65.2% of them were golfing groups as shown in Table 30 and a majority of them had previously visited the museum (see Table 31).

Table 29: Group Composition of Interview Participant
(n=92)

Group Composition	Percent of Groups	Number of Groups
Adults with Children		
Adults with preschoolers (0-5)	3.2%	3
Adults with children (6-12)	38.0%	35
Adults with teenagers (13-18)	13.0%	12
Adults with various aged children (0-18)	21.8%	20
Adults Only	20.7%	19
Teenagers Only	1.1%	1
Teenagers with children	2.2%	2

Table 30: Visitor Type of Interview Participant Group
(n=92)

Group Visitor Type	Percent of Groups	Number of Groups
All Golfers	65.2%	60
Golfers and Nongolfers	19.6%	18
All Nongolfers	15.2%	14

Table 31: Number of Previous Visits to Museum
(n=92)

Number of Previous Visits to the Museum	Percent of Groups	Number of Groups
First Time Visitors	18.5%	17
1-2 Previous Visits	39.1%	36
3 or More Previous Visits	40.2%	37
Lapsed Visitor (Last visited the Museum when it was at the old location)	2.2%	2

Overall Impressions of the Big Back Yard

Overall, the visitor response to the Big Back Yard was very positive. Eighty-three of the 92 groups knew of the exhibit prior to visiting the museum on the day they were interviewed. In 63 of the group interviews, visitors noted that they enjoyed and appreciated the combination of the educational content with the fun and recreation of miniature golf.

- I thought that the golf theme of the Mississippi River starting with the mountains and going down to the sea was very educational and fun to do. (Male, 66)
- I liked that you could have learning mixed in with the golfing. (Female, 11)
- Whoever thought of the idea has pretty good ideas because they've done things pretty cool. It feels like you're mining kinda and then it feels like you're traveling around the world on the golf course. (Male, 10)
- I enjoyed the exhibit being outdoors and being a little more active. I mean we talked about this earlier, but you can see the kids with the buttons and they are just punching the buttons and twirling the balls and not really reading. This [the miniature golf] seemed to draw them in a little bit more. (Female, 44)
- I think it's really a great experience. We have done it twice this summer, which tells you we liked it enough that we'd come back and pay to do it again, so that's kind of a vote of confidence of liking it and liking the learning experience that went with it. (Female, 36)

Concerns were expressed prior to the opening of the exhibit that the experience of miniature golf might overwhelm the educational content. Findings from the exit interviews indicate otherwise. Visitors were able to relate some aspect of the educational content in all but eight of the group interviews conducted. Of those eight, some visitors indicated being primarily interested in the golf experience; others were non-golfers (four groups) who noted they had had only a glancing interaction with the Big Back Yard. The following is one exchange with a boy, age 6 and an adult female, age 25:

Interviewer:	What do you think the main idea or ideas of the Earthscapes Mini Golf exhibit are?
Child:	I don't know.
Adult:	We didn't go over that very much, we just played mini-golf. I asked him if he wanted to play in the sand and he said no.

However, many visitors reported that rather than overwhelm, the addition of mini-golf actually helped them grasp some of the concepts presented.

- Our golf ball went in weird places; we didn't expect certain things to happen! I guess we learned something from that. (Female, 55)

- It was interesting to notice that the ball went really fast on the pavement, so that shows you how fast the water will end up down the storm drains. And we were looking for clues. We read the signs so we would know where to hit our ball. We would have a better line to the hole when it went on the grass because when it went on the pavement it would go too fast just like water does when it rains hard. (Female 45)

- I was fascinated by all the examples that they gave, through the golf thing, it was a good connection. The way the lay of the land, so to speak, of the golf course makes where the water flows. I think that was a very good way of teaching the kids that, you know, where the golf ball goes is where the water goes. (Female, 42)

- I think it's a creative way to get people to learn about this sort of stuff. It's really hands-on where you actually hit a ball through everything instead of watching it. It's a good way to learn about it. (Male, 15)

Perceptions of Main Ideas Presented in Earthscapes Minigolf

As previously noted, the interview consisted of open-ended questions designed to give visitors several opportunities to express not only what was interesting to them, but also any changes they experienced in understanding and perceptions. Two questions, "Could you tell me anything new or interesting that you found out about how the surface of the Earth is shaped?" and "What did you find interesting or surprising about how humans have interacted with rivers and water?" directly explored two of the main goals of the Big Back Yard:

1. To raise public awareness and understanding of the Earth's changing and evolving surface.
2. To foster an appreciation of the complex interaction between humans and landscapes.

Themes that emerged from responses that address both goals are explored below, beginning with goal number one.

Earth's Changing Surface

In 55 interviews at least one member of the group expressed some aspect of the processes that shape the Earth's surface. The themes that emerged from these responses provided evidence that there were variations in the level of understanding or awareness of visitor responses. Those themes or groupings of responses – source to sink, erosion, transport and deposition, and water flow and its

effects – are presented below. In addition, interview responses indicated that the two types of rivers presented, as well as the different terrains modeled throughout the exhibit, provided a way for visitors to connect what they were seeing in the Big Back Yard with landscapes they had seen out in the world.

Source to Sink

Nine of the groups (6 adult and 3 child comments) gave responses during the interview that indicated an awareness of the overall idea of source to sink, including the processes of erosion, transport, and deposition.

- From what I understand, it's basically watching the water concepts from a higher elevation to a lower elevation and what happens when the sediments are laid down throughout different parts of the earth. (Female, 35)
- The water shaped it. I think it said on the river ones [exhibit] where it carves through the sand. It kind of carves away the valley, the river does, kind of picks up and brings it along with it and drops it later on. (Male, 12)
- I think I know how it gets changed [the surface of the earth]. Water goes down the rock and stuff and then it gets bumpier and goes down and once in awhile it goes up a little tiny bit. I don't know, I think that's it. (Male, 10)
- I liked the all river things and I think they did a really good job explaining how the sediments flow from the mountains all the way out to the sea. (Female, 19)

In 19 groups (20 adult comments) responses included references to how water shaped the Earth's surface.

- Well, there's the thing on the ravines and how ravines are shaped by the flow of water. (Male, 40s)
- And water is constantly changing the shape of the earth. (Male, 47)
- How water has the ability to shape the landscape I guess. (Female, 50s)
- I guess I pretty much knew that beforehand but you get to see how water basically sculpts the landscape. (Male, 34)

Erosion

Erosion came up frequently in the interviews with 27 groups mentioning something about erosion (36 adult, 6 teenage, and 2 child comments). Although some talked about erosion as one of the processes that shape the Earth's surface, a majority of the comments about erosion were couched in

terms of environmental concerns. The responses indicated that these visitors saw erosion as a primarily negative event aggravated by human activities, which consequently required human intervention to be slowed or stopped.

- Erosion on the land, the effects of water on the land. You know, just the lay of the land and how the water affects it. (Male, 44)
- Erosion and how we've tried to stop that and we haven't actually figured it out yet. (Male, 13)
- Kind of how man has dealt with the erosion and nature and trying to stop that and how it happens. (Female, 40)
- I like what my brother said, how we are trying to control the erosion. (Female, 11)
- I found it kind of interesting just how difficult it is trying to change the course of a river from playing with the braided river thing. It was really tough. You really had to work fast to counteract the erosion. We put up piles of sand to block it and it broke right through. (Male, 17)

Transport and Deposition

Mention of the transport or deposition of sediment occurred less frequently than erosion. Sixteen groups spoke about sediment transport or deposition (14 adult, 1 teenage, and 5 child comments).

- And how it [the water] carries all sorts of things with it. (Male, 42)
- I was pointing out while we were going through, the erosion and how the water carries the dirt. Like the one hole that asks about why a river meanders -- it's because it takes the least path and kind of shapes the earth around the water. (Male, 22)
- The meandering river, how the river path is always changing. How the silt settles and it'll change the way the river flows. (Male, 32)
- How the water went and it'll carry stuff. (Male, 11)
- I liked the effects of the water, like how strong it is and how it can push things or carry it. (Male, 12)
- Well, the sediment and you know it goes down the river and goes into one spot which makes like a piece of land, an island. (Male, 10)

Water Flow and Path

Many groups spoke generally about the flow of water or the path water will take.

Four groups (5 adult comments) relayed the idea of water moving from mountains to the ocean (or from northern Minnesota to Louisiana) – but made no mention of sediment.

- Water movement from mountains to lower levels. (Male, 41)
- To show how water gets to the ocean, from the mountains to the ocean. (Female, 40)
- I thought that the golf theme of the Mississippi River starting with the mountains in going down to the sea was very educational and fun to do. (Male, 66)

Twenty-four groups (25 adult, 4 teen, and 4 child comments) made general statements about the flow of water or the path water takes.

- How water flows. (Male, 11)
- I thought that each hole had a theme and was designed to convey a lesson about how rivers and water flow through their environment, not only just natural ones, but city and urban type environments too. (Female, 44)
- I liked watching the hands-on activities, the experience of watching the different ways the water moves. (Female, 22)
- The water flow patterns, I guess. We didn't read all the signs; we were just playing the golf course! (Female, 44)

Types of Rivers

The two types of rivers modeled in the exhibit helped visitors make a connection between the processes and the landscape they see. As one visitor remarked, "I found the reason why rivers take the courses that they do very interesting."

Twenty-two groups referred to the meandering river, part of Hole 7, either by name or description (15 adult, 5 teen and 5 child comments.)

- They loved putting the little boats in as they went around the corners and they could see where the channel went and how the sand bars stuck up on the inside of the corners. They loved that. (Female, 45)
- I don't know what hole it was but the river system, how many turns, wherever the turn was, it'll eat into the bank and we see that a lot down at Nine Mile Creek. Every time it floods, it eats a

little bit more and does it over and over and over. Since I've been a kid, I've actually seen that thing change so many different ways. (Male, 47)

- Actually, on this hole over here with the meanders, it demonstrates a situation in the Minnesota River, down by St. Peter. There's an old Dairy Queen there on 169. If you drive by it in the summer, it appears there's no water in the Minnesota River at all. It's all sand. What's really going on is there's a cutoff channel in one of the meanders, which is exactly what's going on over here on one of the holes. (Male, 37)

- I found out about why rivers bend and how that works and why rivers aren't just straight. (Male, 15)

- Yes I have also gone white water rafting in in Utah that reminded me a lot and I believe hole number eight with the meandering stream but the way I saw how the water went faster in some parts and slower and others reminded me a lot of that. (Male, 14) [Adult female in group jokes: You know that part where you were thrown out of the raft, was that a fast part or slow part?]

Twenty groups referred to the braided river, either by name or description (17 adult, 3 teen and 3 child comments). Where the meandering river was a form many visitors recognized as something they had seen in Minnesota, the braided river was less familiar. There was a clearer distinction between the responses made by people who had previous knowledge of braided rivers and those that did not (please see first two quotes). None of the groups interviewed gave any response that indicated they had made a comparison between erosional networks and the braided stream, in terms of self-organization or pattern formation.

- I am interested in stream network evolution, sort of like that big sandbox over there with a bunch of kids digging and you can sort of do that stuff and almost create the networks in there. (Male, 24)

- I thought it was great, especially the big sand pit with the water running through it. That's basically how in classes I've taken on how rivers form, that's how it's described. You start with a flat surface, introduce water, and you can see what it does. So it’s a great experiment for kids. I want to go back and play in it. (Male, 37)

- My favorite thing was the sand pile obviously since I spent half hour there channeling the water and making rivers and streams. (Female 20)

- I thought it was interesting that there was an area where people are invited to change the flow of the water and the sand and there are little tools you can do that with, and then the sign says that you can do that all you want but it will go back whatever way it chooses later on. (Male, 43)

- It was actually very interesting to see the children over there with the water flow, and the sand and what they're trying to control. I was just telling my son, they're just trying to change what

Mother Nature is going to do anyway. You know it's never going to succeed. They're trying to jam up the water with dams of sand and it keeps breaking through. We have no power over that. Its insanity to keep doing the same thing over and over again and expecting a different result. (Male, 40s)

- I liked the sandbox with water running down and making dams and seeing where the water goes. (Male, 13)

Terrain Modeling

One of the interview questions asked, "Was there any feature in the park that reminded you of something you've seen where you live or out in the world?" in order to discover whether visitors recognized the representations in the park. Nearly half of the groups interviewed indicated an awareness of the representations and an ability to make a comparison to something they had seen in the world (45 groups with 49 adult, 10 teen, and 15 child comments).

- The braided rivers reminded me of the braided rivers up in Denali Park in Alaska. (Male, 47)
- The river is like the St. Croix with the deep water on the bends and shallow water. (Male, 37)
- I think it's really cool the way they had the golf course have educational with the way it had, kind of more like the world, kind of shaped like that, and having the golf course act like water. (Male, 12)
- I saw one of the holes had a mountain and there was a stream that went down it into a reservoir at the bottom and it reminds me of rivers I've seen in northern Minnesota that have waterfalls and stuff. (Male, 15)
- The one with the mountains we flew to California and the shape of that hole was reminiscent of the mountains we saw. (Female, 40)
- I'm impressed that there is this exhibit about water. Being so close to the Mississippi and having the river right there made it a great deal of fun. So that made it very interesting. We are from New Mexico and we have another river there the – Rio Grande. It's interesting to compare the depth of the Mississippi with the shallowness of the Rio Grande. (Male, 73)
- You figure out how to do stuff and learn what really happens in your life, not like golfing, like what happens in the ocean and stuff. (Female, 8)
- It's a real effective way to get a point across to kids while they're having fun and not realizing that they're learning something. This is our second visit with the kids. I've been here three times. And they have made connections with it. One time we saw a delta thing and one of the kids made that connection to remembering when we were here, so I was really pleased [interviewer clarifies, you mean after they were here and saw the Big Back Yard?] Yes, we were at the beach and they had made a river or something that went into the water and they had made that connection with what they learned here with what they saw at the beach. They were making their own little delta on the beach. (Female, 40s)

Interactions between Humans and Landscapes

Themes that emerged from responses that addressed the second goal of the exhibit – to foster an appreciation of the complex interaction between humans and landscapes – are explored next. Some of the responses related to general environmental concern; some were more specifically tied to the content presented in the exhibit, such as water flow through storm sewers, field drainage, hard surface runoff, dams, river restoration, and river engineering.

Environmental Concerns

Over half of the groups interviewed (53 groups with 70 adult, 3 teen, and 16 child comments) indicated that they thought environmental concern was one of the main ideas of the exhibit.

- I'm big on water quality so I like what's being taught to the kids. (Male, 42)
- Kind of knew that we messed things up across the way and kind of fixing it as we go. (Male, 30)
- Just to make people more aware of what damage to the environment can be when people change the way the water flows. (Female, 34)
- Oh, because people litter all over the place and it's bad for the world. They throw it in the water. It's bad for the water. We're drinking that stuff. (Female, 11)
- I can't really remember [Adult female prompts, what did we talk about with the runoff, do you remember?] Oh yeah, when people spill oil it ruins the water. (Male, 10)
- I was interested in the pollution and runoff stuff. (Male, 24)
- Pollution, what the river carries. (Female, 10)

Storm Sewers

There were several specific references to storm sewers by 26 groups (18 adult, 1 teen, and 15 child comments). In some interviews, visitors noted that Hole 4, which included a large storm sewer, made an impression because it was a difficult hole to golf.

- I like the hole where they have like lawnmowers and a sewer. There were a lot of obstacles and was hard to get the ball all the way up. If it doesn't go all the way up it goes down. (Male, 12)

- I think there's a pretty good education campaign how the dirt from our streets and water and goes to the river. But the hole was nice, the one with the sewer. (Female, 19)

- What I found most interesting was the sewer and you know bringing us in. And learning about that and you can see on the greens how your ball moved and where didn't move because of the type of greens that it was on. That was fun. (Female, 9)

Drainage and Hard Surface Runoff

There were specific references to drainage and runoff by 19 groups (27 adult and 1 teen comment).

- We have a sod farm and have drainage ditches all along the side of the field. Those drain into Coon Creek and that goes into the Mississippi River, so it was kind of cool to see that. (Female, 43)

- Since I live in the city and see all the urban stuff, I liked the drain tile because I don't know much about that. (Female, 31)

- There were some places where you could either putt the ball on the grass or up onto the hard street and it was showing that when people build driveways the water doesn't drain very well but it drains on the grass. (Male, 40s)

- I had always heard about the farming drain fields. I always wondered, do they really mean drains? According to this, they really do have drains in the ground. So that clarified that one for me. (Female, 40)

- I thought it was kind of interesting how people make concrete stuff and the concrete can't really stop water at all so it needs somewhere to drain or else it would flood the streets and everything. (Male, 15)

Dams

There were also several specific references to dams by 28 groups (28 adult, 6 teen, and 5 child comments).

- I think a lot of it was very interesting. The part about the dams, again. I keep getting back to that but that's something I'd be curious about. I knew they were taking on a lot of the old dams but I didn't really understand the reasons for it. This helped me understand that there might be more to find out there. (Male, 54)

- The picture you had up of the dam, the before and after pictures were kind of neat to see. (Female, 26)

- I liked the display on the Kettle River Dam, the prior work of the river versus once the river was removed. That was pretty startling. I mean once the dam was removed, that changes the river, so that was interesting. (Male, 47)

- The dams. Seeing the dam, that was a good way to see it in miniature. You could see how it actually works. (Female, 59)

- He [boy, age 5] liked playing with the dam here. He thought that was real interesting. (Female, 50)

- When you open it, all the sand is gone and it'll all go over to this side and when you close it, all the sand comes back. (Female, 11)

- The dam model thing as far as showing sediment can fill up the reservoir. (Female, 26)

River Restoration and River Engineering

In addition, 6 groups mentioned river restoration and 8 groups mentioned river engineering.

- Well, I think they were trying to show some of the natural things that happen as water flows, but then some of the things that happen when we, the people, engineer the water. What can happen then is not always good. I'm a public health professional so you know I know about some of the stuff. I thought it was really cool though the way it was done here. (Female, 53)

- I think they're also trying to say we shouldn't use dams and try to let the river flow and not use dams as much because it kills fish and wrecks water and...(Male, 12)

- St. Anthony Falls – I've heard the story about how it was eroding the sandstone and they had to go in and rebuild it and built it again with concrete. It makes me think in some ways it's not nearly as beautiful as it once was. I wonder if there wasn't a better way to do that, to retain some of the beauty. (Female, 47)

- I like the exhibit over here with the creek where they showed how they reclaimed the creek by shaping the creek so that it had boulders for borders and forced the current into the middle so it kept the sediment running downstream and kept the creek from eroding. (Female, 44)

Additional Findings

The plants that were part of the landscape of the Big Back Yard were mentioned by 15 groups (23 adults and 1 teen comment).

- In the Turtle Garden we saw a lot of familiar plants that we didn't know the names of before or the history of. That's a really neat exhibit there. (Female, 40)

- I was interested in more of the plants that are in the Prairie Maze. I didn't see a lot of information. Maybe there is some that I didn't notice. I was interested in the plants. (Male, 43)

- Well, I enjoyed seeing all of the flowers and shrubs label, it's just my personal enjoyment, but I think it was extremely well done and all of the information about rivers flowing was very good was very well presented. (Female, 61)

- I think it's showing us what we can do to improve our environment and help cut down pollution. I didn't realize that you could plant gardens like this [The Rain Garden]. We have an area, actually two drains in our yard that right now drain eventually right into the street sewer. So it's just a really cool idea to plant gardens down where we have so much water. (Female 47)

Along with other exhibit components that were mentioned specifically (storm sewer, dam removal, both types of rivers), two other components are of interest. One for how rarely it was mentioned: only one group mentioned the 3D Map of the World. In contrast, 23 groups mentioned the "waterfall," with it being a favorite of children (7 adult, 1 teen, and 19 child comments).

- I learned something from that map: that the trench on the west coast of South America was so deep. I didn't realize that was one of the deepest trenches. (Female, 33)

- The waterfall where you're trying to go through it but when it turns, the ball gets pushed by the waterfall. (Male, 10)

- I like the waterfall, because the golf ball floated into the tube when you didn't get it across. (Female, 6)

- I was simply impressed with I believe that might up in the third hole, the one that had sort of a waterfall, how the ball was influenced by the water flow. (Male, 24)

Factors Affecting Visitor Experience

The final evaluation question addressed is, "To what extent do factors such as tee-times or group composition affect a visitor's experience?"

<u>Group Composition</u>

As noted in the beginning of the report, the experiences of the Big Back Yard were essentially group experiences. Sixty-one of the groups we interviewed were comprised of adults and children of various ages. During the interviews, we witnessed several examples of adult-child interactions, which referred to conversations that had taken place earlier in the Big Back Yard.

Exchange between adult male (42) and boy (11) during interview:

Adult: What did I tell you I do after I mow the lawn?
Boy: Clean out the stuff so it doesn't go in the water?
Adult: Right, so did you know that before about getting the grass out of the gutter?
Boy: No.
Adult: I don't know if you knew you learned anything, but that's what you learned!

Exchange between adult male (39), boy (7), and girl (11):

Adult: Talk about the dam that we looked at.

Boy: When the water goes down, sand fills up. When the water is blocked, it's just what I said, but when the dam is lifted, it goes down and the sand goes down.

Girl: When you open it, all the sand is gone and it'll all go over to this side and when you close it, all the sand comes back.

Exchange between adult male (40), adult female (42), and boy (12):

Boy: I don't know.

Adult Male: Did you like the dam?

Boy: Sure.

Adult Female: Why?

Boy: I don't know. I liked it because... I don't know!

Adult Female: Well, what did you have to think about when you are hitting with that water flowing?

Boy: The current?

Adult Female: What did you have to do with your stroke?

Boy: Hit it to the other side?

Adult Female: Did you have to hit harder or…?

Boy: Harder.

Adult Female: You had to think about that right?

There was a clear difference in the types of experiences non-golfing groups and golfing groups reported. Some of the non-golfing groups chose not to golf because of the cost; some were unable to golf because tee times were sold out. Only 2 of the 14 non-golfing groups reported investigating the Big Back Yard in any depth. One group expressed surprise at being allowed to do any exploring as they had not paid to play golf.

Responses of non-golfers to the question, "What do you think the main idea or ideas of the Earthscapes Mini-Golf are?"

- I haven't gotten to learn that yet [how the Earth's surface is shaped]. Haven't got that far or haven't seen it. (Male, 37)
- I don't know. (Female, 17)
- Make it look attractive? Have more fun besides looking at the inside things? (Female, 44)
- I guess I didn't look at much of that. Actually we were expecting something more interactive for the kids. When we found out it was a mini-golf course, we decided to spend our time on something else. (Male, 33)

Tee-times

Some people commented that they did not feel they could stop too long to read the signs because there were other golfers behind them. These comments occurred whether tee times were being used or not.

- I also like to say that tee times are nice but I noticed that there were a lot of people behind us, I'm sure we could've let them passed but... And I like to take my time and I would've liked to have been able to read more signs. (Male, 24) *Tee-time in place*

- It's hard to have the chance to read the little things, which we really wanted to do, because there are people behind you so you're kind of rushed, you need to hurry. We didn't have a lot of time to actually read and see what was going on. It was fun and enjoyable, but very rushed. (Female, 40s) *No tee-time in place*

Visitors' Suggestions for Improvement

The last question asked during the interviews was, "Is there anything else you would like to say about the Big Back Yard that you would like me to share with the Science Museum staff?" Although a number of comments reinforced earlier responses about how much the visitors enjoyed the exhibit, often with a request for more golfing holes, there were a few suggestions for improvements.

- The Science House is very dull. It had the "come inside" sign and we went inside and it was kind of bleak. We wanted to explore more and have more interesting experiences and kind of cruised right through. (Male 42)

- Now having come down here and not being able to play golf [tee times sold out], I'd like to come back and play golf but I know. I'm going to have to come through the museum again to do it, so it might be a non-encouraging thing, because of the cost. It would be nice to play golf without having to go to the exhibit. (Male, 30)

- A little information handout of some sort that people can take or maybe even a game, like Word Find, related to it. Especially if you're going to wait because some people are slow [golfing at the holes]. It would be nice to have a little thing to play with. (Female, 40)

- I did notice that we had to buy an exhibit pass to get out here. I don't know about having to pay for the exhibits in the Museum just to play golf. It was kind of surprising to me to have to pay the exhibit fee because you know you don't have to for the movies. (Female, 42)

- Well the fact that we had a tee time and yet we had to wait for people. There were six people ahead of us and six people behind us. When there are six people going at one time it really slows the course down. It's the first course I have ever seen that allowed six people to tee off at one time, it really slows it down. And since they had kids it obviously was a lot slower. The max I think should be four people at a time. Especially since we had to wait for a tee time, we shouldn't have had to wait while you're golfing too. (Male, 26)

III. DISCUSSION

The Big Back Yard's Earthscapes Miniature Golf is a bold and unique exhibit, mixing a science museum learning experience with miniature golf. In order to answer some of the evaluation questions, we attempted to tease apart the two parts, golf and the educational content presented throughout the golf course. At times, however, we discovered through observations and exit interviews that the two often merge into an indivisible whole during visitors' experiences of the Big Back Yard.

Overall Reactions to Big Back Yard

Overall, visitors enjoyed the Big Back Yard immensely. In the exit interviews, visitors commented frequently about the creativity of the exhibit, how much they appreciated the mixture of fun and learning, and that they enjoyed being outside. The use of miniature golf supported a strong group learning experience; visitors indicated pleasure and surprise that the content of the exhibit appealed to such a wide range of age groups

There were three situations in which operational aspects of miniature golf may have impacted visitor experience of the exhibit. First, in many museums, visitors enter a gallery and are able to choose the path they take through the exhibit, the order in which they view exhibit components, and the amount they spend at each component. In contrast, the Big Back Yard had a set flow pattern, beginning with Hole 1 and ending with Hole 9. Visitors were, of course, free to choose the order they golfed the holes or how long they stayed at each hole; however, as visitor responses during interviews indicate, the implicit rules of miniature golf affected visitor behavior. Visitors reported that they felt some pressure to keep moving and, therefore, not read signs because there were groups of golfers behind them waiting to golf that hole. These comments were recorded whether tee times were in place or not. Also, when there were a number of visitors in the exhibit and lines formed at the golf holes, those who were golfing may have been reluctant to lose their place in line. Appendix 5 shows that if groups had to wait to golf, they usually waited in line instead of visiting other components of the Big Back Yard.

Secondly, although tee times were put in place to manage the flow of visitors through the Big Back Yard, observational data indicate that tee times affected the length of time golfing groups spent in the Big Back Yard. Golfing visitors tended to spend more time in the exhibit when tee times were in place, with a majority of the visitors using their time waiting for their tee times to explore the BBY.

The groups that used the wait time for preliminary exploration may have experienced more of the Big Back Yard than golfing groups who did not have to wait for a tee time.

Finally, both observational and interview data suggest that non-golfers did not spend as much time in the exhibit and did not express the level of awareness or understanding of the content as golfers. Non-golfers looked at less labels, spent less total time in the exhibit, and were less likely to visit the stand-alone exhibits (3D Map of the World, Braided River, Erosion Recorder, and Dam Removal). Certainly, golfers were able to experience the content in a kinesthetic manner that non-golfers could not; however, comments by visitors interviewed, as well as anecdotal comments overheard, indicated that visitors who did not pay for golf did not know they were free to walk through that part of the Big Back Yard and interact with a number of the stand-alone components of the exhibit.

Conveyance of Main Ideas Presented in Earthscapes Miniature Golf

Concerns were expressed prior to the opening of the exhibit that the experience of miniature golf might overwhelm the educational content. Findings from the exit interviews indicate otherwise. In only eight of the group interviews did responses indicate that visitors were unable to relate any of the educational content of the exhibit. Of those, some indicated being primarily interested in the golf experience; others were non-golfers (four groups) who noted they had had only a glancing interaction with the Big Back Yard, including the Earthscapes Miniature Golf, Science House, Maze or Panning for Gems.

In considering how visitors' awareness and understanding were changed by their experiences in the Big Back Yard, it is necessary to keep in mind that visitors entered the exhibit with a great variability of prior knowledge and skill levels. Though we did not ask the question directly, during the interviews several adult visitors identified themselves as having significant prior knowledge based on their professions; for example, as a hydrologist, water conservationist, or engineer. Some teenagers also reported prior knowledge, noting that they had just completed an Earth Science course in school. In some cases, additional responses made during the interview supported the claim of prior knowledge; in others, the comments may have been due more to social desirability. Nonetheless, the reporting of prior knowledge underscored the need to be aware that visitors do not enter the exhibit as blank slates. Furthermore, as was discovered in the analysis of the interview data, that prior knowledge could be accurate and complete or it could be inaccurate or incomplete.

In the first instance, more complete prior knowledge allowed the visitor to place the content presented in the Big Back Yard into an existing framework without any dissonance. Those visitors reported the experience of confirmation ("I knew a lot of these things but it kind of reinforced some of the ideas.") or a deepening of understanding ("I learned something from that map [3D Map of the World], that the trench on the west coast of South America was so deep. I didn't realize that was one of the deepest trenches.").

In the second instance, incomplete prior knowledge appeared to have some impact on the acquisition of new content or understanding. As noted in the interview findings, of the three interconnected processes that shape the Earth's surface, people mentioned the process of erosion more frequently than transport or deposition. Additionally, when erosion was mentioned it was almost always in the context of environmental damage, as something caused by human activity.

Prior research on informal learning in museum settings highlights a critical point to keep in mind when considering informal learning in museums: "No matter how successfully exhibitions and programs are executed, it is important to appreciate that people construct their understanding of the world not from a single experience or source, but from a variety of sources over long periods of time."[1]

Perhaps, given that transport and deposition may have been new to some visitors, they may not have felt comfortable enough with those new ideas to express them in an exit interview. However, it is interesting to note that none of the visitors interviewed mentioned or described the Erosion Recorder (observational data indicated that only 8.7% of the visitors tracked looked at the label with a median time of only 26 seconds), a stand-alone exhibit that showed the three processes of erosion, transport, and deposition, while 28 of the groups interviewed mentioned the Dam Removal that showed how sediment fills a reservoir behind a dam. Visitors reported a strong shift in awareness and understanding with the Dam Removal free-standing exhibit, often remarking that they had no idea that sediment filled up behind the dam.

[1] Falk, J. H., & Adelman, L. M. (2003). Investigating the impact of prior knowledge and interest on aquarium visitor learning. *Journal of Research in Science Teaching, 40*(2), 163-176.

The evaluation team was aware that two stand-alone components of the Big Back Yard were not available to visitors during the summer of 2004: Erosion Networks and Underwater Landslide. Given the findings of this evaluation, the future installation of these two components could greatly enhance visitors' complete understanding of the processes that shape the Earth's surface.

Group Composition and the Big Back Yard Experience

Previous museum learning research has indicated the importance of dialogue and interactions across generations.[2] With families making up more than half of the visitors to museums[3] (Ash 2003), we were interested in seeing whether those groups that were comprised of adults and children had noticeably different experiences of the Big Back Yard. Given that 82.7% of the visitors tracked were in groups of adults and children, it was difficult to make any meaningful comparisons with the other two categories – adults only and children only – regarding behaviors such as number of signs looked at. However, as noted in the interview findings, several of the interviews included examples of adult-child interactions, of conversations begun during their experience of the exhibit.

[2] Well, G. (1999). *Dialogic inquiry: Towards a sociocultural practic and theory of educaiton*. New York: Cambridge University Press.

[3] Ash, D. (2003). Dialogic inquiry in life science conversations of family groups in a museum. *Journal of Research in Science Teaching, 40*(2), 138-162.

Appendix 1: Big Back Yard Elements

1. Prairie Maze
2. Panning for Gems
3. Science House
4. Medicine Garden

Clubhouse (During Tee Times Only)

5. Between Clubhouse and Hole 1

3D Map of the World

6. Label: "3D View of the World"
7. Label: "Look Beneath the Oceans"
8. Label: "Look for Changing Landscapes"
9. 3D Map - Other Interactions

Hole 1: Source to Sink

10. Starting Hole 1
11. Behaviors at Hole 1
12. Label: "Start to Finish"
13. Label: "From Source to Sink"

Hole 2: Erosion

14. Starting Hole 2
15. Behaviors at Hole 2
16. Label: "Eroding Rock"
17. Label: "A Downhill Move"
18. Label: "Can a Park Also Be A Garden?" or "Food Webs"

Erosion Recorder Exhibit

19. Label: "A Slice Through Earth's History"
20. Erosion Recorder Interactive Exhibit

Hole 3: Hydraulic Jump

21. Starting Hole 3
22. Behaviors at Hole 3
23. Label: "Spillway"
24. Label: "Hydraulic Jump"

Hole 4: City Storm Sewer

25. Starting Hole 4
26. Behaviors at Hole 4
27. Label: "Pollution's Secret Passage"
28. Label: "Draining the City"
29. Label: "One Source in a Million"

Hole 5: Draining the Fields

30. Starting Hole 5
31. Behaviors at Hole 5
32. Label: "Draining the Fields"
33. Label: "Field of Drains"
34. Label: "Two Choices: Fast or Slow"
35. Label: "What's the Best Way?"
36. Label: "Draining the Land, Changing the Watershed"

Braided River Exhibit

37. Behaviors at Braided River
38. Label: "Unraveling the Behavior of Braided Rivers"
39. Label: "Different Geography, Different Rivers"
40. Label: "River Just Keeps on Braiding"
41. Label: "Can a Park Also Be A Garden?" or "Food Webs"

Hole 6: City Surface Runoff

42. Starting Hole 6
43. Behaviors at Hole 6
44. Label: "Hard Surface Runoff"
45. Label: "Rain Gardens"
46. Label: "Rainwater's Wayside Rest"
47. Label: "Can a Park Also Be A Garden?" or "Food Webs"
48. Label: "Hold a Truck…But Doesn't Hold Water"

Hole 7: Meandering River

49. Starting Hole 7
50. Behaviors at Hole 7
51. Label: "Meandering River"
52. Exhibit/Label: "Measure Meandering Rivers"
53. Label: "Rivers on the Move"

Dam Removal Exhibit

54. Dam Removal Exhibit "Removing Sandstone Dam"/"Changing the River With a Dam"
55. Label: "Restoring Urban Creeks and Streams"
56. Label: "Can a Park Also Be A Garden?" or "Food Webs"

Hole 8: Lock and Dam

57. Starting Hole 8
58. Behaviors at Hole 8
59. Label: "Engineered River"
60. Label: "Engineered Obstacles"
61. Label: "St. Anthony Falls"

Hole 9: Gulf of Mexico

62. Starting Hole 9
63. Behaviors at Hole 9
64. Label: "River Delta"
65. Label: "Out to Sea"
66. Label: "Ready for another round of golf?

Appendix 2: Big Back Yard Tracking Sheet

Date: _____ Tracker's name: _____

Time enters BBY: _____ Time exits BBY: _____ *These two times are real time i.e 2:13 – 3:22 pm

☐ Did not interact with any components in BBY (Record only demographic information below through group size)

Are they using Tee Times? (Ask before you begin each observation): ☐ Yes ☐ No

Weather: ☐ Sunny ☐ Cloudy ☐ Raining ☐ Humid Approximate temperature: _____

Gender of visitor you tracked: ☐ Male ☐ Female

Age of visitor you tracked: ☐ 9 – 13 ☐ 14 – 18 ☐ 19 – 24 ☐ 25 – 44 ☐ 45 – 64 ☐ 65 +

Ethnicity: ☐ Caucasian (not Hispanic or Latino/a) ☐ American Indian ☐ Asian ☐ African-American

☐ Hispanic or Latino/a ☐ Other. Please specify: _____

Group Size: Do not include the visitor you tracked. If visitor was alone, put zeros on each line.

_____ # of preschoolers (ages 0 – 5)

_____ # of children (ages 6 – 12)

_____ # of teens (ages 13 – 18)

_____ # of adults (ages 19 - 64)

_____ # of senior citizens (ages 65+)

How would you characterize this visitor's experience?

☐ Golfer

☐ Non-golfer, with a golfing group

☐ Non-golfer, not with a golfing group

1. Prairie Maze

Start Time: _____ Stop Time: _____ ☐ Did not visit Prairie Maze

*Record time from when they approach maze to when they exit and walk away from it

2. Panning for Gems

Start Time: _____ Stop Time: _____ ☐ Did not visit Panning for Gems

*Record time from when they are in front of exhibit to when they turn and walk away from it.

3. Science House

Start Time: _____ Stop Time: _____ ☐ Did not visit Science House

*Record time from when they enter house to when they exit house

4. Medicine Garden

Start Time: _____ Stop Time: _____ ☐ Did not visit Medicine Garden

*Record time from when they walk up to garden to when they turn and walk away from it

Clubhouse ***Only Record This When Tee Times Are In Place

Start Time: _____ Stop Time: _____ ☐ Not Using Tee Times ☐ Did not visit Clubhouse

*Record start time as the moment they leave clubhouse (with or without clubs). Record stop time as the moment they approach Hole 1 with clubs.

	Behaviors
5. Between Clubhouse and Hole 1	☐ Went straight to Hole 1 (Don't need to record time above) ☐ Waited at picnic tables for tee time (only if using tee times) ☐ Went to exhibit component(s)/label(s): _____ _____ _____ _____ (write numbers)

3D Map of the World

Start Time: _____ Stop Time: _____ ☐ Did not visit 3D map

* Record start time as the moment they approach the map area. Record stop time as the moment they turn and walk away.

Exhibit Component	**Behaviors**
6. Label: **"3D View of the World"** (On wall, Left side of map)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Went up to map ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to map)
7. Label: "Look Beneath the Oceans" (In front of map, left side)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Went up to map ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to map)
8. Label: "Look for Changing Landscapes" (In front of map, right side)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Went up to map ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to map)
9. 3D Map - Other Interactions	☐ Glanced at map without reading labels (less than 3 secs) ☐ Looked at map without reading labels (3 secs or longer) ☐ Interacted with another visitor regarding map - without reading labels (pointed to map, motioned a visitor over to map, was motioned by a visitor over to map) ☐ Watched other visitors interact with map ☐ Museum staff present at exhibit ☐ Interacted with staff

Notes for 3D Map:

Hole 1: Source to Sink

Start Time: _____ Golf Time: _____ Stop Time: _____ ☐ Did not visit Hole 1

* Record start time as the moment they stop and stand in front of Hole 1. Record golf time as the moment they set the ball down at Hole 1 (for golfers only). Record stop time as the moment they leave Hole 1 and begin to walk to another component of the BBY.

* Stop Time for Clubhouse and Start Time for Hole 1 can be the same time if they went straight to Hole 1.

Hole Component	**Behaviors**
10. Starting Hole 1 *Only for golfer or non-golfers with a golfing group. This is what the visitor you are tracking does between Start Time above and when the <u>first person</u> in their group golfs.	☐ Not with a golfing group ☐ Didn't have to wait, group golfed right away ☐ Waited in line ☐ Went to exhibit component(s)/label(s): _____ _____ _____ _____ (write numbers)
11. Behaviors at Hole 1	☐ Museum staff present at hole ☐ Interacted with staff For non-golfers only: ☐ Glanced at hole (less than 3 secs) ☐ Stopped and looked at hole (3 secs or longer) ☐ Watched another visitor golf
12. Label: "Start to Finish" (Beginning of hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
13. Label: "From Source to Sink" (Next to the actual hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)

Notes for Hole 1:

Hole 2: Erosion

Start Time: _____ Golf Time: _____ Stop Time: _____ ☐ Did not visit Hole 2

** Record start time as the moment they stop and stand in front of Hole 2. Record golf time as the moment they set the ball down at Hole 2 (for golfers only). Record stop time as the moment they leave Hole 2 and begin to walk to another component of the BBY.

Hole/Exhibit: Component	**Behaviors**
14. Starting Hole 2 *Only for golfer or non-golfers with a golfing group. This is what the visitor you are tracking does between Start Time above and when the <u>first person</u> in their group golfs.	☐ Not with a golfing group ☐ Didn't have to wait, group golfed right away ☐ Waited in line ☐ Went to exhibit component(s)/label(s): _____ _____ _____ _____ (write numbers)
15. Behaviors at Hole 2	☐ Museum staff present at hole ☐ Interacted with staff For non-golfers only: ☐ Glanced at hole (less than 3 secs) ☐ Stopped and looked at hole (3 secs or longer) ☐ Watched another visitor golf
16. **Label: "Eroding Rock"** (Beginning of hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
17. Label: "A Downhill Move" (At the bottom of the mountains)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
18. Label: Check which one is hanging ☐ **"Can a Park Also Be A Garden?" or** ☐ **"Food Webs"** (Between holes 2 & 3 on sidewalk)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to plants)

Notes for Hole 2:

Erosion Recorder Exhibit (Between Holes 2 & 3)

Start Time: _____ Stop Time: _____ ☐ Did not visit Erosion Recorder Exhibit

* Record start time as the moment they approach the Erosion Recorder. Record stop time as the moment they turn away from Erosion Recorder and walk away from it.

Exhibit Component	**Behaviors**
19. Label: "A Slice Through Earth's History" (Left side of Erosion Recorder)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to exhibit)
20. Erosion Recorder Interactive Exhibit (Label and corresponding exhibit)	☐ Glanced at exhibit (less than 3 secs) ☐ Stopped and looked at exhibit (3 secs or longer) ☐ Manipulated exhibit (move lever or tank) ☐ Watched another visitor manipulate ☐ Museum staff present at exhibit ☐ Watched museum staff manipulate ☐ Interacted with staff ☐ Assisted a visitor or was assisted by a visitor to use exhibit ☐ Motioned a visitor or was motioned by a visitor over to exhibit ☐ Pointed to something on exhibit/label

Notes for Erosion Recorder Exhibit:

Hole 3: Hydraulic Jump

Start Time: _____ Golf Time: _____ Stop Time: _____ ☐ Did not visit Hole 3

*Record start time as the moment they stop and stand in front of Hole 3. Record golf time as the moment they set the ball down at Hole 3 (for golfers only). Record stop time as the moment they leave Hole 3 and begin to walk to another component of the BBY.

Hole Component	Behaviors
21. Starting Hole 3 *Only for golfer or non-golfers with a golfing group. This is what the visitor you are tracking does between Start Time above and when the first person in their group golfs.	☐ Not with a golfing group ☐ Didn't have to wait, group golfed right away ☐ Waited in line ☐ Went to exhibit component(s)/label(s): _____ _____ _____ _____ (write numbers)
22. Behaviors at Hole 3	☐ Museum staff present at hole ☐ Interacted with staff For non-golfers only: ☐ Glanced at hole (less than 3 secs) ☐ Stopped and looked at hole (3 secs or longer) ☐ Watched another visitor golf
23. Label: "Spillway" (Beginning of hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
24. Label: "Hydraulic Jump" (On sidewalk)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)

Notes for Hole 3:

Hole 4: City Storm Sewer

Start Time: _____ Golf Time: _____ Stop Time: _____ ☐ Did not visit Hole 4

*Record start time as the moment they stop and stand in front of Hole 4. Record golf time as the moment they set the ball down at Hole 4 (for golfers only). Record stop time as the moment they leave Hole 4 and begin to walk to another component of the BBY.

*Make sure you are observing the hole so you can see interactions with the two signs on either side of the large drain pipe.

Hole Component	Behaviors
25. Starting Hole 4 *Only for golfer or non-golfers with a golfing group. This is what the visitor you are tracking does between Start Time above and when the first person in their group golfs.	☐ Not with a golfing group ☐ Didn't have to wait, group golfed right away ☐ Waited in line ☐ Went to exhibit component(s)/label(s): _____ _____ _____ _____ (write numbers)
26. Behaviors at Hole 4	☐ Museum staff present at hole ☐ Interacted with staff For non-golfers only: ☐ Glanced at hole (less than 3 secs) ☐ Stopped and looked at hole (3 secs or longer) ☐ Watched another visitor golf
27. Label: "Pollution's Secret Passage" (Left side of gutter)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
28. Label: "Draining the City" (Right side of gutter)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
29. Label: "One Source in a Million" (By hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)

Notes for Hole 4:

Hole 5: Draining the Fields

Start Time: _____ Golf Time: _____ Stop Time: _____ ☐ Did not visit Hole 5

*Record start time as the moment they stop and stand in front of Hole 5. Record golf time as the moment they set the ball down at Hole 5 (for golfers only). Record stop time as the moment they leave Hole 5 and begin to walk to another component of the BBY.

Hole Component	Behaviors
30. Starting Hole 5 *Only for golfer or non-golfers with a golfing group. This is what the visitor you are tracking does between Start Time above and when the first person in their group golfs.	☐ Not with a golfing group ☐ Didn't have to wait, group golfed right away ☐ Waited in line ☐ Went to exhibit component(s)/label(s): _____ _____ _____ _____ (write numbers)
31. Behaviors at Hole 5	☐ Museum staff present at hole ☐ Interacted with staff For non-golfers only: ☐ Glanced at hole (less than 3 secs) ☐ Stopped and looked at hole (3 secs or longer) ☐ Watched another visitor golf
32. Label: "Draining the Fields" (Beginning of hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
33. Label: "Field of Drains" (corner by field drains)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
34. Label: "Two Choices: Fast or Slow" (In the middle of the hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
35. Label: "What's the Best Way" (End of hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
36. Label: "Draining the Land, Changing the Watershed" (Large sign on sidewalk facing Hole 5)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)

Notes for Hole 5:

Braided River Exhibit

Start Time: _____ Stop Time: _____ ☐ Did not visit Braided River Exhibit

*Record start time as the moment they look at the Braided River Exhibit (they do not have to be directly by it). Record stop time as the moment they turn away from Braided River Exhibit and walk away from it.

* Some visitors tend to come to this exhibit more than once, so record all behaviors together but record times separately.

Exhibit Component	Behaviors
37. Behaviors at Braided River	☐ Glanced at exhibit (less than 3 secs) ☐ Stopped and looked at exhibit (3 secs or longer) ☐ Manipulated exhibit (move water spouts, make dams, move sand, move pipes *Simply touching the water or sand without doing any of the listed examples is not considered manipulation) ☐ Watched another visitor manipulate ☐ Museum staff present at exhibit ☐ Watched museum staff manipulate ☐ Interacted with staff ☐ Assisted a visitor or was assisted by a visitor to use exhibit ☐ Motioned a visitor or was motioned by a visitor over to exhibit ☐ Pointed to something on exhibit
38. Label: "Unraveling the Behavior of Braided Rivers" (Large sign across from the beginning of Hole 5 facing Braided River)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to exhibit)
39. Label: Different Geography, Different Rivers" (Facing Braided River exhibit)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to exhibit)
40. Label: "River Just Keeps on Braiding" (Facing Braided River exhibit by water spouts)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to exhibit)
41. Label: Check which one is hanging ☐ **"Can a Park Also Be A Garden?" or** ☐ **"Food Webs"** (On sidewalk going to Science House)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to plants)

Notes for Braided River Exhibit:

Hole 6: City Surface Runoff

Start Time: _____ Golf Time: _____ Stop Time: _____ ☐ Did not visit Hole 6

*Record start time as the moment they stop and stand in front of Hole 6. Record golf time as the moment they set the ball down at Hole 6 (for golfers only). Record stop time as the moment they leave Hole 6 and begin to walk to another component of the BBY.

Hole/Exhibit: Component	Behaviors
42. Starting Hole 6 *Only for golfer or non-golfers with a golfing group. This is what the visitor you are tracking does between Start Time above and when the first person in their group golfs.	☐ Not with a golfing group ☐ Didn't have to wait, group golfed right away ☐ Waited in line ☐ Went to exhibit component(s)/label(s): _____ _____ _____ _____ (write numbers)
43. Behaviors at Hole 6	☐ Museum staff present at hole ☐ Interacted with staff For non-golfers only: ☐ Glanced at hole (less than 3 secs) ☐ Stopped and looked at hole (3 secs or longer) ☐ Watched another visitor golf
44. Label: "Hard Surface Runoff" (At beginning of hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
45. Label: "Rain Gardens" (Larger sign on sidewalk in middle of hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
46. Label: "Rainwater's Wayside Rest" (By hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
47. Label: Check which one is hanging ☐ **"Can a Park Also Be A Garden?" or** ☐ **"Food Webs"** (on sidewalk by electrical tower)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to plants)
48. Label: "Hold a Truck…But Doesn't Hold Water" (In the middle by electrical tower)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to ground)

Notes for Hole 6:

Hole 7: Meandering River

Start Time: _____ Golf Time: _____ Stop Time: _____ ☐ Did not visit Hole 7

* Record start time as the moment they stop and stand in front of Hole 7. Record golf time as the moment they set the ball down at Hole 7 (for golfers only). Record stop time as the moment they leave Hole 7 and begin to walk to another component of the BBY.

Hole/Exhibit Component	Behaviors
49. Starting Hole 7 *Only for golfer or non-golfers with a golfing group. This is what the visitor you are tracking does between Start Time above and when the <u>first</u> person in their group golfs.	☐ Not with a golfing group ☐ Didn't have to wait, group golfed right away ☐ Waited in line ☐ Went to exhibit component(s)/label(s): _____ _____ _____ _____ (write numbers)
50. Behaviors at Hole 7	☐ Manipulated exhibit (shovel out sand, put boats or balls in water) ☐ Watched another visitor manipulate ☐ Museum staff present at hole ☐ Watched museum staff manipulate ☐ Interacted with staff ☐ Assisted a visitor <u>or</u> was assisted by a visitor to use river ☐ Motioned a visitor <u>or</u> was motioned by a visitor over to river For non-golfers only: ☐ Glanced at hole (less than 3 secs) ☐ Stopped and looked at hole (3 secs or longer) ☐ Watched another visitor golf
51. Label: "Meandering River" (Beginning of hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
52. Exhibit/Label: "Measure Meandering Rivers" (End of Hole 7 - between Hole 7 and Dam Exhibit)	☐ Didn't look at exhibit/label ☐ Glanced at exhibit (less than 3 secs) ☐ Stopped and looked at exhibit (3 secs or longer) ☐ Manipulated exhibit (measure one or both rivers *Touching the string without measuring is <u>not</u> considered a manipulation) ☐ Watched another visitor manipulate ☐ Museum staff present at exhibit ☐ Watched museum staff manipulate ☐ Interacted with staff ☐ Assisted a visitor <u>or</u> was assisted by a visitor to use exhibit ☐ Motioned a visitor <u>or</u> was motioned by a visitor over to exhibit ☐ Pointed to something on exhibit/label
53. Label: "Rivers on the Move" (On sidewalk – next to #52)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to Hole 7 or #52)

Dam Removal Exhibit (Between holes 7 & 8)

Start Time: _____ Stop Time: _____ ☐ Did not visit Dam Removal Exhibit

*Record start time as the moment they approach the Dam Removal Exhibit. Record stop time as the moment they turn away from Dam Removal Exhibit and walk away from it.

Exhibit Component	Behaviors
54.Dam Removal Exhibit "Removing Sandstone Dam"/"Changing the River With a Dam" (Between Holes 7 & 8. This exhibit has two sides)	☐ Glanced at exhibit (less than 3 secs) ☐ Stopped and looked at exhibit (3 secs or longer) ☐ Manipulated exhibit (move dam) ☐ Watched another visitor manipulate ☐ Museum staff present at exhibit ☐ Watched museum staff manipulate ☐ Interacted with staff ☐ Assisted a visitor or was assisted by a visitor to use exhibit ☐ Motioned a visitor or was motioned by a visitor over to exhibit ☐ Pointed to something on exhibit/label
55. Label: "Restoring Urban Creeks and Streams" (Sidewalk on the way to Hole 8)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to plants)
56. Label: Check which one is hanging ☐ **"Can a Park Also Be A Garden?" or** ☐ **"Food Webs"** (On side of Dam Removal exhibit next to Hole 8)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to plants)

Notes for Dam Removal Exhibit:

Hole 8: Lock and Dam

Start Time: _____ Golf Time: _____ Stop Time: _____ ☐ Did not visit Hole 8

*Record start time as the moment they stop and stand in front of Hole 8. Record golf time as the moment they set the ball down at Hole 8 (for golfers only). Record stop time as the moment they leave Hole 8 and begin to walk to another component of the BBY.

Hole Component	Behaviors
57. Starting Hole 8 *Only for golfer or non-golfers with a golfing group. This is what the visitor you are tracking does between Start Time above and when the first person in their group golfs.	☐ Not with a golfing group ☐ Didn't have to wait, group golfed right away ☐ Waited in line ☐ Went to exhibit component(s)/label(s): _____ _____ _____ _____ (write numbers)
58. Behaviors at Hole 8	☐ Museum staff present at hole ☐ Interacted with staff For non-golfers only: ☐ Glanced at hole (less than 3 secs) ☐ Stopped and looked at hole (3 secs or longer) ☐ Watched another visitor golf
59. Label: "Engineered River" (Beginning of hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
60. Label: "Engineered Obstacles" (Middle of hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
61. Label: "St. Anthony Falls" (On sidewalk)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)

Notes for Hole 8:

Hole 9: Gulf of Mexico

Start Time: _____ Golf Time: _____ Stop Time: _____ ☐ Did not visit Hole 9

* Record start time as the moment they stop and stand in front of Hole 9. Record golf time as the moment they set the ball down at Hole 9 (for golfers only). Record stop time as the moment they leave Hole 9 and begin to walk to another component of the BBY.

Hole Component	Behaviors
62. Starting Hole 9 *Only for golfer or non-golfers with a golfing group. This is what the visitor you are tracking does between Start Time above and when the first person in their group golfs.	☐ Not with a golfing group ☐ Didn't have to wait, group golfed right away ☐ Waited in line ☐ Went to exhibit component(s)/label(s): _____ _____ _____ _____ (write numbers)
63. Behaviors at Hole 9	☐ Museum staff present at hole ☐ Interacted with staff For non-golfers only: ☐ Glanced at hole (less than 3 secs) ☐ Stopped and looked at hole (3 secs or longer) ☐ Watched another visitor golf
64. Label: "River Delta" (Beginning of hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
65. Label: "Out to Sea" (On sidewalk by hole)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label, pointed to hole)
66. Label: "Ready for another round of golf?" (On sidewalk across from #65)	☐ Didn't look at label ☐ Glanced at label (less than 3 secs) ☐ Stopped and looked at label (3 secs or longer) ☐ Interacted with another visitor regarding label (pointed at label, motioned a visitor over to label, was motioned by a visitor over to label)

Notes for Hole 9:

Appendix 3: Big Back Yard Interview Guide

Hello, I am working with the Science Museum of Minnesota to conduct a study of their new exhibit, the Big Back Yard. Would you have about ten minutes to answer a few questions? I'll be taping the conversation to help us capture all your comments. Your answers will be confidential and shared only with program staff members in order to improve the exhibit. (*Once the recorder is on introduce yourself and ask each person in the group to say their first name*)

1. Did you play golf during your visit to the Big Back Yard? Did you have a tee-time?

2. How many people in your party golfed? Did anyone decide not to golf?
Follow-up question: What did that person(s) do while the rest of the party golfed?

Non-Golfers
2a. Ask if they were interested in golfing and decided not to. Why/Why not?
2b. If no one in the party golfed, ask if they walked through the park, visited the Science House, the Medicine Garden or the Maze.
(*If they walked through the exhibit and/or interacted with any of the freestanding portions, continue on with the interview*.)

3. What did you find **most interesting** about The Big Back Yard?
Follow-up: If they just name something ask why they found that interesting. Ask if there was anything else.

4. What do you think the **main idea or ideas** of the Earthscapes Mini-Golf are?
Follow-up: What in the exhibit led you to that idea?

There were a couple of big ideas that the Science Museum was trying to communicate to visitors in the Earthscapes Mini-Golf. I'd like to ask you a few more specific questions about those ideas.

5. Could you tell me anything new or interesting that you found out about how **the surface of the Earth is shaped**?
Follow up: If they have already mentioned something in a previous response build on that response. If they say no, ask if that was because they already knew the ideas that were presented?

6. What did you find interesting or surprising about **how humans have interacted** with rivers and water?

7. Was there any feature in the park that **reminded you of something you've seen** where you live or out in the world? What did it remind you of?

8. Imagine you could tell me about your visit to the Big Back Yard through the **"eyes" of your golf ball**. What could you say about the journey you (as a ball) just completed? What was your favorite part of the journey? Why?

9. Was there anything presented in the park that **you'd like to know more about**?

10. Is there **anything else** you would like to say about The Big Back Yard that you would like me to share with the Science Museum staff?

We'd like to ask just a few questions to help the museum staff understand visitor experiences:
Had you heard about the Big Back Yard before your visit to the Museum today? (*If yes, how?)*
Do you live in the Minneapolis/St. Paul Metro area or are you visiting? *(If from another area, ask where)*
Is this your first visit to the Science Museum? (*If no, ask next question*)
How many times have you visited the Science Museum in the past 12 months?
Do you mind if I ask your ages? [*After interview is complete and party has left, note on recorder ethnicity of group, weather: Sunny, Cloudy, Raining or Humid and Temp., and any clarifying comments*]

Appendix 4: Number of Visitors and Time Spent at Each Hole

Table 32: Number of Visitors and Time Spent at Hole 1
(n=323)

Type of Visitor	Percent of Visitors	Number of Visitors	Minimum	Maximum	Median
Golfer	51.1%	165	20 sec.	10 min. 13 sec.	2 min. 14 sec.
Non-golfer, with golfers	7.4%	24	6 sec.	3 min. 12 sec.	1 min. 53 sec.
Non-golfer, not with golfers	2.2%	17	1 sec	1 min. 9 sec.	13 sec

Table 33: Number of Visitors and Time Spent at Hole 2
(n=323)

Type of Visitor	Percent of Visitors	Number of Visitors	Minimum	Maximum	Median
Golfer	51.4%	166	35 sec.	7 min. 19 sec.	2 min. 39 sec.
non-golfer, with golfers	7.4%	24	24 sec.	6 min. 12 sec.	2 min. 21 sec.
non-golfer, not with golfers	3.7%	12	1 sec.	1 min. 14 sec.	34 sec.

Table 34: Number of Visitors and Time Spent at Hole 3
(n=323)

Type of Visitor	Percent of Visitors	Number of Visitors	Minimum	Maximum	Median
Golfer	51.4%	166	41 sec.	5 min. 48 sec.	3 min. 4 sec.
non-golfer, with golfers	7.4%	24	57 sec.	5 min. 33 sec.	2 min. 36 sec.
non-golfer, not with golfers	7.7%	25	1 sec.	11 min. 39 sec.	39 sec.

Table 35: Number of Visitors and Time Spent at Hole 4
(n=323)

Type of Visitor	Percent of Visitors	Number of Visitors	Minimum	Maximum	Median
Golfer	51.4%	166	30 sec.	11 min. 49 sec.	3 min. 42 sec.
non-golfer, with golfers	7.4%	24	32 sec.	12 min. 18 sec	3 min. 22 sec.
non-golfer, not with golfers	3.4%	11	5 sec.	1 min. 54 sec.	22 sec.

Table 36: Number of Visitors and Time Spent at Hole 5
(n=323)

Type of Visitor	Percent of Visitors	Number of Visitors	Minimum	Maximum	Median
Golfer	51.1%	165	39 sec.	10 min. 41 sec.	3 min. 37 sec.
non-golfer, with golfers	6.8%	22	20 sec.	11 min. 7 sec.	2 min. 15 sec.
non-golfer, not with golfers	3.7%	12	5 sec.	1 min. 29 sec.	25 sec.

Table 37: Number of Visitors and Time Spent at Hole 6
(n=323)

Type of Visitor	Percent of Visitors	Number of Visitors	Minimum	Maximum	Median
Golfer	50.8%	164	5 sec.	12 min. 18 sec.	2 min. 24 sec.
non-golfer, with golfers	6.5%	21	12 sec.	3 min. 52 sec.	2 min. 3 sec.
non-golfer, not with golfers	4.3%	14	2 sec.	2 min. 9 sec.	37 sec.

Table 38: Number of Visitors and Time Spent at Hole 7
(n=323)

Type of Visitor	Percent of Visitors	Number of Visitors	Minimum	Maximum	Median
Golfer	51.4%	166	54 sec.	14 min. 4 sec.	3 min. 16 sec.
non-golfer, with golfers	6.5%	21	13 sec.	5 min. 9 sec.	2 min. 29 sec.
non-golfer, not with golfers	7.4%	24	2 sec.	2 min. 18 sec.	24 sec.

Table 39: Number of Visitors and Time Spent at Hole 8
(n=323)

Type of Visitor	Percent of Visitors	Number of Visitors	Minimum	Maximum	Median
Golfer	51.4%	166	54 sec.	14 min. 4 sec.	2 min. 24 sec.
non-golfer, with golfers	6.2%	20	15 sec.	8 min. 25 sec.	1 min. 48 sec.
non-golfer, not with golfers	3.7%	12	1 sec.	1 min. 10 sec.	18 sec.

Table 40: Number of Visitors and Time Spent at Hole 9
(n=323)

Type of Visitor	Percent of Visitors	Number of Visitors	Minimum	Maximum	Median
Golfer	51.4%	166	3 sec.	23 min. 55 sec.	1 min. 39 sec.
non-golfer, with golfers	6.8%	22	39 sec.	5 min. 58 sec.	1 min. 53 sec.
non-golfer, not with golfers	9.9%	32	1 sec.	3 min. 33 sec.	18 sec.

Appendix 5: Golfing Group Behaviors While Waiting to Golf (For Golfers and Non-golfers With Golfers)

Hole 1: Source to Sink

Table 41: Behaviors for Visitors in Golfing Groups While Waiting At Hole 1
(n=35)

Behavior	Percent of Visitors	Number of Visitors
Waited In Line Only	100%	35

Hole 2: Erosion

Table 42: Behaviors for Visitors in Golfing Groups While Waiting At Hole 2
(n=42)

Behavior	Percent of Visitors	Number of Visitors
Waited In Line Only	90.5%	38
Waited in Line and Visited Exhibits	9.5%	4

Table 43: Exhibit Components Visited While Waiting at Hole 2
(n=4)

Exhibit Component	Percent of Visitors	Number of Visitors
Prairie Maze	25.0%	1
Label 16: “Eroding Rock”	75.0%	3
Look at Hole 3	25.0%	1

Hole 3: Hydraulic Jump

Table 44: Behaviors for Visitors in Golfing Groups While Waiting At Hole 3
(n=57)

Behavior	Percent of Visitors	Number of Visitors
Waited In Line Only	84.2%	48
Waited in Line and Visited Exhibits	15.8%	9

Table 45: Exhibit Components Visited While Waiting at Hole 3
(n=8)

Exhibit Component	Percent of Visitors	Number of Visitors
Erosion Recorder	25.0%	2
Label 23: "Spillway"	50.0%	4
Label 24: "Hydraulic Jump"	25.0%	2
Braided River	12.5%	1

Hole 4: City Storm Sewer

Table 46: Behaviors for Visitors in Golfing Groups While Waiting At Hole 4
(n=72)

Behavior	Percent of Visitors	Number of Visitors
Waited In Line Only	73.6%	53
Waited in Line and Visited Exhibits	26.4%	19

Table 47: Exhibit Components Visited While Waiting for Hole 4
(n=19)

Exhibit Component	Percent of Visitors	Number of Visitors
Look at Hole 3	5.3%	1
Label 27: "Pollution's Secret Passage"	36.8%	7
Label 28: "Draining the City"	15.8%	3
Look at Hole 5	5.3%	1
Braided River	52.6%	10
Label 38: "Unraveling the Behavior of Braided Rivers"	5.3%	1

Hole 5: Draining the Fields

Table 48: Behaviors for Visitors in Golfing Groups While Waiting At Hole 5
(n=66)

Behavior	Percent of Visitors	Number of Visitors
Waited In Line Only	77.3%	51
Waited in Line and Visited Exhibits	21.2%	14
Went to Exhibits Only	1.5%	1

Table 49: Exhibit Components Visited While Waiting for Hole 5
(n=15)

Exhibit Component	Percent of Visitors	Number of Visitors
Label 29: "One Source in a Million"	6.7%	1
Label 32: "Draining the Fields"	26.7%	4
Label 36: "Draining the Land, Changing the Watershed"	6.7%	1
Erosion Recorder	73.3%	11
Label 38: "Unraveling the Behavior of Braided Rivers"	13.3%	2

Hole 6: City Surface Runoff

Table 50: Behaviors for Visitors in Golfing Groups While Waiting At Hole 6
(n=31)

Behavior	Percent of Visitors	Number of Visitors
Waited In Line Only	93.5%	29
Waited in Line and Visited Exhibits	6.5%	2

Table 51: Exhibit Components Visited While Waiting for Hole 6
(n=2)

Exhibit Component	Percent of Visitors	Number of Visitors
Label 44: "Hard Surface Runoff"	100%	2

Hole 7: Meandering River

Table 52: Behaviors for Visitors in Golfing Groups While Waiting At Hole 7
(n=64)

Behavior	Percent of Visitors	Number of Visitors
Waited In Line Only	89.1%	57
Waited in Line and Visited Exhibits	9.4%	6
Went to Exhibits Only	1.6%	1

Table 53: Exhibit Components Visited While Waiting for Holes
(n=7)

Exhibit Component	Percent of Visitors	Number of Visitors
Look at Hole 6	14.3%	1
Label 51: Meandering River"	85.7%	6

Hole 8: Lock and Dam

Table 54: Behaviors for Visitors in Golfing Groups While Waiting At Hole 8
(n=54)

Behavior	Percent of Visitors	Number of Visitors
Waited In Line Only	74.1%	40
Waited in Line and Visited Exhibits	24.1%	13
Went to Exhibits Only	1.8%	1

Table 55: Exhibit Components Visited While Waiting for Holes
(n=14)

Exhibit Component	Percent of Visitors	Number of Visitors
Look at Hole 7	7.4%	1
Dam Removal	64.3%	9
Label 55: "Restoring Urban Creeks and Streams"	7.4%	1
Label 59: "Engineered River"	21.4%	3
Label 60: "St. Anthony Falls"	7.4%	1

Hole 9: Gulf of Mexico

Table 56: Behaviors for Visitors in Golfing Groups While Waiting At Hole 9
(n=22)

Behavior	Percent of Visitors	Number of Visitors
Waited In Line Only	100%	22

Appendix 6

Table 57: Visitor Interactions Related to Label

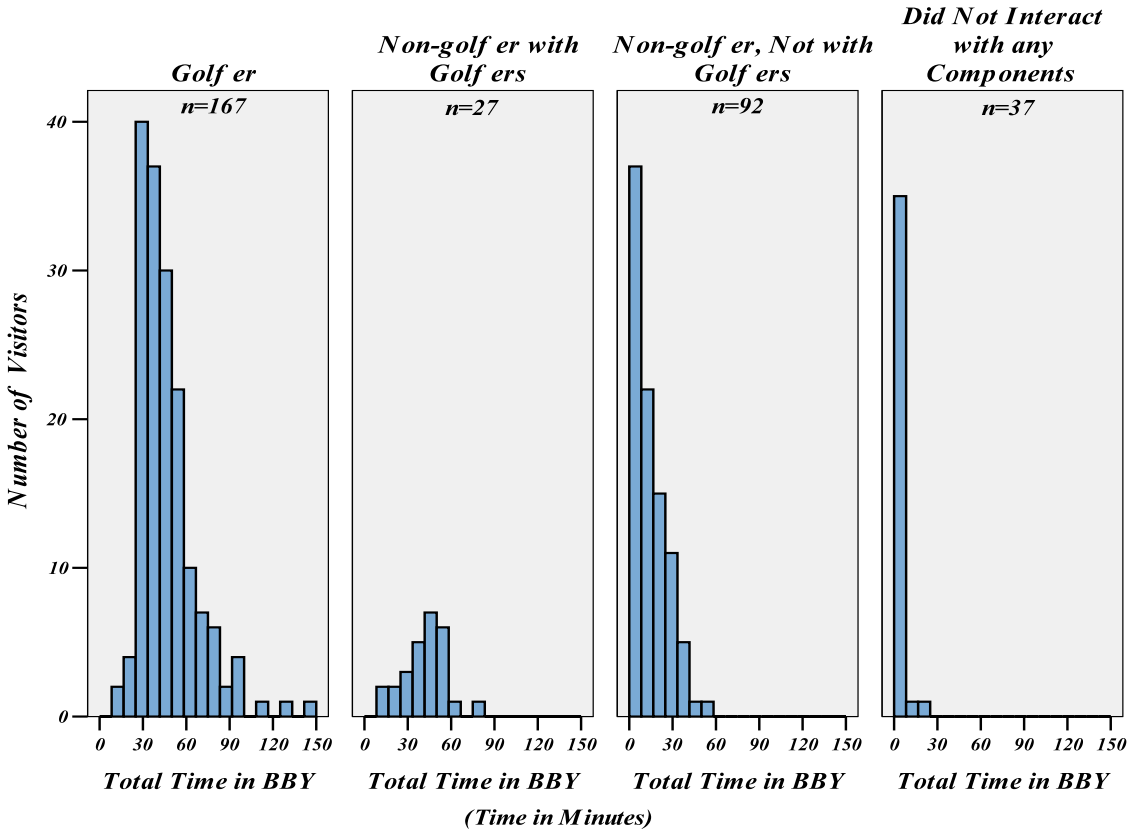
(n=323)

Name of Label	Percent of Visitors	Number of Visitors
Label 27: "Pollution's Secret Passage"	6.8%	22
Label 16: "Eroding Rock"	5.3%	17
Label 12: "Start to Finish"	5.0%	16
Label 51: "Meandering River"	4.3%	14
Label 13: "From Source to Sink"	3.4%	11
Label 23: "Spillway"	3.1%	10
Label 40: "River Just Keeps on Braiding"	2.8%	9
Label 32: "Draining the Fields"	2.5%	8
Label 66: "Ready for another round of golf?"	2.5%	8
Label 18: "Food Webs/Can a Park Be a Garden?"	2.2%	7
Label 28: "Draining the City"	2.2%	7
Label 48: "Hold a Truck…But Doesn't Hold Water"	2.2%	7
Label 19: "A Slice Through Earth's History"	1.9%	6
Label 24: "Hydraulic Jump"	1.9%	6
Label 38: "Unraveling the Behavior of Braided Rivers"	1.9%	6
Label 8: "Look for Changing Landscapes"	1.9%	6
Label 17: "A Downhill Move"	1.5%	5
Label 64: "River Delta"	1.5%	5
Label 7: "Look Beneath the Oceans"	1.5%	5
Label 34: "Two Choices: Fast or Slow"	1.2%	4
Label 36: "Draining the Land, Changing the Watershed"	1.2%	4
Label 44: "Hard Surface Runoff"	1.2%	4
Label 45: "Rain Gardens"	1.2%	4
Label 29: "One Source in a Million"	0.9%	3
Label 35: "What's the Best Way?"	0.9%	3
Label 53: "Rivers on the Move"	0.9%	3
Label 55: "Restoring Urban Creeks and Streams"	0.9%	3
Label 59: "Engineered River"	0.9%	3
Label 6: "3D View of the World"	0.9%	3
Label 39: "Different Geography, Different Rivers"	0.6%	2
Label 46: "Rainwater's Wayside Rest"	0.6%	2

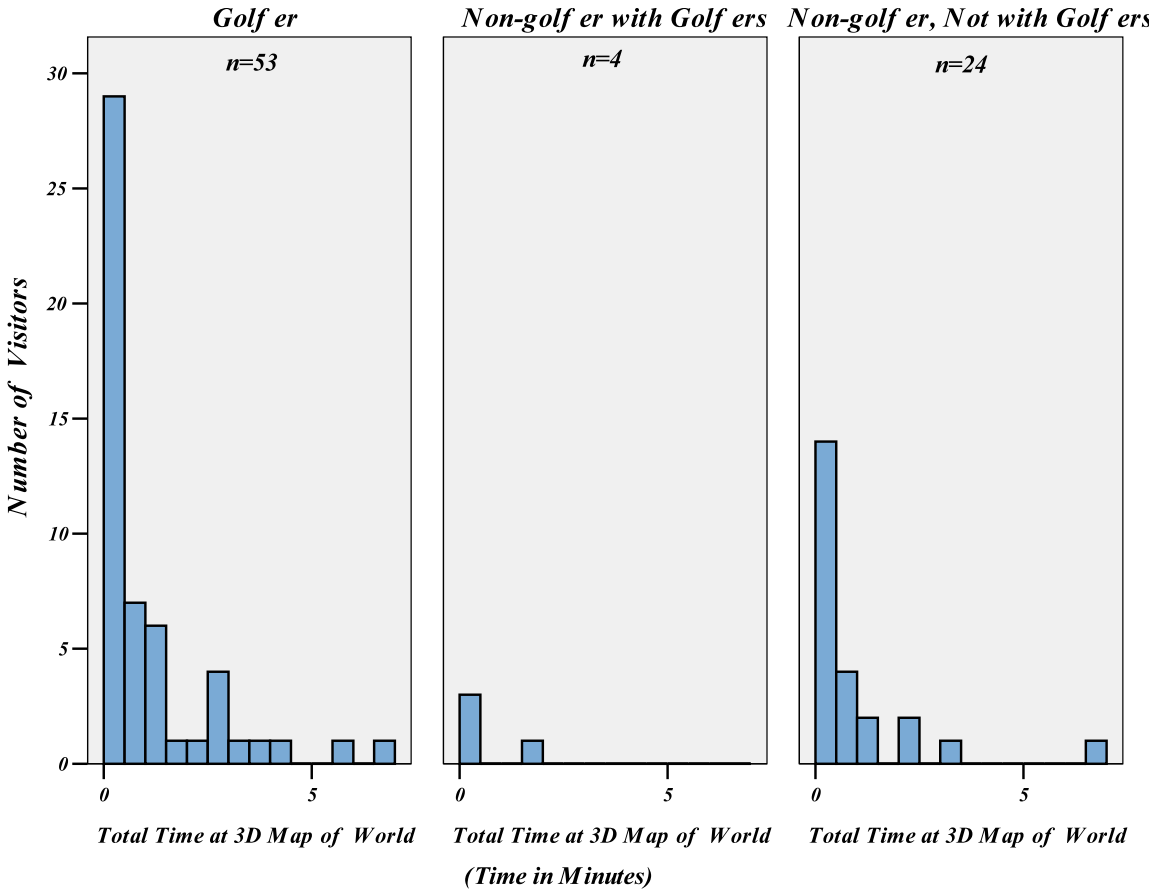
Label 60: “Engineered Obstacles”	0.6%	2
Label 65: “Out to Sea”	0.6%	2
Label 33: “Field of Drains”	0.3%	1
Label 47: “Food Webs/Can a Park Be a Garden?”	0.3%	1
Label 41: “Food Webs/Can a Park Be a Garden?”	0%	0
Label 56: “Food Webs/Can a Park Be a Garden?”	0%	0
Label 61: “St. Anthony Falls”	0%	0

Appendix 7: Histograms of Time Spent in Big Back Yard, and at Stand-Alone Exhibits and Other Big Back Yard Features Based on Visitor Experience

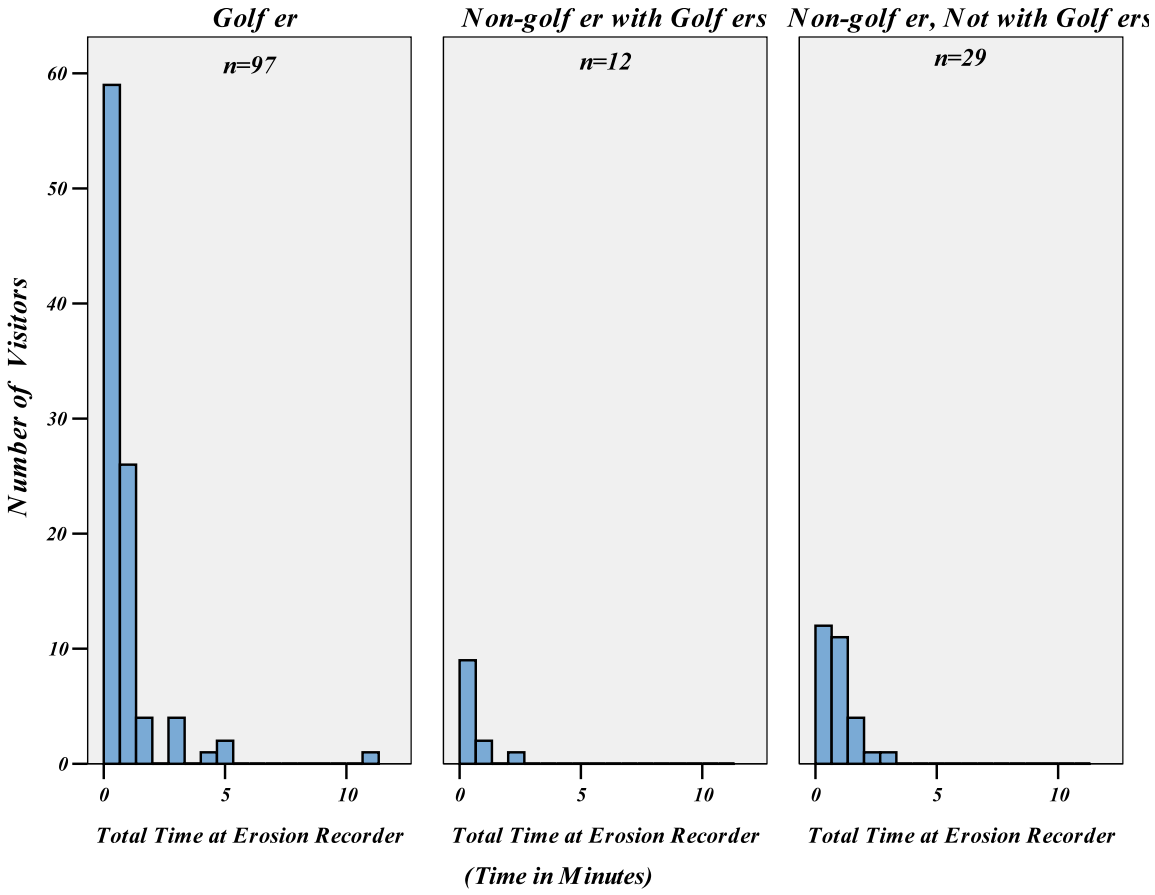
Graph 4: Total Time in Big Back Yard Based on Visitor Experience



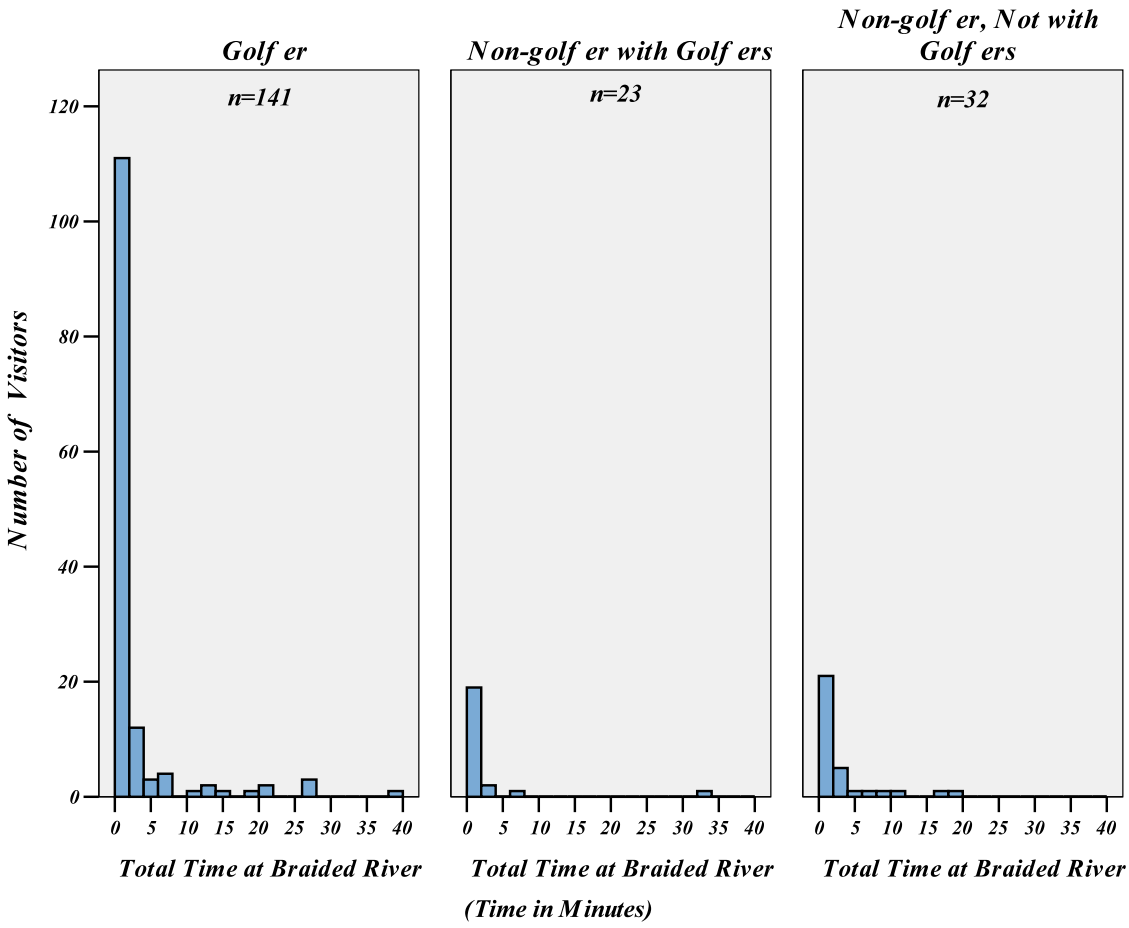
Graph 5: Total Time at 3D Map of the World Based on Visitor Experience



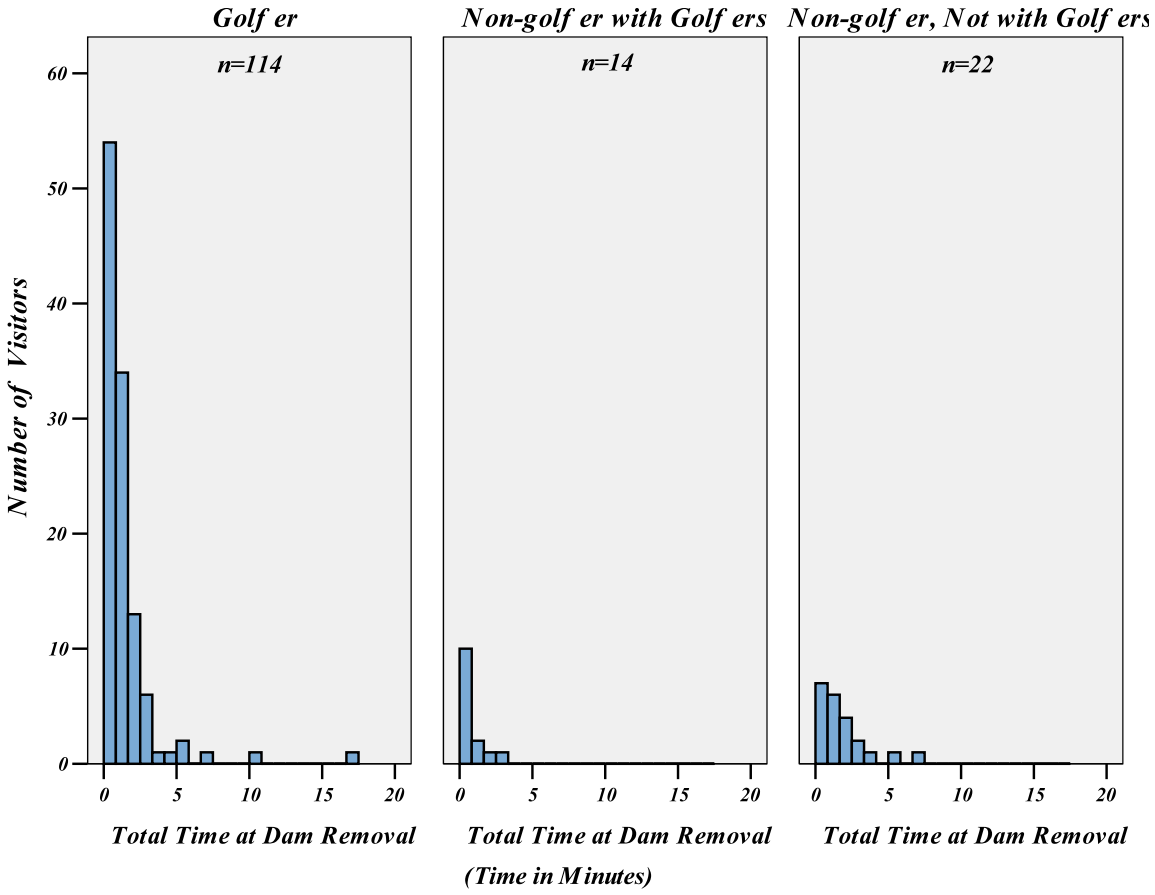
Graph 6: Total Time at Erosion Recorder Based on Visitor Experience



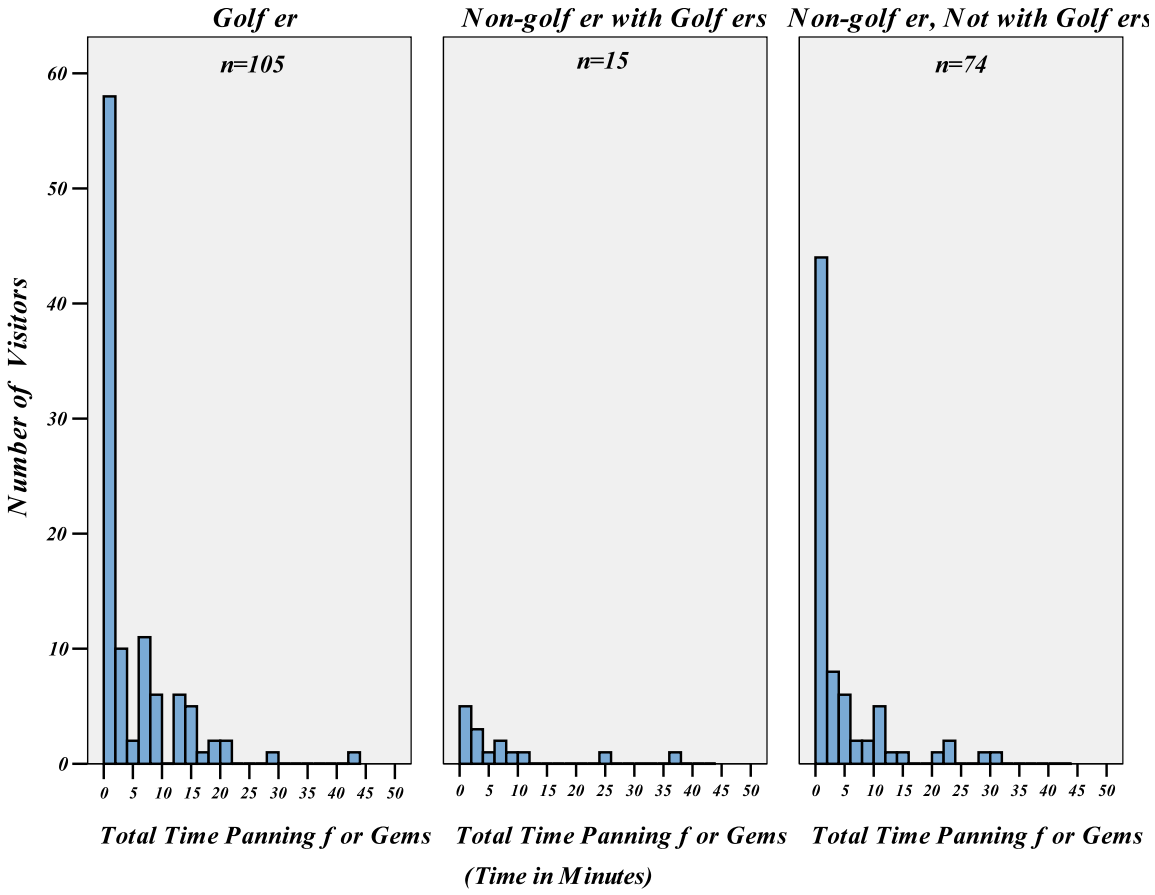
Graph 7: Total Time at Braided River Based on Visitor Experience



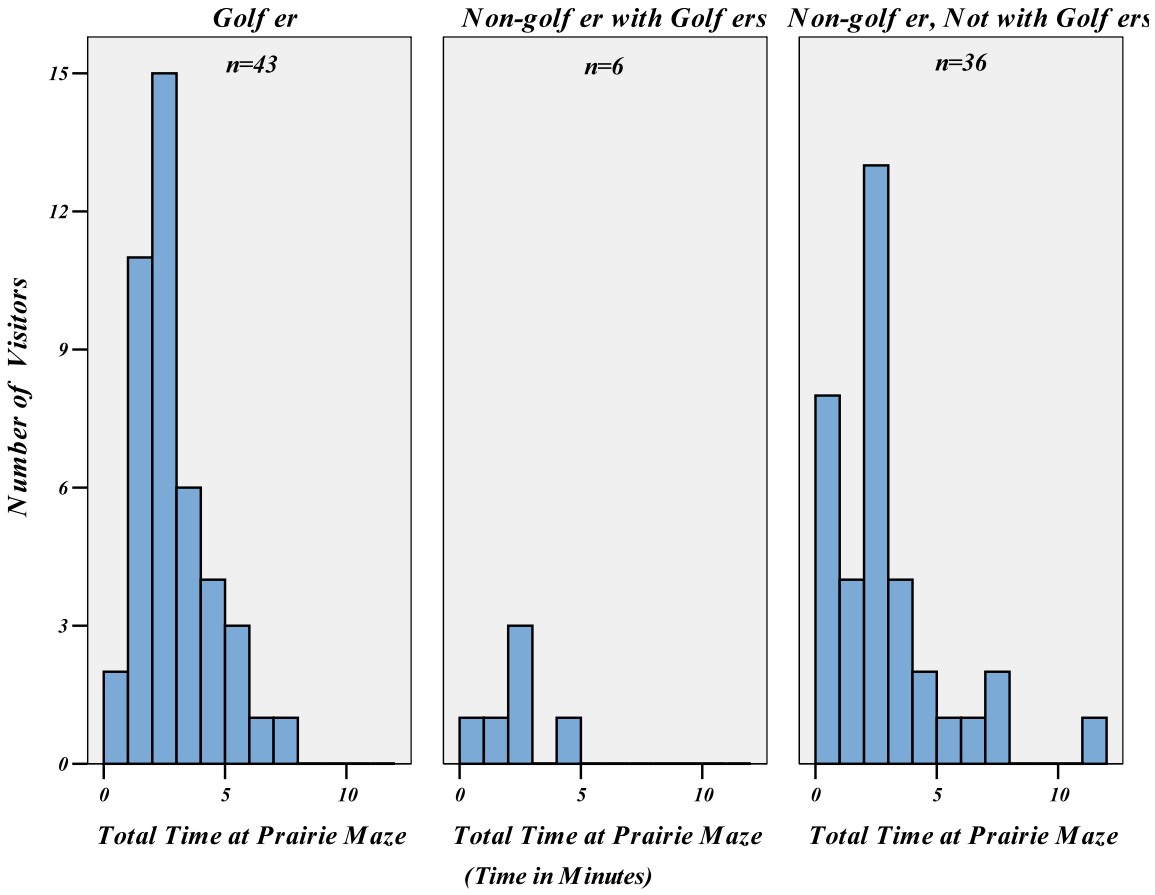
Graph 8: Total Time at Dam Removal Based on Visitor Experience



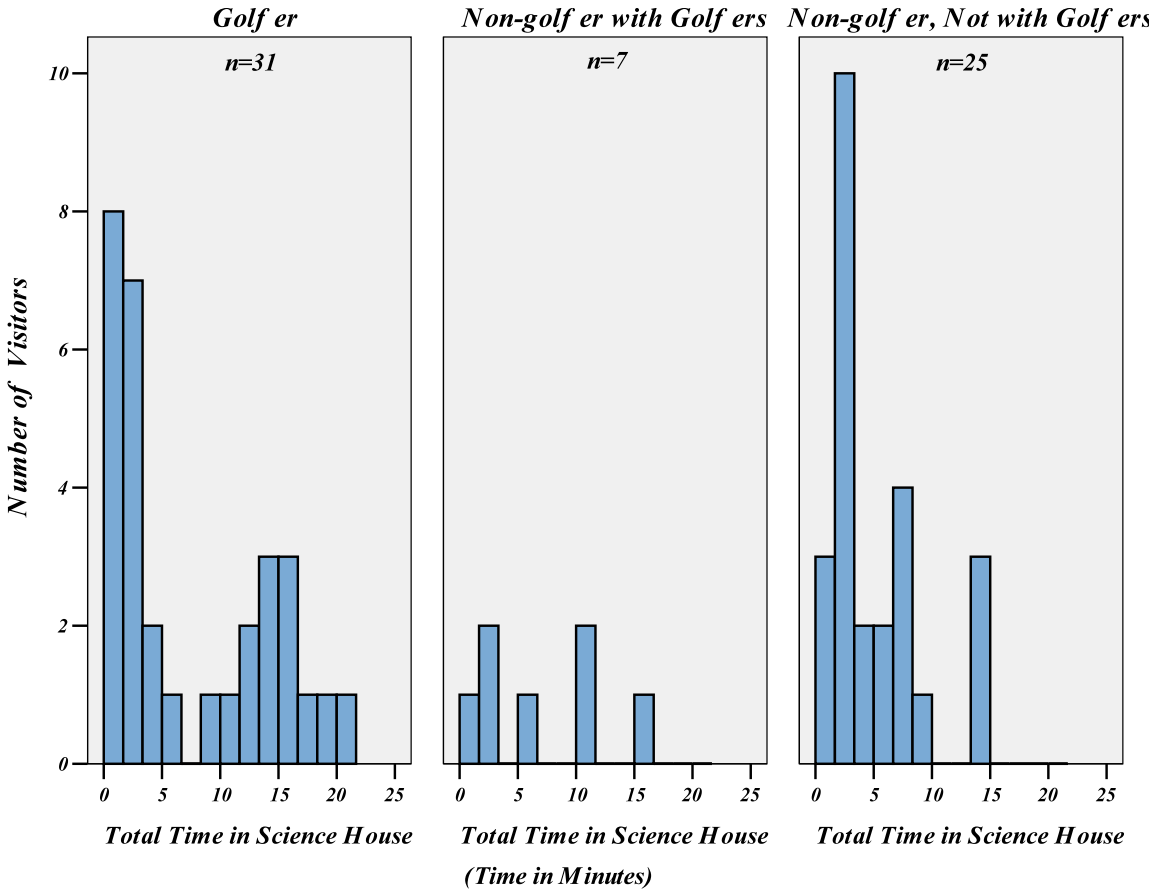
Graph 9: Total Time at Panning for Gems Based on Visitor Experience



Graph 10: Total Time at Prairie Maze Based on Visitor Experience



Graph 11: Total Time in Science House Based on Visitor Experience



Graph 11: Total Time at Medicine Garden Based on Visitor Experience