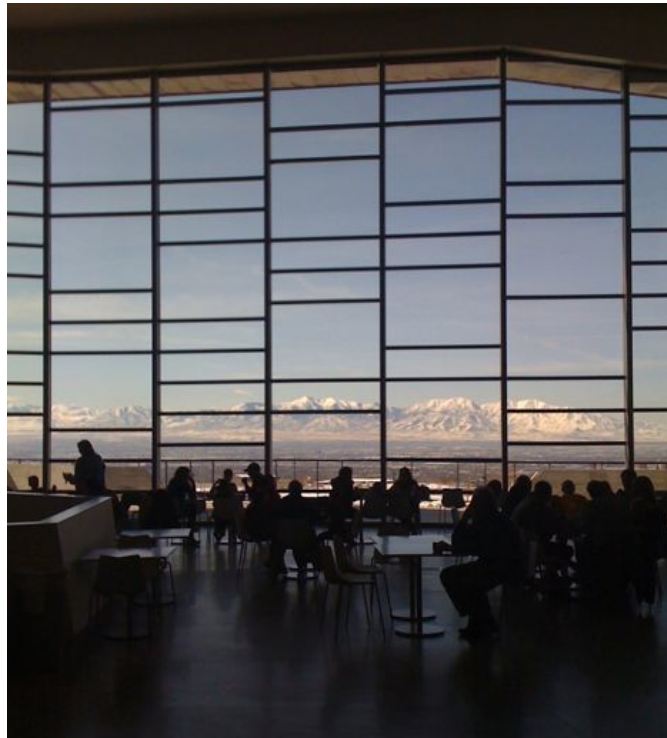


Whole Museum Tracking Study (WMTS)

Final Report

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**for the Natural History Museum of Utah
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“I’d like to remember that we live in a beautiful country and that we need to take care of our land and it’s fun to look at the past so that we can be sure that we have a future.”

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“I learn something new every visit,
the connectedness of everything in Utah.”

SECTION 1: INTRODUCTION

1.1 INTRODUCTION

The new Natural History Museum of Utah (NHMU) opened in November 2011, with a total of 51,270 square feet of public interpretive space. In 2012, NHMU began a multiphase evaluation process to help staff members understand the experiences that visitors have during their visits to the new building. The overall purpose of the research is to assess the degree to which the museum is meeting visitor needs and is having the desired impacts, so that future decisions will increase the likelihood that visitors will return and will develop long-term relationships with the institution.

The Whole Museum Tracking Study (WMTS) takes a broad-brush look at casual visitors to the NHMU. Data collectors followed 100 people through the building during their visits, noting where they went, where they stopped, what they did, and how much time they spent, and then briefly interviewed the tracked subjects at the exit. The study was conducted from September 28 to November 15, 2012. (The tracking methods and the demographics of the 100 subjects are described in later chapters of this report; for methods, see page 15; for demographics see page 20.)

Why we did this study

The first phase of the visitor research program was the Stay-Time Study (STS), which collected data on 418 general visitor groups regarding the total time they stayed in the museum during a single visit. Subjects were time-checked at the beginning and end of their visits, but they were not followed. The STS gave us useful information about different demographic groups and the duration of their visits, which averaged 1 hour, 51 minutes. This information provided a foundation for the planning and execution of this next tracking study.

Once we knew the average time spent by visitors on a visit to the museum, and which demographic factors influenced the duration of time, we sought to understand more about visitors' allocation of their time and the degree of engagement with exhibits they chose to stop at. The WMTS explored the questions, *Where do visitors go, and what do they do, during a single visit to the museum?*

The WMTS provided concrete feedback on the issues addressed in the proposal:

- Do the majority of NHMU's visitors see the whole museum on a single visit? Do they make it all the way through, do they visit each area equally, or do they pick and choose?
- What kinds of behaviors do visitors engage in within different areas of the museum? Are some behaviors more frequent in some areas than in others?
- Are there similarities or differences in time and behavior patterns between repeat and first-time visitors?
- How much time are visitors spending on wayfinding and group logistics? Do they have any problems finding their way around?

See Results at a Glance on page 13 for a brief summary of the main findings related to the questions above.

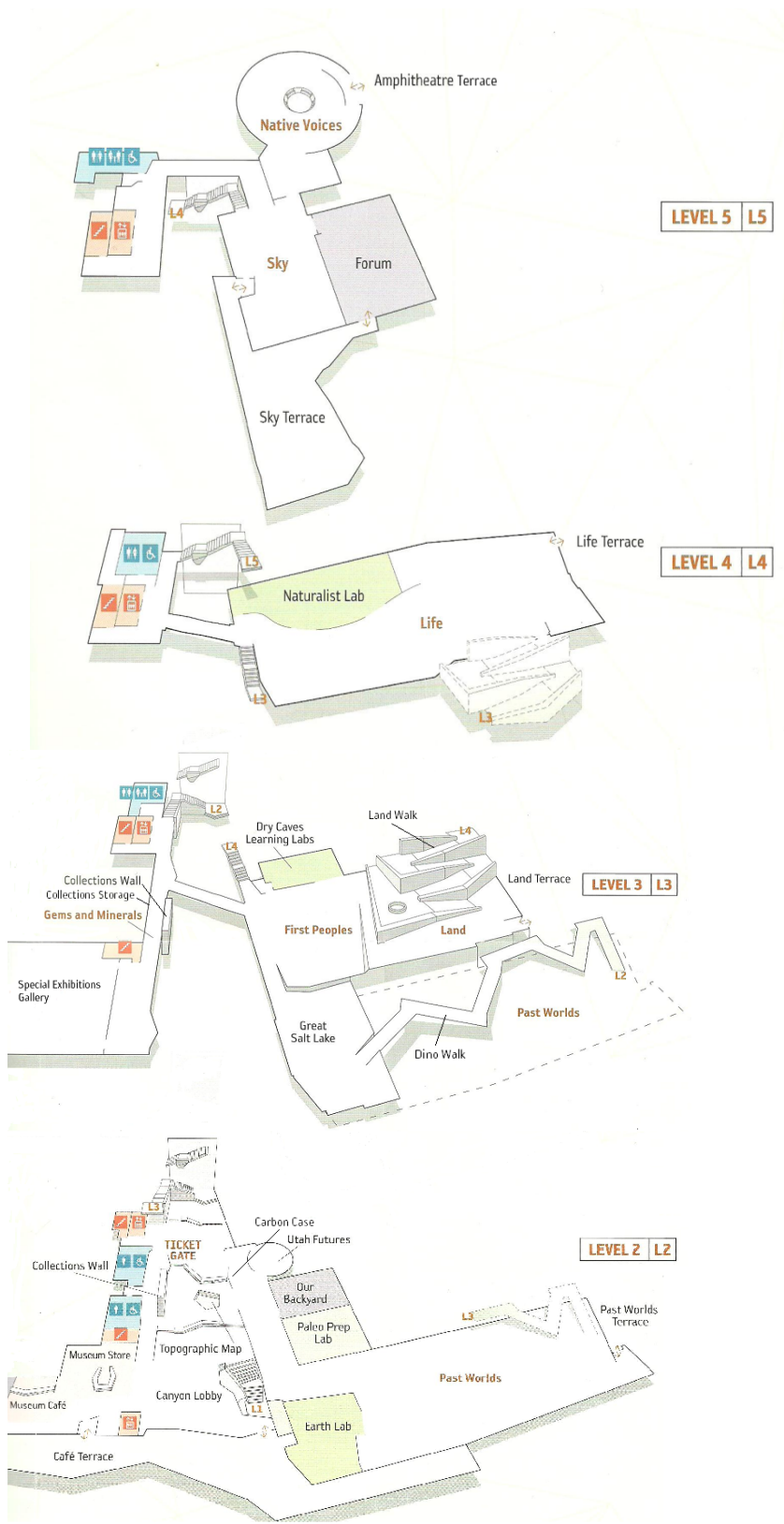


Figure 1. Floor plan of the major exhibition spaces of the museum.

Details with statistics and discussions emphasizing trends and patterns of time and behaviors are in the full report that follows this section.

Throughout the report, recommendations are made for how the WMTS data can be used to improve visitor circulation, wayfinding, and the use of the building’s top-to-bottom designed experience. Finally, the results will be examined to suggest the implications for repeat visitation.

Description of report

This section describes some of the tools used throughout the study and the report, along with a section-by-section guide.

The museum has five floors, called levels. To facilitate the tracking-and-timing methods, we divided levels 2-5 into eight areas. Within the areas (not counting Canyon) were 25 exhibit subareas offering things to do and see, as shown on Table 1 and in the floor plan, opposite.

Level	Area	Exhibit Subarea
5	SKY-NATIVE VOICES	Sky Exhibits
		Native Voices
		Sky Terrace
		Amphitheatre Terrace
4	LIFE	Life Main Floor
		Dioramas
		Life Terrace
		Naturalist Lab
3	LAND	Land Main Floor
		Land Walk
		Land Terrace
	FIRST PEOPLES-GREAT SALT LAKE	First Peoples
		Great Salt Lake
		Dry Caves Lab
	GEMS-COLLECTIONS	Gems & Minerals
		Collection Wall
		Collection Storage
2	PAST WORLDS	Past Worlds Main Floor
		Dino Walk
		Past Worlds Terrace
		Earth Lab
		Paleo Prep Lab
	FUTURES-BACKYARD	Utah Futures
		Our Backyard
		Carbon Case
	CANYON	
1	Entrance & Admissions	

Table 1. Museum Levels and Areas. The levels, areas, and exhibit subareas of the museum as defined for the Whole Museum Tracking Study. The entrance and admissions are on Level 1. Levels 2, 3, 4, and 5 have exhibits. The CANYON on Level 2 has the store, café, and some entry exhibits.

THE MISSION of the Natural History Museum of Utah is to illuminate the natural world and the place of humans within it.

THE PRIMARY AUDIENCES at NHMU are families with children, as well as adults; school groups; the faculty, staff, and students of the University of Utah; and a growing number of tourists from outside the state.

INTERCONNECTED THEMES link the galleries: energy flow, evolution, ecology, and biodiversity.

A SUITE OF SIX GALLERIES cascade from the top floor downward and illustrate an integrated single experience: Sky, Life, Land, First Peoples, Great Salt Lake, and Past Worlds.

In this report, each of the eight main areas of the museum will be discussed separately, starting with the CANYON (page 45) and then going to the top of the building and working down, from SKY-NATIVE VOICES to PAST WORLDS, and FUTURES-BACKYARD. Visitors' use of the terraces and labs are considered separately on page 72.

Data on the time visitors spent overall and in the different areas is covered in the chapter on Time and Other Variables, starting on page 23.

Discussions of what kinds of behaviors visitors engaged in during their visit are included in the section on Activities and Behaviors, page 31.

A summary of the brief Exit Interviews begins on page 41 and consists of a review of the responses by subjects (N=98) to the thought question, "Thinking about all the things I've seen, done and learned today, I would most like to remember..."

Six Case Studies, a diverse sample of different groups and time spent, are reviewed starting on page 77 to give a more personal narrative of what a total visit looked like. This is followed by a closer look at the Seven Adult-Only Repeat visitors in the sample, page 86.

This report pays some special attention to repeat (R) versus first-time (F) visitors; and adult-only groups (AO) versus adults who came with kids (AK) throughout the different sections.

Included throughout the report are qualitative data consisting of direct quotes from visitors, notes made by data collectors as they observed their subjects, and notes submitted by the DCs in their final summaries.

The report ends with Conclusions, Recommendations, and Next Steps.

All quantitative and qualitative data are included in the original master spreadsheets in Appendix 1.

Abbreviations and references used in the report

Data collectors are referred to as "DCs" in the narrative. First-time visitors are referred to as F, repeat visitors as R. Adults who visited with kids are referred to as AK, and adult-only groups as AO.

Visitor quotes are always presented in quotation marks. Numbers in brackets that follow the quotes, e.g. [56], indicate the ID number of the subject. (There are 100 unique numbers but they are not continuous because, while subjects were numbered consecutively from day one of data collection, we purposefully did not renumber the subset of subjects retained for analysis.)

Data collector comments are presented in italics in the narrative portion. Photographs are captioned but not numbered. Most were taken by authors or snatched from the web.

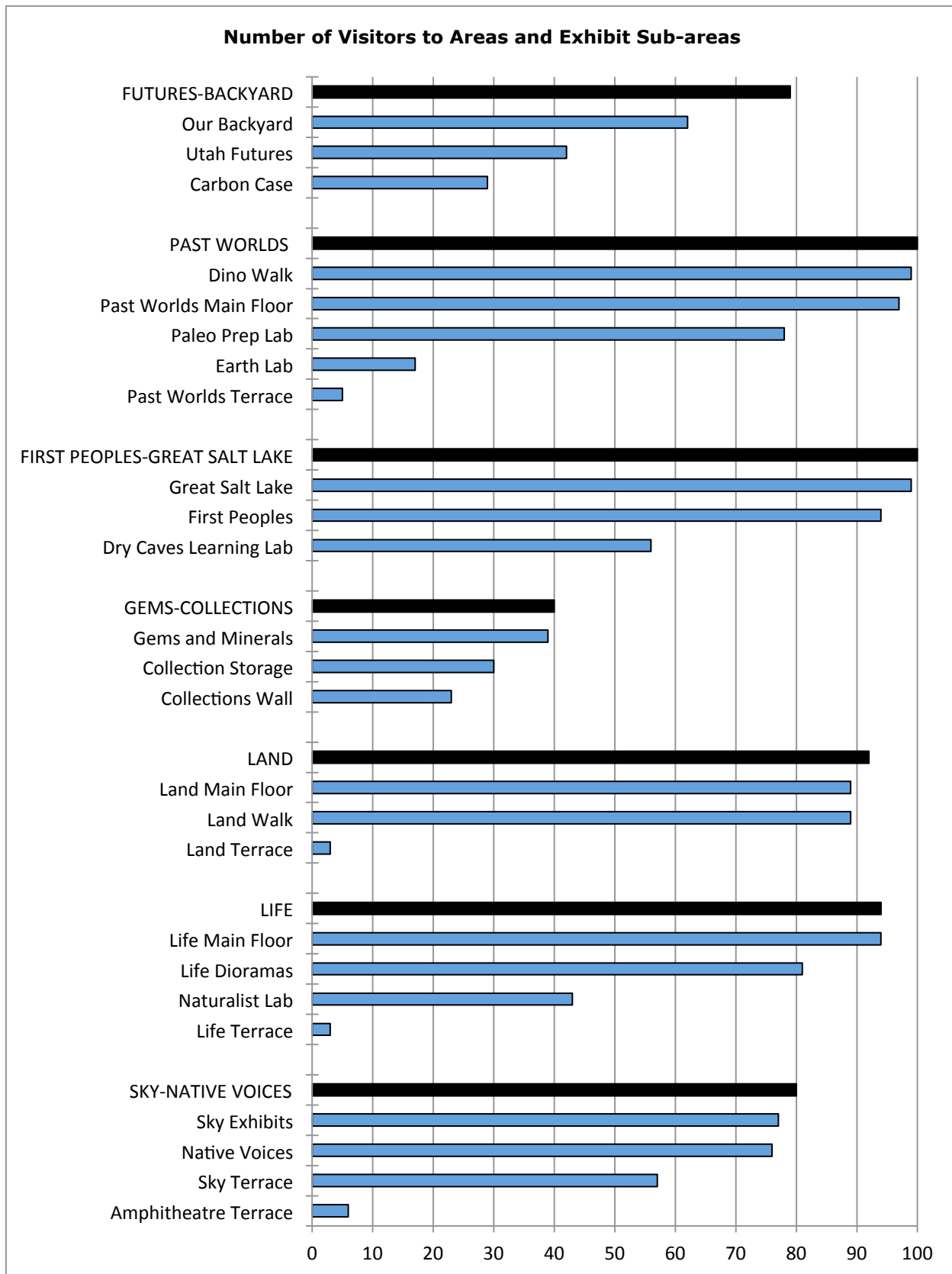


Figure 2. Number of visitors out of 100 who went to seven areas (excluding Canyon) and 25 exhibit subareas. The Canyon area is discussed in a separate section on page 45. Note that the number of visitors to the Collections Wall represented here is the number that viewed the display from its back side, not from the front.

1.2 RESULTS AT A GLANCE

Below are the questions we proposed for the Whole Museum Tracking Study (WMTS) and a brief review of the study's findings:

Do the majority of NHMU's visitors see the whole museum on a single visit? Do they make it all the way through, do they visit each area equally, or do they pick and choose?

Given the architectural and conceptual flow of the new NHMU building, we were interested in how visitors used the building during a typical visit. The data from this study indicates that visitors tended to explore the entire museum, regardless of whether they were first-time or repeat visitors, were members, or were in a group that included kids.

Most of the 100 visitors went to six of the seven areas of the museum, and more than half of the visitors went to most of the exhibit subareas (excluding labs and terraces). See Figure 2 on opposite page. Visiting the entire museum probably increases the likelihood that visitors will encounter the overarching themes of the museum (energy, evolution, ecology, and biodiversity).

There were some differences in the order in which visitors saw the museum. First-time visitors were more likely to start on Level 5, while repeat visitors were more likely to start on Level 2. Although these differences could be due in part to the methods used in this study (first-time visitors were told to start on Level 5—see Methods page 15), starting at the top of the museum and working down reveals the most conceptually coherent flow of exhibit content and experiences—the “suite of six interrelated galleries.”

What behaviors do visitors engage in within different areas of the museum? Are some behaviors more frequent in particular areas?

By tracking visitor behaviors throughout their visit, we learned more about *how* visitors used the museum. Analysis of the data indicates that throughout the museum, there were very high levels of visitors using interactives, talking, reading, and pointing. Additionally, over 75% of visitors watched others use interactives, touched something, looked at scenery, or watched a video.

Particular areas seemed to inspire some different behaviors: Visitors to the LIFE area were more likely to read out loud and call other group members over to see something. More people pointed in GEMS–COLLECTIONS.

The average time spent in the museum was 116 minutes (1 hour, 56 minutes). On average, visitors spent the longest times in SKY–NATIVE VOICES (Level 5) and PAST WORLDS (Level 2).

Are there similarities or differences in time and behavior patterns between first-time (F) and repeat (R) visitors, or adults only (AO) and adults with kids (AK)?

First-time visitors spent slightly more time on average in the whole museum than repeat visitors. Although the differences in each area were not statistically significant, the few minutes of extra time spent by Fs in each area added up. This difference in time spent is likely because more Fs read labels than Rs. Additionally, Fs were more likely to be in adult-only (AO) groups and therefore were not subject to the schedules or needs of small children during their visits.

Some behaviors were engaged in more often by a particular demographic group: AKs read out loud and used their cell phones more often; first-time visitors took more photos; and AO groups watched more videos.

Just like the sample taken during the previous (STS) study, repeat visitors were significantly more likely to come with kids and to be museum members.

How much time are visitors spending on wayfinding and group logistics? Do they have any problems finding their way around?

Visitor comments, data collector notes, and behavior tracking indicated that wayfinding was an issue in the new museum. Nearly half of visitors (48%) did a wayfinding behavior during their visit, and, beyond the expected orientation needs, many visitors indicated some confusion. Comments about wayfinding from both visitors and DCs, as well as engagement in wayfinding activities, were more prominent in these areas of the museum: the CANYON, the areas between Levels 5 and 4 and Levels 4 and 3, and in the hub area of FIRST PEOPLES–GREAT SALT LAKE and GEMS–COLLECTIONS. See full discussion of wayfinding starting on page 39.



Visitors can flow in, over, and out of the CANYON as they walk through the museum's exhibition spaces, suggesting a hike in one of Utah's mountain regions.

1.3 METHODS

The Whole Museum Tracking Study (WMTS) aimed to gather information about the whole visit experience, from the time visitors entered the museum to the time they left, tracking where they went, what they did, and how much time they spent. For this study, a sample of 100 visitors was observed throughout their visits: Their journeys were tracked and timed, and they participated in brief exit interviews before they left. Data was collected between September 28 and November 14, 2012.

Recruiting and sampling

Visitors were approached upon entry to the museum and asked the initial question, "Is this your first visit to the new Natural History Museum of Utah?" The study aimed for a sample of 50% first-time visitors (F) and 50% repeat visitors (R).

Once their visitation history was determined, visitors were screened for eligibility and invited to participate in the study. An eligible subject was defined as an individual over the age of 18 on a typical visit to the museum, whether in an informal group or alone. Visitors arriving with school or tour groups were excluded. Potential subjects were also screened to assure relative freedom from factors that might affect stay-time and behaviors during a visit: University of Utah students or staff members (who always get free admission) were excluded, and visitors wishing to participate in a special tour (for example an architectural tour) were excluded.

A continuous random sampling method was used for recruiting subjects. In this method, an eligible visitor was approached as he or she entered the museum foyer, before going to the cashier's desk. If the visitor (or his or her group) declined to participate or was found to be ineligible, the next eligible visitor in the same location was approached. (See complete recruiting and end-of-visit scripts in Appendix 2.)

Upon being recruited, subjects were told that their participation involved allowing the data collector to observe their group as they used the museum from the start to the end of their visit, and then taking time to answer a couple of questions at the end of their visit. Those who declined to participate at this stage (31%) were thanked for their time, and the next visitor was approached. All refusals were recorded.

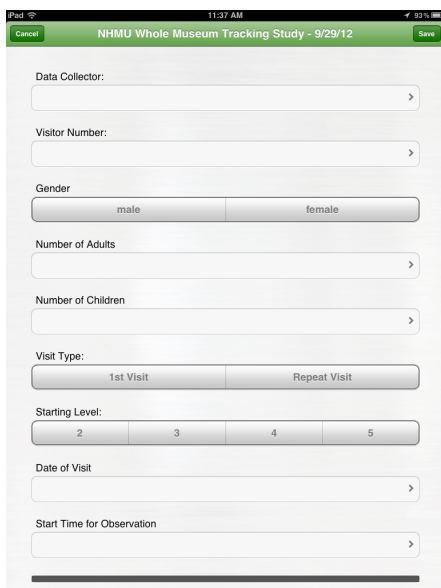
The quota of sampling an equal number of first-time and repeat subjects was determined based on the previous (STS) study of 418 randomly sampled participants, which included 155 (37%) repeat visitors. The methods of the WMTS dictated a smaller sample, in which fewer individuals (N=100) were studied more intensely throughout their visit. With a smaller total sample size, a 50-50 F and R sample would assure an adequate number of repeat visitors for analysis and comparison. A first-time visitor was defined as anyone who had not visited the *new* Natural History Museum of Utah. Groups that contained even one repeat visitor were counted as repeat visitors even though other group members might be there for the first time.

For each successfully recruited visitor group, a single member (generally the visitor who was first approached) became the primary subject and was assigned a unique number for purposes of data recording.

First-time visitors were encouraged to start their visit on Level 5 to experience the top-to-bottom suite of exhibits; repeat visitors did not receive any instructions for where to start.

Data collection

Five data collectors (DCs) were trained to recruit, track, time, and interview the subjects, noting where the subjects went, how much time they spent, the activities they did, and how they interacted with their groups and other visitors, staff members, or volunteers. Data were recorded on iPads using the iForm Builder electronic software (<https://www.iformbuilder.com/>), with an interface custom-designed for the NHMU study by Jennifer Borland at Rockman Et Al. See Appendix 3 for all iForm data entry screens. Data that was recorded was uploaded daily to a cloud-based database on the iForm website. At the end of data collection, all the data was downloaded to an Excel spreadsheet for analysis.

The image shows a screenshot of an iPad displaying a data collection form titled "NHMU Whole Museum Tracking Study - 9/29/12". The form contains several input fields and buttons: "Data Collector:" with a text field and arrow; "Visitor Number:" with a text field and arrow; "Gender" with two buttons labeled "male" and "female"; "Number of Adults" with a text field and arrow; "Number of Children" with a text field and arrow; "Visit Type:" with two buttons labeled "1st Visit" and "Repeat Visit"; "Starting Level:" with four buttons labeled "2", "3", "4", and "5"; "Date of Visit" with a text field and arrow; and "Start Time for Observation" with a text field and arrow. The iPad status bar at the top shows the time as 11:37 AM and battery level at 93%.

First screen of the data collection form as it appeared on an iPad.

The primary participant was followed and timed as he or she entered and exited the areas and subareas, giving a snapshot of each visitor's pathway through the museum. Only the primary subject was tracked; if the rest of the group split off or was engaged elsewhere, the DC made notes, but continued to follow the pathway of the primary subject.

For each subject, the following quantitative data were collected:

- Gender
- Group make-up: number of adults, number of children
- Visit status: first-time or repeat
- Starting level
- Member status
- Resident status
- Special interest in natural history; if yes, what was it?

As they moved from area to area, the subjects' behaviors were also documented. This was done quantitatively by frequency and qualitatively. While a subject was in each subarea, DCs selected from a list of "activities" to identify what discrete behaviors the subject was doing—reading, touching, using interactives, talking to staff, using a cell phone, etc. The frequency of each activity by subarea provided some insight into the different ways visitors were using the separate exhibits.

In addition to recording the frequency of behaviors, as DCs observed the subject and his or her group, they wrote notes about things such as how the subject interacted with group members, what they talked about (if unobtrusively overheard), what they spent time doing, wayfinding issues they had, or any special activities they participated in. These data were qualitative and were used to flesh out the picture of group behavior, attentiveness, and flow.

The CANYON area was treated differently regarding activities. This area was unique in this study; it had no defined subareas, and most subjects passed through it at least twice—once when they entered and once when they exited the museum. In addition, possible activities included the cafeteria, the store, and just sitting at the tables. As in the other areas, DCs also had a chance here to record observations of a subject's particular behaviors and conversations.

At the end of each subject's visit, a brief exit interview was administered. This interview consisted of a single open-ended question: "Overall, thinking about what you saw, did, and learned during your visit today, please finish this sentence: 'I would like to remember...'" Responses were transcribed into the database.



Data collector training and practice with the iPads in September 2012.

Data analysis

At the end of data collection, the data was downloaded into an Excel spreadsheet for “clean up,” verification, and analysis. Researchers, with the help of the DCs, reviewed, completed, and coded the data for analysis. Any subjects with incomplete data were discarded at this time. In calculating average time spent in each area, we combined multiple visits from one person.

Time, stops, and demographics were analyzed statistically using Excel and SPSS (a specialized statistics software). Statistical analyses were carried out by Jon Deuel, who was also our statistician for the STS. Activities were analyzed by Ellen Bechtol using Python (an open-source computer language). Customized programs were written in Python that allowed us to segment and break down the activities done by visitors by start level, visit type, and visitor demographics. Qualitative results—the DCs’ comments and the results of the exit interview question—were analyzed by looking for trends and frequency of references to subjects, places, activities, and concepts.

Challenges and limitations to project methods

This study is “large grained,” meaning that it gives a broad rather than a finely detailed view of visitors’ time spent, behaviors engaged in, and thoughts about the exhibits. Although the data cannot answer specific questions about the exact number and specific exhibits visited and the time spent at each one, it does form a solid basis for asking more research questions and provides a database for comparisons with future studies.

We feared that the relatively high refusal rate could be a limitation. Thirty-one percent of visitors recruited for the WMTS declined to participate. This is higher than the refusal rate for the Stay-Time Study, which was only 6%. This higher rate could have a simple explanation: The STS was unobtrusive and asked very little of participants, whereas visitor groups approached about the WMTS were going to be “shadowed”; some felt uncomfortable with being followed throughout their visit or had other objections. Comparison of the STS and WMTS showed that the samples have similar characteristics, with a few exceptions that can be attributed to the WMTS protocols (see discussion on page 21). This gave us confidence that, despite the higher refusal rate, this smaller sample was a good representation of the museum’s audience at the times the samples were taken.

While DCs made every effort to remain unobtrusive and minimize their impact on a subject’s visit, there were some visitors who the DCs felt were less able to forget they were being shadowed; this may have affected their visit in unknown ways. In particular, DCs noted that some subjects seemed to look to them for wayfinding help, or for validation that they were going in the right direction. (See discussion about wayfinding on page 39.)

The definitions of repeat and first-time visitors used for the WMTS differed from what it had been for the STS, and adjustments had to be made in order to compare them. The WMTS defined a repeat visitor group as any group that included one or more repeat visitors, even if the other members of the group were first-time visitors, i.e., had never been to the new NHMU. The STS separated groups containing both first-time and repeat visitors into a third category called “Mixed.” For purposes of analysis and comparison, we had the STS data reanalyzed: We merged the mixed group into the repeat visitor group, so that the numbers would be more comparable with the WMTS sample.

The uncertainty of some other definitions was a limitation. For documenting activities, DCs were provided with a reference list of all the items in each subarea that would be included in a certain category (e.g. watch video, use interactive). But some uncertainties emerged, particularly in defining a video versus an interactive exhibit, or a talk-back monitor. As a result, some of the frequencies for these categories might be weaker than others, and those are noted in the discussions.

For purely logistical reasons of data collection, the FUTURES–BACKYARD area combined three conceptually very different subareas: the children’s space, Our Backyard; the family game environment, Utah Futures; and the Carbon Case in the hallway entering and leaving Past Worlds. During data analysis, efforts were made where possible to distinguish the results for those three exhibits.

Our intention was to record the exit interviews using the iPads, but because of erratic function of the record button in the iForm program, many of the responses to the exit interviews were transcribed from the DCs notes and memory. (Some DCs improvised and created recordings on their smart phones, which were later transcribed.) These differences might have created some unknown inconsistencies.

Finally, we should note that this tracking study of the whole museum collected far more data than could be analyzed and reported in this study due to constraints of time and budget. All the spreadsheets are available for further study when the opportunity allows.

1.4 DEMOGRAPHICS OF THE SAMPLE

The final sample for the Whole Museum Tracking Study (WMTS) consisted of 100 subjects. A total of 196 visitors were approached to participate in the study, and 53% of those ended up participating. Ninety-two subjects were excluded for a variety of reasons: because they were affiliated with the University of Utah, had come to the museum for a reason other than a visit, or because of their own personal preference. An additional four subjects were discarded later due to incomplete data.

This study aimed to collect data on the visits of 50 first-time visitors and 50 repeat visitors; the final sample consisted of 52 first-time visitors and 48 repeat visitors. From the beginning of data collection, the sampling captured more first-time visitors (due to the greater number of first-timers than repeat visitors who typically come to the museum). Therefore, sampling procedures were adjusted during the last two weeks to focus on repeat visitors. When sampling stopped, the count was 52 first-time and 51 repeat visitors. Later, after exclusions for incomplete data were made, the count was 52 first-time and 48 repeat Visitors.

The data were collected between September 28 and November 14, 2012. Sampling took place on every day of the week except Wednesday evenings. The largest number of samples was taken on Sundays and the smallest on Mondays; Tuesdays, Thursdays and Saturdays were also well represented.

Who was represented in the sample?

The sample taken during this period in the fall of 2012 represented the following characteristics:

Visitor characteristic	Proportion
First-time visitors (F)	52%
Repeat visitors (R)	48%
Nonmembers	70%
NHMU members	30%
Utah residents	58%
Utah tourists	3%
Other US state	37%
International	2%
Group with children (AK)	63%
Adult-only group (AO)	37%
Had special interest	23%
No special interest	77%

Table 2. Visitor characteristics of the WMTS. Shows visitor variables of the Whole Museum Tracking Study sample (N=100) taken in fall of 2012.

Is the sample representative of NHMU audiences?

In April 2012, we collected demographic data on 418 NHMU visitors for the Stay-Time Study (STS); to our knowledge, that is the most comprehensive demographic profile to date of NHMU audiences. While the WMTS sample of 100 had an overall similarity to the STS sample, it was not directly comparable, since protocols that were used in the WMTS affected some of the representation.

The WMTS sample had more repeat visitors than the STS sample. A greater proportion of repeat visitors in the WMTS sample reflected our aim of recruiting 50% repeat and 50% first-timers (the STS had 37% repeat visitors). Just like the STS repeat visitor group, WMTS repeat visitors were more likely to come with children and more likely to be members.

The WMTS sample had slightly more groups with children. This is likely a natural association with the higher number of repeat visitors.

The WMTS sample had slightly more museum members; this is likely a natural association with the higher number of repeat visitors.

One characteristic on which the two samples were directly comparable was residency status, and a slight difference was evident (see Table 3). The WMTS sample taken in September and October of 2012 had more out-of-state tourists and fewer Utah residents than the STS sample taken in April 2012. This may have been because the STS was carried out during Utah’s spring school break, when more residents might have attended.

As in the STS, the proportion of Utah tourists is strikingly low.

Visitor characteristic	WMTS	STS
Utah residents	58%	74%
Utah tourists	3%	6%
Other US state	37%	18%
International	2%	2%

Table 3. Comparison of residency status for the NHMU Whole Museum Tracking Study sample (WMTS N=100) and the Stay-Time Study sample (STS N=418).

Recommendations:

- We strongly suggest that the NHMU sample their visitors on a regular basis to get a true understanding of the ebb and flow of seasonal and annual visitor numbers and characteristics.

“I would like to remember to allow for more time the next time.”

SECTION 2: FINDINGS

2.1 TIME AND OTHER VARIABLES

Time is an indicator of engagement. Knowing how long visitors spent in the museum, in an exhibit area, or at an exhibit element is information the museum can use for the purposes of marketing, programming, serving visitor needs, and renovating existing exhibits or developing new ones. In this section we will review the findings about time spent in several ways:

- Overall time spent by the total sample
- Area breakdowns of the time data
- Demographics and time—data by first-time visitors (F) vs. repeat visitors (R) and other demographic characteristics
- Sweep rates—time data factored for the variable of square footage in the major areas
- Scattergram of a combination of the variables of visitors' time spent and stops made

How long did visitors stay in the museum?

The average (mean) total time spent in the museum for the whole WMTS sample (N=100) was 116 minutes (1 hour, 56 minutes). The median stay-time was 107 minutes (1 hour, 47 minutes). The shortest stay-time was 48 minutes; the longest was 296 minutes (4 hours, 56 minutes).

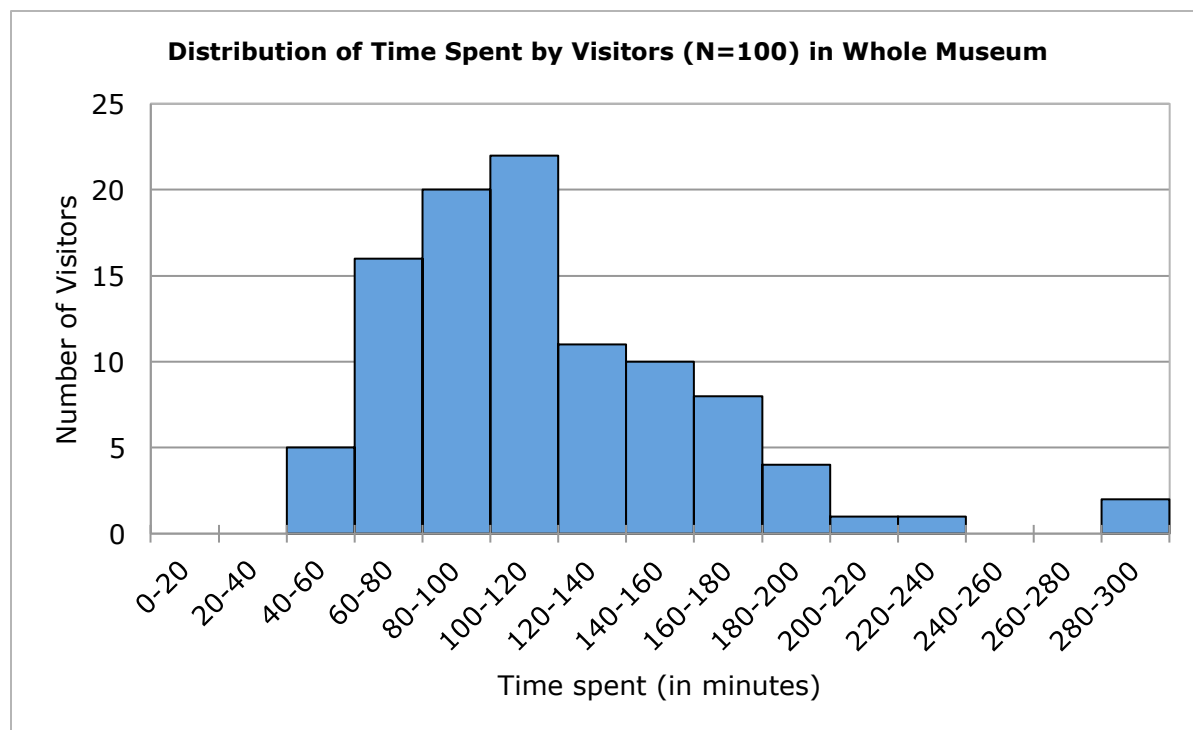


Figure 3. Histogram of time spent in the museum. Shows the distribution of time spent in the museum by the WMTS sample (N=100). Each bar represents the number of visitors who spent the amount of time shown in that “bin.” This is a normal distribution; the average and median are well represented. On the far right are two outliers whose stay-times were the longest.

Who were the two people who stayed the longest?

- *4 hours, 56 minutes.* This female repeat visitor came with two other adults and two children on a Sunday. They started on Level 5 and made 20 stops total. She was a Utah resident; was not a member; and had a special interest in natural history. In the exit interview she said: "The very coolest thing is the wall of the dragon skulls" (referring to the Ceratopsians).
- *4 hours, 41 minutes.* A first-time female visitor who came with two children on a Saturday. They started on Level 5, and expressed a special interest in "dinosaurs, land, evolution, and ancient humans." From out-of-state, and not a member, she directed her child to certain exhibits and managed the pace of the visit, stopping in all 25 areas of the museum. In the exit interview she said: "I would like to remember the really incredible dinosaur exhibits that we saw today. And especially the collections and the lab and the journey a fossil takes to the museum was very interesting. And seeing excavation sites in Utah and how they were brought here and turned into displays was really interesting. The dinosaur exhibits are some of the best we've ever seen and we've been to a lot of museums of natural history."

Breaking the overall sample into visitor segments based on visit history and group type reveals some trends of similarities and a few differences.

First-time visitors spent more time overall

There was a statistically significant difference in the time spent by first-time visitors (F) who averaged 2 hours 8 minutes compared to repeat visitors (R) who spent an average time of 1 hour 44 minutes. That was a surprise, because the data from our earlier Stay-Time Study did not show a difference between F and R groups.

Overall Average Time	First-Time Visitors	Repeat Visitors
Whole Visit: 1 hr 56 min	2 hrs 8 min	1 hr 44 min

The average time spent by the overall sample in the different areas ranged from 8 minutes to 21 minutes. There were, however, no statistically significant differences between the average times for F and R visitors in the seven areas. It was also a surprise because we had postulated that R visitors would allocate their time differently than F visitors because the Rs would be more familiar with the museum and would favor certain areas over others.



Area	Overall Average	First-time Visitor	Repeat Visitor
Level 5 SKY-NATIVE VOICES	21 min	23 min	18 min
Level 2 PAST WORLDS	20 min	23 min	18 min
Level 4 LIFE	19 min	21 min	16 min
Level 3 FIRST PEOPLES-GREAT SALT LAKE	17 min	19 min	15 min
Level 3 LAND	14 min	15 min	14 min
Level 2 FUTURES-BACKYARD	9 min	8 min	10 min
Level 3 GEMS-COLLECTIONS	8 min	9 min	8 min

Table 4. Time spent by F and R visitors. Shows different areas of the museum and a comparison of F and R visitors, listed from most to least time spent. These differences were not statistically significant.

There were only small differences between the average time spent by F visitors (a little longer) and by Rs in each area, but those differences added up to a longer overall stay time.

Adult-only groups and adults with children differed in two places

Looking at the demographic segment of adult-only groups (AO) compared with adults with kids (AK), we saw no statistical difference in the whole-visit stay time or the stay-time in individual areas except for FUTURES-BACKYARD and SKY-NATIVE VOICES.

Area	Overall Average	Adults-Only	Adults with Kids
Whole Visit	1 hr 56 min	2 hr 2 min	1 hr 53 min
CANYON	15 min	16 min	12 min
Level 2 FUTURES-BACKYARD	9 min	4 min	11 min
Level 2 PAST WORLDS	20 min	19 min	21 min
Level 3 FIRST PEOPLES-GREAT SALT LAKE	17 min	19 min	16 min
Level 3 GEMS-COLLECTIONS	8 min	10 min	8 min
Level 3 LAND	14 min	16 min	13 min
Level 4 LIFE	19 min	19 min	19 min
Level 5 SKY-NATIVE VOICES	21 min	26 min	18 min

Table 5. Time spent by AO and AK visitors. Shows different areas of the museum and a comparison of AO and AK visitors, listed for CANYON, and the areas on floors from Level 2 to Level 5. Red = significantly different.

Subjects in AK groups spent significantly more time on Level 2 in the FUTURES-BACKYARD area, most likely because they were spending it with their children in the Our Backyard exhibits.

Conversely, the visitors in AO groups spent more time in the SKY-NATIVE VOICES area, probably because in the Native Voices area there were fewer hands-on devices and a long video that may have appealed more to AO groups.

Where visitors started their visit made a difference in time spent

Another variable that influenced the average total time spent was the floor, or level, on which visitors started their visit. Visitors who started on the fifth floor were more likely to stay longer (2:14) than visitors who started on the second floor (1:41). This difference in stay time is statistically significant.

Membership status and having a special interest in natural history had an impact on time spent

Two more visitor characteristics were associated with significantly longer average stay times:

- Non-members were more likely to stay longer (2:06) than NHMU members (1:34).
- Visitors with special interest in natural history were more likely to stay longer (2:22) than visitors without a special interest (1:49).

Residence did not have an impact

There were no differences in stay time between Utah residents (1:56) and out-of-state visitors (1:56).

Square footage, average time, and sweep rates

Another way to consider time data is to factor the time spent by visitors with the area (size) of the exhibits. This allows exhibit developers to make comparisons of time spent given the amount of real estate devoted to an exhibit.

On the opposite page are three graphs that show in order: area sizes in square feet; average stay-times for each area; and the "sweep rate index" for each area. The sweep rate index is calculated by dividing the size of the area (square footage) by the average amount of time that visitors spent there (minutes), yielding a rate expressed in units of square feet per minute. This gives the amount of space a visitor moved through per minute in a given area and allows for more accurate comparisons of time spent between areas of different sizes.

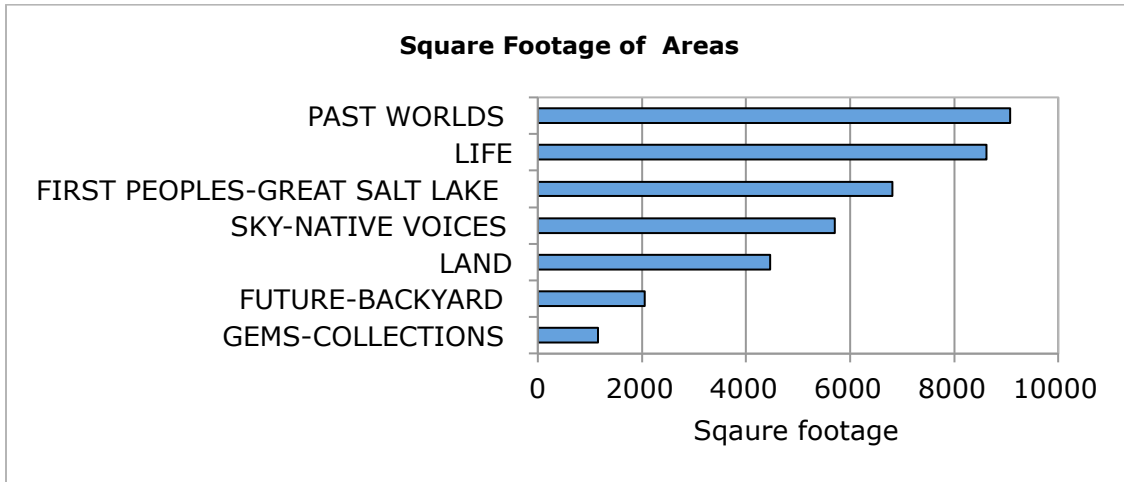


Figure 4. Square footage of areas. The area with the largest square footage was PAST WORLDS; the smallest was GEMS-COLLECTIONS.

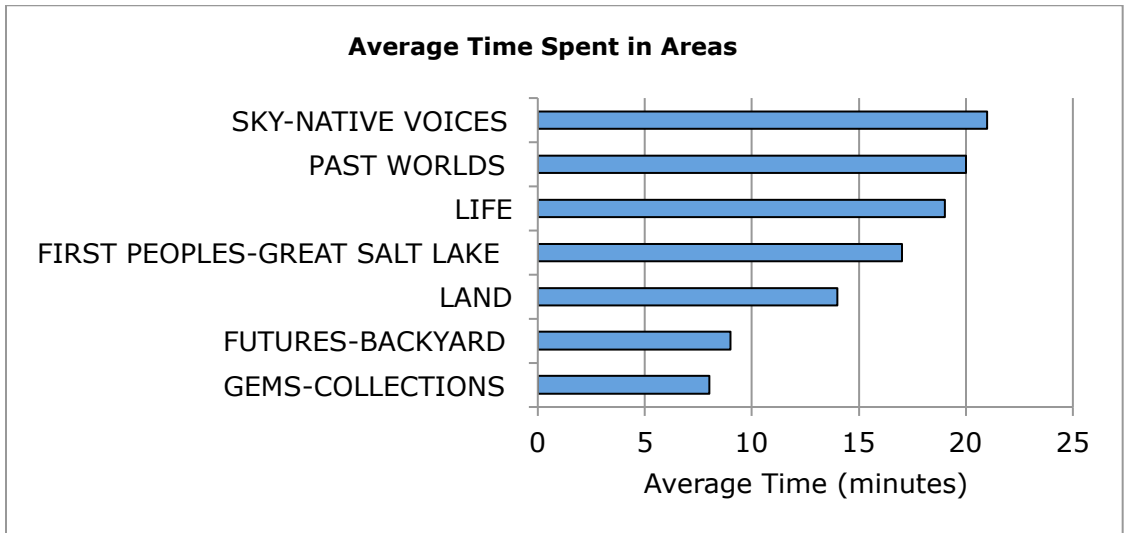


Figure 5. Average time spent in areas. The average time spent (minutes) was the longest in SKY-NATIVE VOICES.

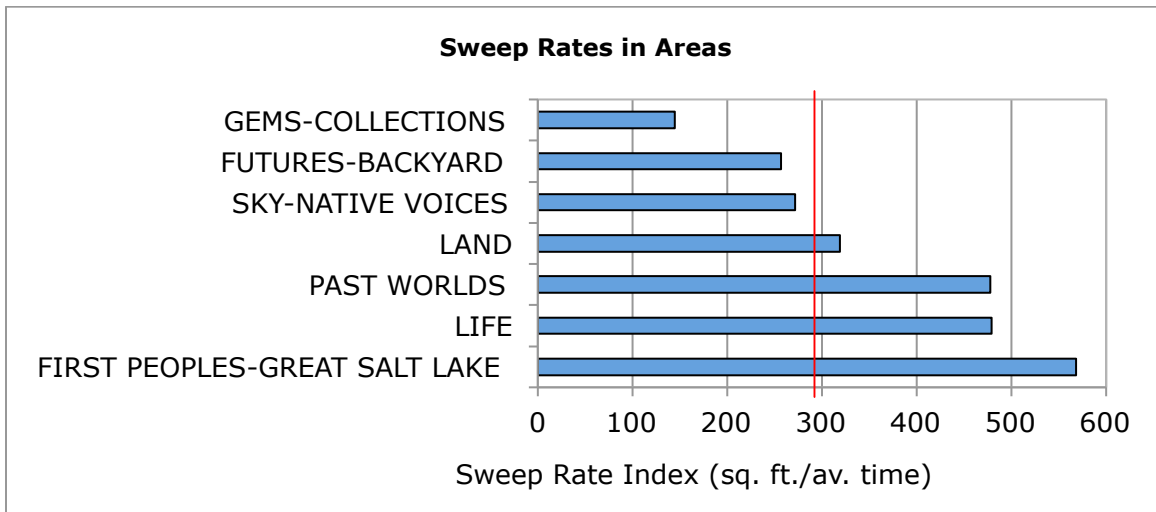


Figure 6. Sweep rates in seven areas. Square footage of exhibit space divided by the average stay-time = the Sweep Rate Index, which was the slowest (slower is better) in GEMS. Red line is at 300 square feet per minute—an “optimum.”

In general, studies have shown that as the size of the exhibit space increases, the average amount of time spent by visitors does not increase correspondingly. This was true for NHMU. Although PAST WORLDS was the largest area, people spent more time on average on Level 5 with SKY-NATIVE VOICES.

GEMS-COLLECTIONS had the lowest (slowest) sweep rate. Figures below 300 (to the left of the red line) indicate that visitors are spending more time, moving more slowly through the given area, stopping at more of the elements, or stopping at a few elements for a long time.

Sweep rates far above 300 suggest that visitors are not covering the area thoroughly, are making very quick visits, as in FIRST PEOPLE-GREAT SALT LAKE area, or they are moving through the area at a comparatively rapid "browsing" pace, as in PAST WORLDS, perhaps skipping things or not stopping at a high percentage of exhibit elements, as in LIFE.

Sweep rates allow comparisons across different exhibits and museums

Sweep rates are a useful measure for comparing the thoroughness of use across exhibits of different sizes. Sweep rates are also useful for setting goals for exhibit effectiveness. We have seen examples of how this works in extreme cases at other museums:

- The Smithsonian knows that its visitors often are motivated to see as many exhibits as possible in a day, and the sweep rates are very high (600 +). The Smithsonian's goal for their new permanent mammal hall was to make a space that visitors could move through quickly, with dramatic sightlines, large displays, and wide pathways. In its temporary exhibitions (and other kinds of permanent halls), the Smithsonian probably hopes to attract a more dedicated audience that will slow down and spend more time.
- In contrast, the Dolly Parton Museum knew that visitors were motivated to stop and examine every detail of Ms. Parton's outfits and other memorabilia, and sweep rates were probably under 100. Renovations at the Parton Museum were intended to help speed up "through-put" and prevent long lines of eager dedicated fans from forming in the exhibits.

NHMU is solidly in the middle of these two extremes. As exhibit developers plan for displays in the 7,000-square-foot Special Exhibit Gallery they should take sweep rates into consideration and adjust the size and complexity of the temporary shows accordingly and aim for a 300 square-feet-per-minute optimum: not too fast, not too slow.



Visitors stopping at the Collections room near Gems & Minerals. More stops and/or longer stops make for slower sweep rates.

Scattergram of time and stops

A scattergram combines the data for each subject's time spent and the number of exhibit subareas he or she stopped in. This gives a big picture of the spread of visitors' attention in the museum—from people who spent a short amount of time and made few stops, to those who spent the most amount of time and made more stops. But it's not random. Between those two ends of the spectrum, most of the participants in this study made 12 to 18 stops and spent more than one hour and less than three hours.

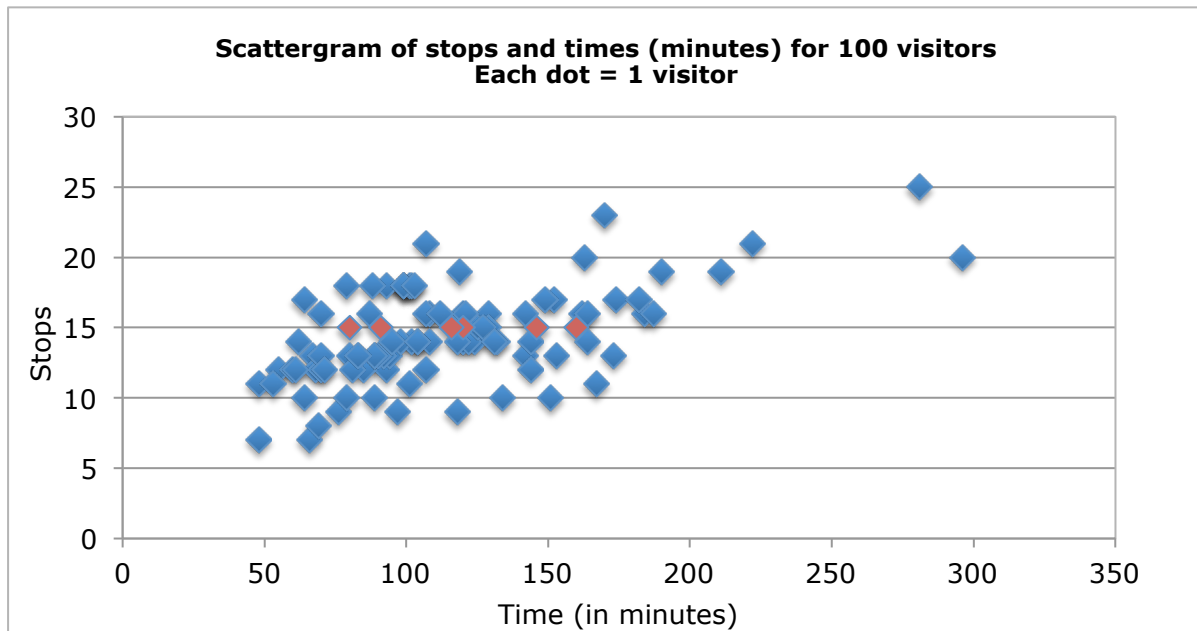


Figure 7. Scattergram of stops and times. This scattergram plots the variables of time spent in minutes and number of stops for our sample of 100 visitors.

Red dots on the scattergram are the six visitors who are discussed in the Six Case Studies section, page 77. Two dots to the far right are the "longest time spent" visitors (see page 24.)

The average time spent was 116 minutes. The average number of stops was 15. The scattergram shows how the individual data points spread around those two figures.

The maximum number of possible stops for this study was 25. One person stopped at “everything.” The average number of stops (out of 25 places or areas) was 15. Fifteen of 25 stops is 60% of the possible total, which seems like a relatively extensive use of the museum. There is a large database of time and stops data for exhibitions (see Serrell 1998 and 2010), which shows typically 20% to 35% of the individual exhibits are stopped at within an exhibition, but there are no other whole-museum scattergrams of time and stops to compare with NHMU’s yet.

While stay times differed significantly between first-time visitors (F) and repeat visitors (R), the average number of stops was close to the same, which suggests that F visitors are engaging for slightly longer times per stop.

For readers craving less numerical, more personal descriptions and comparisons of a visitor’s journey in the museum, see the Six Case Studies, starting on page 77.

Time data: histograms, sweep rates, scattergrams...so what?

Few museums know exactly where their visitors go, what they do, and how long they spend looking at the exhibits. Museum staff members probably have pretty good hunches about which areas attract more families and which interactives are popular, but the data gathered at NHMU give a more complete picture of how people are using the museum.

Knowing about time data enables museum staff to ask and answer key questions to better meet visitors’ interests and needs. The average time visitors spent at NHMU was roughly two hours, which seems to be enough time to see and stop in about 60% of the main areas; sweep rates in half of the areas indicate slow movement/looking trends. Some questions to ponder include:

- Are you satisfied with those numbers? What could be changed to help visitors “create their own personal journey through the past, present, and future” in a more thorough way?
- What would help visitors move more slowly through PAST WORLDS? How can you get more people to the dioramas in LIFE?
- Should visitor services personnel at NHMU be more systematic in encouraging people, especially first-time visitors, to start on Level 5?
- Will special exhibits open in the 7,000-square-foot gallery on Level 3 take time away from or add to the two-hour average time spent in the museum? What is the sweep rate goal for special exhibits?

Spending time in the museum is a choice visitors make, and the museum needs to respect and honor that precious commodity that visitors share with us:

“I would like to remember to allow for more time the next time.” [14]

“I will come back to explore more. You need a membership to see all the exhibits because there is so much to see and do.” [36]

The next section will describe what activities and behaviors that visitors engaged in—in the whole museum and in the different exhibit areas—to expand our understanding of the visitor experience at NHMU.

2.2 ACTIVITIES AND BEHAVIORS OBSERVED

Data collectors (DCs) had a list of 22 activities/behaviors to watch for as they observed visitors in exhibit subareas of the museum. (The CANYON had a unique set of activities and is discussed on page 46.)

This list consisted of *stop and look; look while walking; read; watch video; talk; look at scenery; touch; interactive: use, sit; interactive: watch; call over; point; read out loud; work together on an activity; assist kid with something; use cell phone; wayfinding activity; take photo; use bathroom; use cell phone for trailhead item; do special activity; talk to staff member or volunteer.*

Frequency of different behaviors ranged from extremely common to very rare, and the data were analyzed in several ways: activities done by all participants in the whole museum; activities in 15 of the exhibit subareas; behaviors by demographics, e.g., adult-only compared with adults with kids; and first-time visitors compared with repeat visitors.

See Table 6 on the next page for a chart of the percentages of people who were observed doing various behaviors in 15 of the exhibit subareas.

Most common behaviors

The most commonly observed behaviors in the whole museum were using interactives, talking about the exhibits, reading, and pointing. More than 90% of subjects participated in these activities somewhere in the museum. (Stop and look and look while walking happened universally, i.e., 100%, and will not be analyzed further.) Selected behaviors—from most to least common and reasons for differences noted in the exhibit subareas—will be discussed below.



Almost everyone we followed used an interactive at some point in their visit.

Using interactives

There were many opportunities in the NHMU for visitors to encounter interactives. Unlike many museums where interactive exhibits are located only in a “discovery room” or aimed mainly at a younger audience, here the hands-on elements were scattered throughout the spaces and were meant to appeal to a broad range of ages, genders, interest levels, and social groups. And they did. Adults enjoyed watching their children use the interactives; they worked together with kids as a family; and adults became engaged in doing the hands-on exhibits themselves. Adults commented that they were glad the interactives were not just for children.

Table 6. Percentage of visitors that did various behaviors in selected exhibit sub-areas. Red indicates behaviors done by one-third (33%) or more of visitors observed during the study.

	Utah Futures (N=42)	Our Backyard (N=62)	Past Worlds Main (N=97)	Dino Walk (N=99)	Land Main (N=89)	Land Walk (N=89)	Gems and Minerals (N=39)	First Peoples (N=94)	Great Salt Lake (N=99)	Life Main (N=94)	Life Dioramas (N=81)	Sky Exhibits (N=77)	Native Voices (N=76)
Interactive: use	48%	37%	63%	24%	73%	73%	54%	71%	59%	61%	49%	42%	24%
Talk	48%	76%	81%	75%	75%	72%	82%	76%	71%	81%	73%	81%	84%
Read	60%	26%	72%	68%	75%	72%	72%	70%	71%	74%	74%	90%	89%
Point	14%	35%	54%	54%	42%	34%	62%	36%	40%	56%	51%	48%	42%
Interactive: watch	26%	47%	48%	6%	54%	60%	18%	40%	52%	44%	19%	39%	14%
Touch	21%	37%	40%	21%	43%	56%	49%	48%	36%	49%	38%	31%	17%
Look at scenery	0%	2%	14%	11%	33%	20%	15%	3%	18%	14%	5%	30%	0%
Sit	26%	40%	25%	1%	2%	1%	0%	13%	4%	5%	21%	6%	34%
Work together on activity	17%	26%	26%	0%	28%	30%	3%	19%	15%	32%	0%	6%	3%
Call over	2%	31%	21%	10%	16%	21%	10%	17%	19%	33%	7%	16%	14%
ROL	19%	10%	31%	20%	16%	20%	21%	16%	19%	36%	26%	25%	21%
Wayfinding activity	2%	0%	5%	2%	2%	6%	5%	11%	2%	14%	1%	22%	21%
Take photo	0%	15%	23%	17%	7%	7%	15%	7%	11%	15%	2%	3%	7%
Use cell phone	0%	18%	12%	10%	10%	11%	8%	5%	6%	10%	6%	10%	3%
Talk to staff or volunteer	0%	2%	9%	2%	2%	4%	3%	4%	9%	2%	0%	1%	1%
Bathroom	2%	2%	0%	0%	0%	0%	5%	2%	0%	10%	1%	3%	4%
Do special activity	0%	0%	3%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Use cell phone for trailhead item	0%	2%	0%	0%	0%	1%	0%	0%	0%	0%	0%	3%	1%

Talking

The DCs were supposed to be as unobtrusive as possible, but visitors knew they were being watched, so the DCs could stand nearby and listen in on conversations. DCs noted “talk” when people spoke to each other about the exhibits. This “talk” between visitors included discussing what they read or did, expanding on the information in the exhibits, instructing each other in how to use the exhibits, explaining the concepts to children, or wondering about something. There was less talking noted in Utah Futures, maybe because people were focused on the big-screen interactive.

Reading and reading out loud

Some visitors read briefly, some intensely, but almost everyone read something somewhere. The amount of reading behavior observed by DCs varied depending on the nature of the social group and opportunities for reading in exhibit subareas. Reading occurred less in Our Backyard than anywhere else, probably because there was less to read there, and the target audience was very young children. Generally speaking, more adult-only visitors (AO) read than did groups of adults with kids (AK).

Reading out loud was less frequent overall, but more AK groups read aloud than AOs. The most reading out loud was done in LIFE.

Pointing

Almost everyone pointed at something somewhere, but more people pointed in Gems & Minerals (which featured small, tightly grouped objects to pore over) than in any other exhibit subarea. Pointing and talking often occurred together.



At Gems & Minerals we saw the highest level of pointing behaviors of any exhibit subarea.

Overall, AK groups did more pointing than AOs, except in Gems & Minerals, where both groups engaged in pointing equally.

Least common behaviors

The least commonly observed behaviors were talking to staff or volunteers, using the bathroom, doing a special activity, or using the Trailhead cell phone activity.

Encountering staff, volunteers, or special activities

Visitors in this study had infrequent contact with museum personnel, who typically were not available or in evidence beyond the entrance and the CANYON. DCs said that other visitors would approach them with questions, thinking they were gallery interpreters. Special activities during the study period (October–November 2012) were not common. One subject who was engaged really appreciated it:

"I liked the volunteers who came and talked to us. Maybe because it was less busy today, but they seemed to be everywhere and I really liked that."

One data collector noted that her subjects often didn't seem to know about or find the special activities taking place that day, and commented:

A sign in the entrance with any of the special activities for the day might be useful.

Bathrooms

The bathrooms near LIFE on Level 4 were used the most. Visits to the bathrooms in other areas beyond the CANYON and Level 1 were not frequently noted by the DCs.

Trailhead activity

Only 5% of the people in this study used or tried to use their cell phones to connect with the Trailhead interactive. DCs noted both specifically and in their overall comments that visitors had apparent difficulty getting connected.

Common Behaviors for Certain Areas/Demographics

Other behaviors that were not universal—but were more common in some places than in others—included watching video, sitting, wayfinding, taking photo, and using cell phone.

Watching videos

In exhibit subareas that had videos, the percentage of people who stopped at them ranged from 16% to 47%:

- 16% Sky
- 17% Life Main Floor
- 19% Great Salt Lake
- 30% First Peoples
- 31% Paleo Prep Lab
- 32% Dry Caves Lab
- 46% Dino Walk
- 47% Native Voices

Visitor studies research in other exhibitions showed that the average "attraction rate" of videos was 32% for a sample of 45 different videos (Serrell 2002). At NHMU, the above-average attraction rate for the Cleveland-Lloyd video was probably due to the strength of the stories about competing theories, despite the cramped area of the Dino Walk and lack of seating. In Native Voices the captivating colorful and emotional content of the Dance Video, as well as available seating, attracted many viewers. Likewise, the popularity of the Dry Caves video may be related to the fact that it was a good place to sit down and rest. The three areas with videos with lower attraction rates did not have any seating.

Some limitations to note: The percentages for "watch video" in the NHMU data may reflect more than one video in a given exhibit subarea, making the data cumulative rather than a percentage for a single video. Also, "watch" does not say how long a visitor watched. Additionally, we had some confusion about what the museum referred to as a video and what was called an interactive (see page 19).

Sitting down

The percentage of people who sat down ranged from 0% to 40%. Sitting down was noted most frequently in Our Backyard, where 40% of parents with young kids sat and watched their children play. In Native Voices about a third of the visitors sat, usually to watch the 12-minute video. In Utah Futures, 26% of the subjects sat down at one of the five stations. A quarter of the visitors sat somewhere in Past Worlds Main Floor, mainly on the benches along the wall. And 21% sat at the seats in the diorama area of LIFE as they interacted with the ID wheels. In at least seven of the exhibit areas there was either no place to sit (e.g., the ramps of Dino Walk and Land Walk, Gems & Minerals) or most people chose not to sit down.

40% Our Backyard
34% Native Voices
26% Utah Futures
25% Past Worlds
21% Life



Adults as well as children sat at the dioramas when seats were available. Seats could be moved.

Taking photos

The area where the most visitors (25%) took a photo was on the Sky Terrace. Overall, there was an interesting trend that more F visitors took photos than R visitors on all levels. And, more people took photos in Past Worlds than any other exhibit subarea.

Using cell phone

Forty-four percent of visitors used a cell phone at some time during their visit. More people used a cell phone while in Our Backyard than in any other area. This corresponds roughly to a high percentage of visitors sitting down in that area. These calls appeared to be personal or business conversations, but in a couple of cases the calls were for wayfinding between members of the same group who had become separated.

Activities in whole museum (excluding CANYON)	
Interactive: use	98%
Talk	97%
Read	96%
Point	93%
Interactive: watch	87%
Touch	85%
Look at scenery	83%
Sit	73%
Work together on activity	69%
Call over	65%
Reading out loud	57%
Wayfinding activity	48%
Take photo	46%
Use cell phone	44%
Talk to staff or volunteer	32%
Bathroom	28%
Do special activity	11%
Use cell phone for Trailhead item	5%

Table 7. Activities in whole museum. Percentages of people who did these activities somewhere in the whole museum. See Table 6 for a comparison of percentages of people who did activities in the different exhibit subareas on page 32.

Activities by Demographic Groups

Data were analyzed by time and behaviors for adult-only (AO) vs. adults with kids (AK) and for first-time visitors (F) vs. repeat visitors (R). Results showed that in many cases the data for AKs and Rs were much alike because the R visitors were overwhelmingly in AK groups.

See Appendix 4 for a complete listing of the data for AO vs. AK and F vs. R. Some of the trends are summarized below.

First-time visitors did a few things more often than repeat visitors

Fs and Rs spent roughly the same amount of time in all areas of the museum (see Table 4 on page 25) and did most of the same behaviors, but a higher percentage of Fs than Rs did certain behaviors: More Fs were readers and they took more photographs. They might have watched some of the videos longer because F visitors were more likely to be in AO groups, unimpeded by children urging them to move on.

Adult-only visitors took more photos

AO visitors took more photos in all areas of the museum except for Our Backyard, where AKs took photos of their children playing.

Repeat visitors with children used their cell phones more

Rs used their cell phones more than Fs. Many of those Rs were parents sitting in Our Backyard.

Adults with kids sat down more often

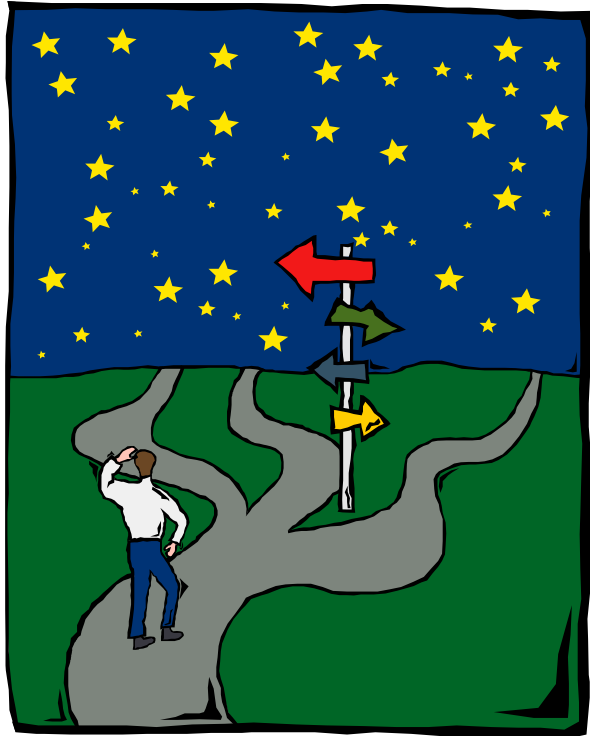
All of the visitors who sat in the First Peoples area were AKs—probably at the Median Village dig area to watch while their children played. More AKs than AOs sat in Life Main Floor, Past Worlds Main, and Utah Futures. But AOs sat as often in Native Voices. And, not surprisingly, all the people who sat down in Our Backyard were AKs.

Adult-only groups watched more videos in some areas

There was a trend that more AOs watched the video on Dino Walk than AKs. The Cleveland-Lloyd stories required a longer attention span than some children had. More AOs watched videos in Life than AKs, probably because some of the videos were geared slightly more toward adults than kids (e.g., the one on species population). In Sky, Native Voices, and Land Main Floor, video use was about the same for both groups. In isolated cases, some children were also intent viewers.



The data were also remarkable for the similarities between AO vs. AK and F vs. R, which suggests that many of the exhibits are working well for audiences of a wide range of ages and demographics.



Directional signs should be easy to find, easy to read, and easy to understand.

2.3 WAYFINDING

Forty-eight percent of the subjects engaged in some form of wayfinding, which included behaviors of looking at the handout map, using a graphic wayfinding panel, asking a staff person for directions, discussing with their group where to go next, and acting lost or confused. There were more wayfinding behaviors on Level 5 than in any other area, where slightly more than 20% of the visitors to Sky exhibits and Native Voices appeared to need or use wayfinding aids. In Life Main Floor and in Gems & Minerals, about 15% of the visitors did wayfinding, as did 11% in First Peoples. (Keep in mind that these wayfinding behaviors are counted beyond those tallied in CANYON. See page 46-48 for details on wayfinding in CANYON.) Generally, first-time (F) visitors exhibited more wayfinding behaviors than did repeat (R) visitors.

Unlike the behaviors of talking, using interactives, or reading out loud, which are indications of positive engagement, wayfinding behaviors can often be an indication of a *negative* experience (e.g., confusion, loss of feeling of control). And negative experiences can overshadow the positive ones. Also, think of the math: Even if just 10 out of 100 visitors were having trouble, that can mean 100 visitors for every 1,000 visitors, or several thousand visitors in a week of high attendance.

These issues are not unique to NHMU. Wayfinding and orientation problems are one of the most commonly cited recommendations for “needs improvement” in a study of 48 exhibition evaluations (Serrell, 2013).

While using maps and other aids to locate things to do and places to go is expected behavior in a museum, the frequency of that activity or the behavior accompanied by confused talk indicates a problem.

In visitors’ words:

“I thought it was good that there were a lot of benches, lots of places to sit, but I thought there should be more signs explaining what level you are on.” [92]

“I think the layout is not done very well... I can’t seem to know whether to go left/right. It’s not one straight path. You should have arrows that say, go this way, go that way.” [D34]

In the DCs’ words:

Commented when they left that they wish they had had a map.

Visitor mentioned issues with signage and wayfinding, difficult to locate elevator upon arrival, sequence of land exhibits was at times confusing, felt starting at level five was not helpful.

Seemed confused how to proceed from Canyon, ended up going upstairs to Gems & Minerals. Group continued up the ramp to the elevator without having tickets scanned. Apparently did not notice sign with arrow to right to have ticket scanned.

Knowing where to start, where to find a specific exhibit or service, and why the building is laid out the way it is can contribute to a positive experience for those who crave wayfinding. For those who don't, wayfinding information will not be a distraction, and they can ignore it and wander freely.

There is more discussion about wayfinding in the Conclusions and in many of the specific recommendations, but here are some additional thoughts:

- Orientation to the museum starts long before visitors walk in the door. Information on your website, signage on busses and in the newspapers, and roadside signs leading to Rio Tinto all contribute to setting expectations and confirming them.
- Drop-off area for pedestrians and busses, and directions to the parking area need improvement. Directions for leaving the parking lot should be clarified (it's a divided road!).
- Once inside the building, there needs to be more general orientation on Level 1 before visitors reach the ticket sellers, such as a big map of the building, and "Special Events Today" with the locations and times on a whiteboard.
- Signage for where to find the lockers would be nice so that people don't have to carry their coats.
- Every ticket seller should offer a brochure (map) to every visitor.
- First-time adult visitors should be encouraged to start on Level 5 and walk down. Signage in Level 1 could emphasize the continuity and overall experience of the cascading flow through the suite of six exhibits: Sky–Life–Land–First People–Great Salt Lake–Past Worlds.
- At the top of the stairs on Level 2 and getting off the elevator from Level 1 there should be better directions for getting to the back of the Canyon where the ticket scanner is located.
- Ticket scanners could reinforce the idea of starting at Level 5 and working down. There's more to NHMU than dinosaurs!
- The placement and design of the current wayfinding signage is aesthetically pleasing with light colors for the arrows, background, and text, but it needs to have more contrast in color and/or type size. The current panels should be given new graphic treatments.
- Put orientation and wayfinding information on the walls in the elevators.

2.4 EXIT INTERVIEWS

As subjects seemed to be ending their visit, researchers confirmed that the observation period was completed and requested permission to ask one question of them before they left the museum: "Overall, thinking about what you saw, did, and learned during your visit today, please finish this sentence: 'I would like to remember....'" The purpose of this one-question interview was to gather participants' personal perceptions about their visits, adding a qualitative component to the quantitative museum experience we gained through tracking and timing.

Serrell and other researchers have successfully used this question in combination with related questions (e.g. "What is the main purpose of the display?" "What is one new idea you are taking away?") to get immediate feedback from visitors about their experience in a single exhibition. For this whole-museum study, we were asking the question in an isolated way, i.e., there was no preceding conversation to set the context of a reflective interview. Thus, many responses were briefer than we would get from a longer, more situated interview. Some subjects named a "favorite" thing, rather than think about what they'd most like to remember; a few said things like, "I don't know, there's so much." Nonetheless, the participants' responses accurately reflected some of the content and experiences targeted by NHMU and revealed interesting trends regarding how the museum is perceived as a whole. The results provide excellent support for developing a longer and more probing exit interview to be conducted in the future.

Responses¹ were recorded, transcribed, and analyzed in two ways:

1. TOP-DOWN. We looked for some of the goal-related messages of NHMU, scanning the data for evidence that visitors related to the museum's key messages about evolution or change through time; ecology or connections; biodiversity; energy; and climate change, global warming, and sustainability; as well as the connected story told in the museum as a whole.
2. BOTTOM-UP. We reviewed the raw data for the appearance and frequency of comments about the subjects, places, activities, and memories participants were taking with them that were related more to their concrete experiences than the broad or abstract themes.

1. TOP-DOWN (Goal-referenced content feedback)²

Evolution or change through time was evident in the interest in the human skulls in LIFE, and in the geological and social changes that define Utah:

"The wall of skulls, the chronology through time. We want to remember to look up that little one from Indonesia..." [D32]

"One thing about the history of Utah is that there is a lot of history about the evolving of mankind." [D39]

"The exhibits on the formation of the Rockies and other geological aspects were probably one of the highlights." [6]

"I was surprised to learn people were in Utah 11,500 years ago—that fact really stuck in my head." [56]

¹ Responses from 98 subjects were recorded; two were lost due to a language problem and the recorder malfunctioning.

² We have already quoted from the exit interviews in other parts of this report where the comments are in the context of the exhibit subareas; here they are grouped into common themes.

"I'd like to remember the richness of the immense history of the earth. The way it influenced and had bearing on innumerable people in the world and their way of living." [80]

Ecology, connections, biodiversity appeared most often in responses related to the nature, environments and geology of Utah:

"The diversity and beauty of Utah wildlife, the beauty of the landscape and all the different animals and plants." [18]

"I'd like to remember about the Pleistocene—the variety and numbers of different animals." [37]

"The tools and resourcefulness we have as human people; homage to the first peoples, not just in archaeology, but as shown in Native Voices." [91]

"Things relating to Utah, such as Utah being a very healthy state. We were also interested in seeing things that relate to other places we've have been, like the tar pits in California." [2]

"The connectedness of everything in Utah." [45]

Energy was inferred once:

"The life and cells area, photosynthesis, it all relates to my body, plants and to life." [63]

Climate change, global warming, sustainability was hinted at in visitors' considerable interest in the green aspects of the building, as well as the references to climate change:

"I loved the sustainable design of the museum." [68]

"The architecture and solar panels..." [67]

"Solar panels and renewable energy." [27]

"The acknowledgement of global warming." [91]

Connected story. Quite a few of the responses reflected the museum's aim to tell a complete, connected story in the overall experience—the flow of the exhibits and content as well as the architecture as it blended with the environment:

"What I loved was how it's laid out, so it kind of walks you through time and through history...it helped me sort of visualize, I could actually see and touch it. It's a magnificent story well told." [42]

"The first thing I want to remember is that the architecture of the building is spectacular and inside is amazing too. The history is quite condensed and is good and you can have a good comprehension of everything." [D39]

"The beauty of the building, the way it flowed with the walkways and how everything was displayed so beautifully; the views were gorgeous. [69]

"The connectedness of everything, from First Peoples to now, how it goes back and forth. [D32]

"The architecture of the building and the layout of the surrounding geography...the way that the building fits into the hillside." [21]

One of the data collectors (who was also a museum volunteer) noticed the "flow" too:

In going through the museum so many times where I wasn't a visitor and not able to look at things specifically, I was able to truly observe the overall design and flow as an amazing trip through the ages, through life and through Utah. So often in a museum, we are caught up in the details of the displays. It was good to actually see the "forest" for a change.

2. BOTTOM-UP. (Frequency of comments about the experience)⁴

Dinosaurs

NHMU is about dinosaurs! For most respondents, this single word seemed to suffice. Only a very few bothered to elaborate:

“The dinosaur collection is like none other I have seen.” [72]

“The dinosaur exhibit is probably the centerpiece of the museum so it’s always enthralling to walk through that.” [40]

Subject	Number of times mentioned³
Dinosaurs	25
Native Americans, First Peoples	17
Social experience, fun things for kids	54
Interactives	37

Native Americans

Quite a few wanted to recall stories about Native Americans, from first peoples to the present:

“Will remember the bear-dancing video in Native Voices and that Native Americans are not just a piece of history, but are active in current times in Utah.” [2]

“The native area was very emotional.” [27]

“I was surprised to learn people were in Utah 11,500 years ago—that fact really stuck in my head.” [56]

Things for families and children

Many were focused on the social aspects of their visit—sharing the museum experience together and enjoying the many things designed for children.

“The experiences with the children, enjoying the museum together.” [77]

“The look of delight on my kid’s faces as they went around and discovered things...” [D37]

“Liked the interactive stuff for the kids, especially the labs with the toys you can take out and play with.” [83]

“I’d like to remember my kids playing here—that’s really why we come.” [D31]

One of the data collectors noted that parents seemed relieved that they didn’t always have to tell kids not to touch.

Interactives

Both adults and children liked the interactives.

“Good hands-on stuff for all ages.” [91]

“I loved how interactive everything was.” [62]

“We enjoy the interactives, they’re good for both adults and children.” [48]

“All the experiential exhibits, the interactives, they encouraged you to think scientifically.” [44]

³ Although the total number of subjects was 100, many subjects mentioned more than one item, and each instance was recorded.

⁴ These results, unsurprisingly, often mirrored trends uncovered in the qualitative data for the Stay-Time Study. We have already quoted from the exit interviews in other parts of this report where the comments are in the context of the exhibit subareas; here they are grouped into common themes.

UTAH!

Some wanted to remember their visit as place-based, especially in regard to local geology and minerals, and Utah environments.

“The geology that I learned today; the three kinds of rocks. I’m up in the mountains a lot hiking.” [60]

“I drove here from Colorado, so the maps and everything, kind of looking at where I went and where I’m at, the mountain ranges and things like that.” [D33]

“The history of the Utah Valley and the processes of change that shaped it.” [52]

“I was interested to learn that the Great Salt Lake was not always there and how it has changed.”[D38]

“I particularly liked the minerals exhibit and the way they explained the different types of minerals and crystals.” [21]

“The special focus on Utah.” [44]

Subject	Number of times mentioned
Utah geology, gems & minerals, rocks	19
Helioscope	5
Solar panels	3
Human skulls	2
Ceratopsian Skull Wall	2
Plate tectonics/ “interactive globe”	2

Individual activities

Many participants named individual exhibits that they wanted to remember. A few exhibits were named by more than one person, for example, the helioscope, the solar panels, the human skulls, the “dragon skulls” (Ceratopsian skull wall), and the interactive globe. Most were mentioned just once: Life cells, DNA, genetics, photosynthesis, diorama ID wheels, elk statue, seismographic activity, sniffers, pottery (“piecing things together”), shoes, glowing rocks and minerals, dino ID wheels, Cleveland-Lloyd story, dino dig, see-through floor, hands-on stream, projection of prairie grasses on the Canyon wall, Collections Wall.



A lot of comments were about the things they saw.

See Appendix 5 for a complete summary of the items respondents mentioned and the data spreadsheet for all the subjects’ remarks.

SECTION 3: AREA REPORTS

3.1 CANYON Level 2

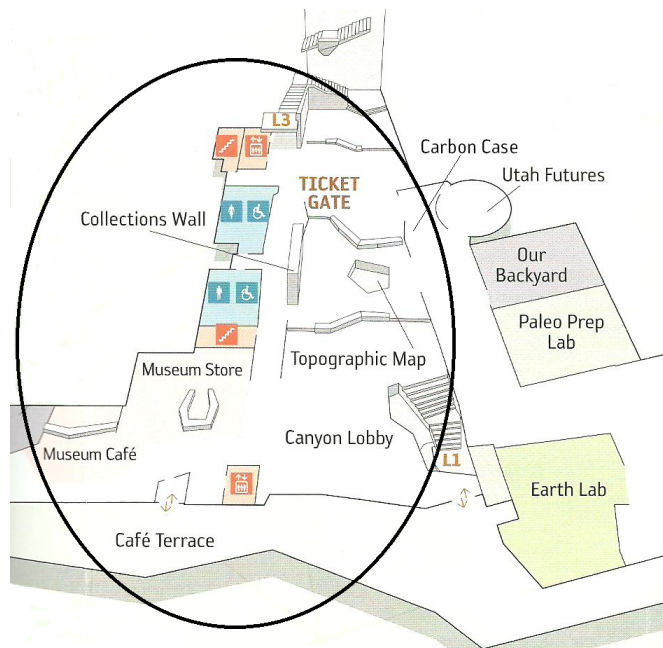


Figure 8. Floor plan of the CANYON area.

The CANYON area on Level 2 is an important hub in the museum—it serves as the gateway to the exhibition spaces and offers a place for visitors to relax, eat, shop, and orient themselves. Generally, study participants visited here twice—once on their way into the museum and once on their way out. Some visitors returned to the CANYON during their stay to take a break or eat. A couple repeat visitors did not exit the museum from here but from another area of the museum.



Visitors enjoy the view from the CANYON area as well as use it as a place to take a break.

The average stay time was 8 minutes, and nearly two-thirds of CANYON visits were less than 10 minutes long. Visits to CANYON lasting longer than 20 minutes usually involved eating food or doing a special activity (astronomy days or Dinosaur Musical).

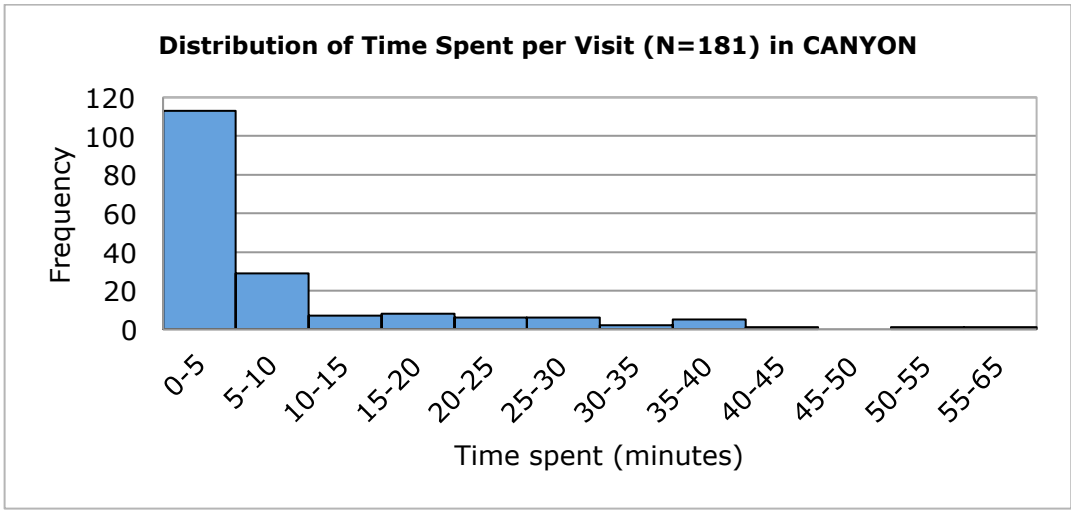


Figure 9. Histogram of time spent in the CANYON. Average stay time was 8 minutes, but the distribution is skewed towards more short visits. Multiple visits were not combined.

Because the CANYON offers opportunities not available in other parts of the museum, a unique set of activities was used to track visitors through this space. Activities that visitors could do while in CANYON were: *read intro label (at top of stairs up from Level 1); look at topographical map, collections wall, Lightweeds art installation; use Trailhead computer, do wayfinding; look at scenery; visit store, café, canyon terrace; sit at tables/chairs, and other (usually restroom).*

Visitors engaged in different activities on their way into the building than they did on their way out. Upon entering the CANYON, a majority of visitors looked at the collections wall and topographical map, and more than a third did wayfinding activities. Lower numbers of people used the Trailhead computer, read the intro label, looked at Lightweeds or scenery, and went to the store.

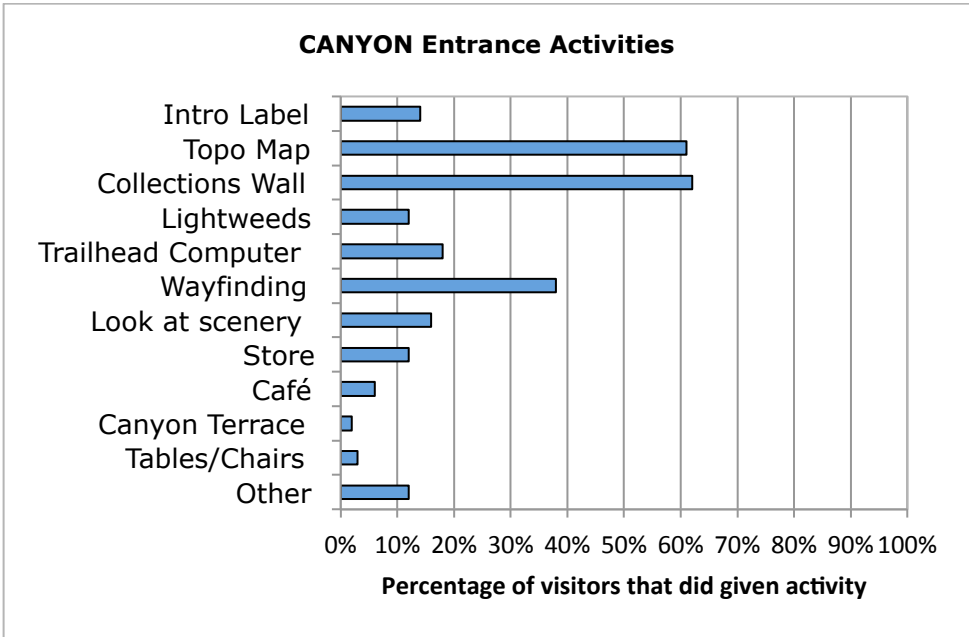


Figure 10. Percentage of all visitors' entry activities. Over half of the study population looked at the Topographical Map and Collections Wall.

On their way out, more than two-thirds of visitors stopped at the store and many people visited the café and/or sat down at tables/chairs. Visitors also returned to the collections wall and did wayfinding activities again, maybe to check and see if they'd missed anything.

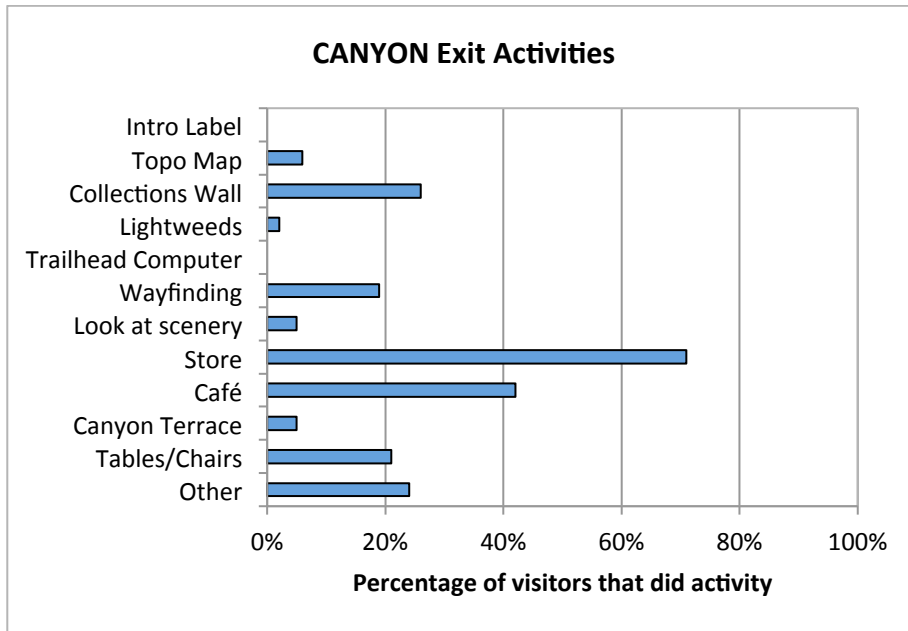


Figure 11. Percentage of all visitors' exit activities. Over two-thirds of visitors went to the store.

The CANYON had the highest rate of wayfinding in the entire museum. While it is common for visitors to wayfind at the start of a museum visit, DC comments indicated that some visitors could not orient themselves with the signage provided:

Referred to map, great deal of looking around, could not find elevator. Asked store employee for directions. Made comment that ticketing employee could have been more helpful in pointing out where elevator was located.

Seemed confused how to proceed from Canyon, ended up going up stairs to Gems & Minerals. Subject stated at end that it was confusing to get off the elevator at second level and find their way.

One subject suggested they should have arrows on the floor, especially on the elevator side of the museum.

First-time (F) and repeat (R) visitors often did the same activities in CANYON, but of note is that more F visitors looked at the topographical map, did wayfinding, and read the intro label on their way into the museum. Upon exiting the museum, more R visitors visited the café, used tables/chairs, and looked at the Collections Wall (see Figures 12 and 13).

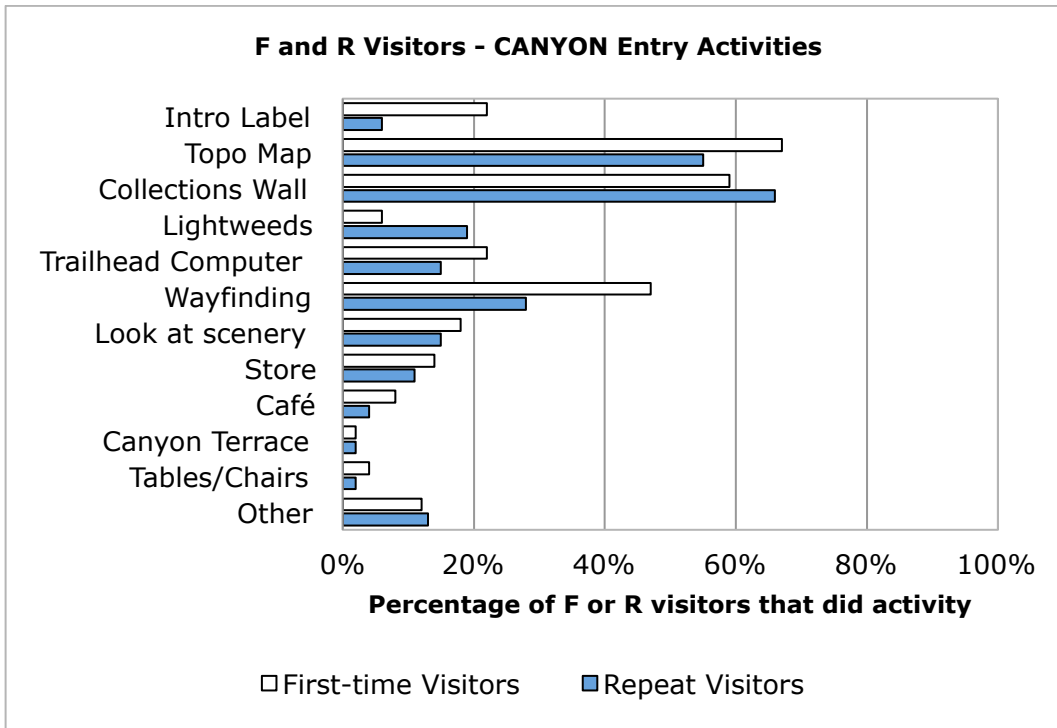


Figure 12. Graph of F and R visitors' entry activities in CANYON. This graph shows the percentage of first-time (N=32) or repeat (N=30) visitors that did a given activity when entering the CANYON area.

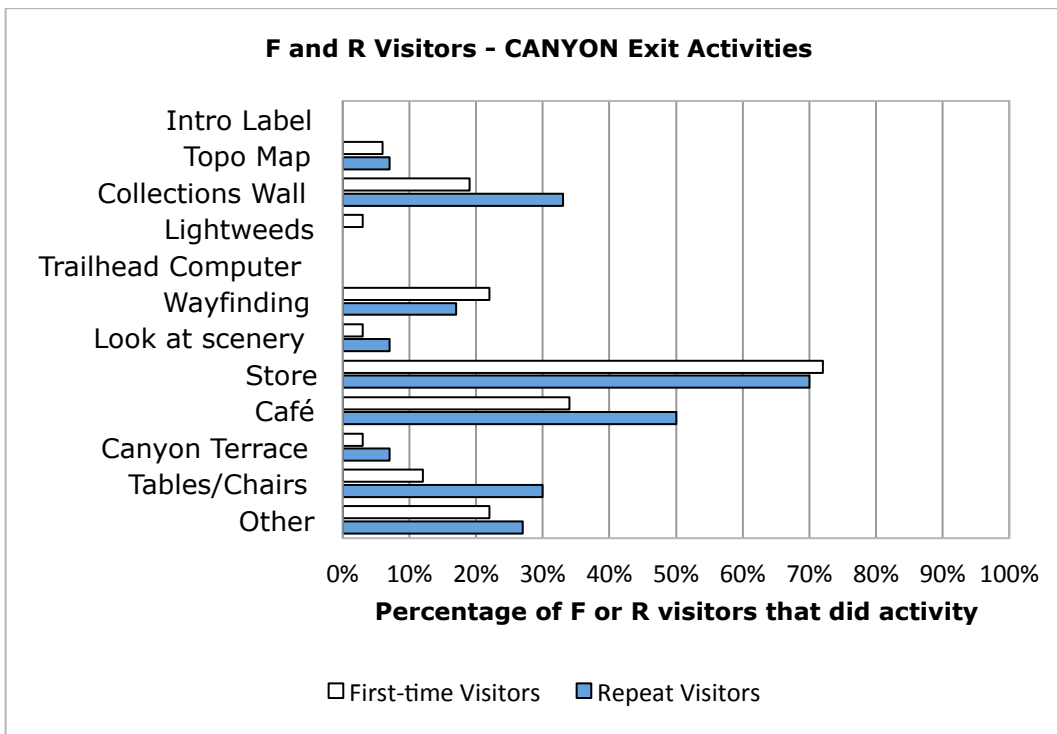


Figure 13. Graph of F and R visitors' exit activities in CANYON. This graph shows the percentage of first-time (N=51) or repeat (N=47) visitors that did a given activity upon exiting the CANYON area.

Visitors had the option to begin their interpretive experience in the CANYON at the intro label at the top of the stairs from Level 1. While the label (for those who noticed it) introduces visitors to the architectural concept of the building, it could do more to establish the conceptual architecture of exhibit spaces. Other visitor studies suggest that knowing how the building is arranged physically and conceptually can increase a visitor's chance for a positive experience (Serrell 2006, page 112). If they don't feel lost, confused, or think they are missing something, they are more likely to pick up on the overarching themes of the museum.

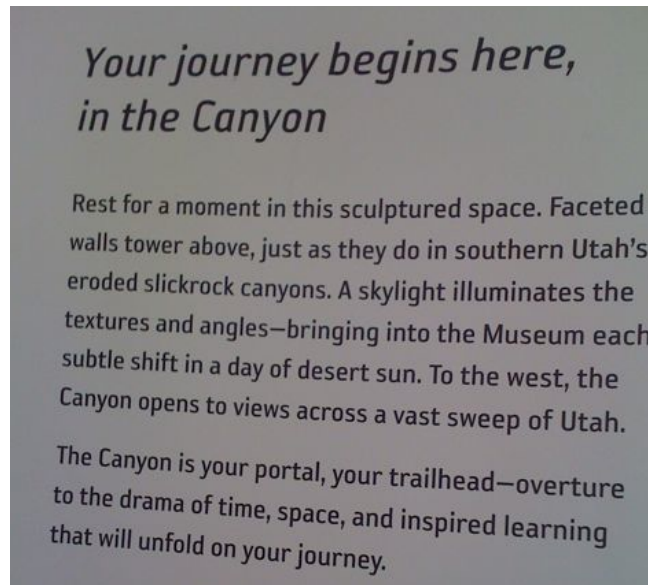


Image of the intro label in CANYON. Editing this label to introduce visitors to the conceptual layout and themes of the museum would increase visitor orientation and the chance for a positive experience.

Recommendations for CANYON:

- Rewrite introductory label to make it more relevant to the visitor experience in the whole museum. Mention the flow of the suite of six exhibits.
- Increase directional signage to clearly mark pathways to and from stairs and elevators; make existing signage more obvious.
- Orient visitors in the Entry Hall, Level 1, before they get to CANYON on Level 2, about what they can see and do—and where to leave their coats.
- Add a "You Are Here" indicator on the topographical map.

“The boys were so interested in some of the exhibits that
I had to literally drag them away.”

3.2 SKY-NATIVE VOICES Level 5

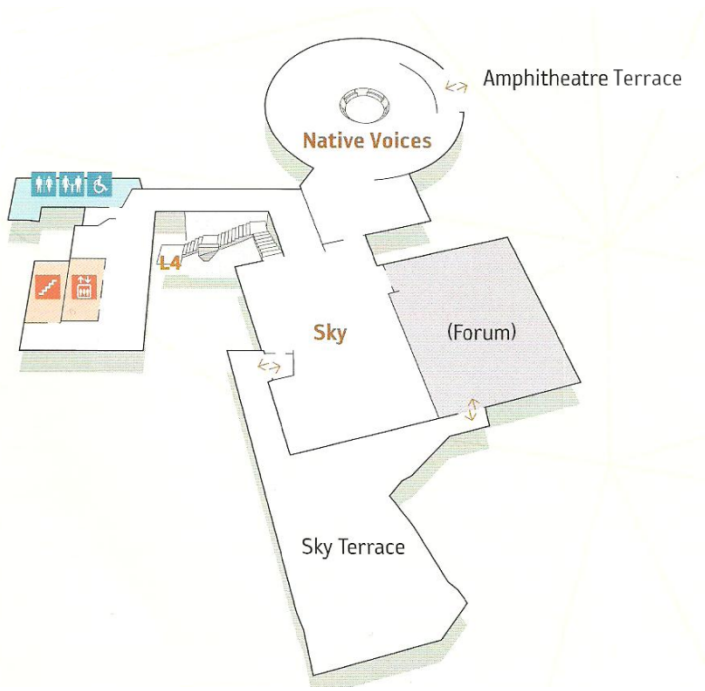


Figure 14. Floor plan of Level 5. Shows Sky exhibits, Native Voices, and two outdoor areas—Sky Terrace and the Amphitheatre Terrace.

Eighty percent of the visitors went to Level 5. About equal numbers went to the Sky exhibits as went to the Native Voices exhibit. The Sky Terrace was visited by 57 people, more than any other terrace. The view from the top of the building was impressive.

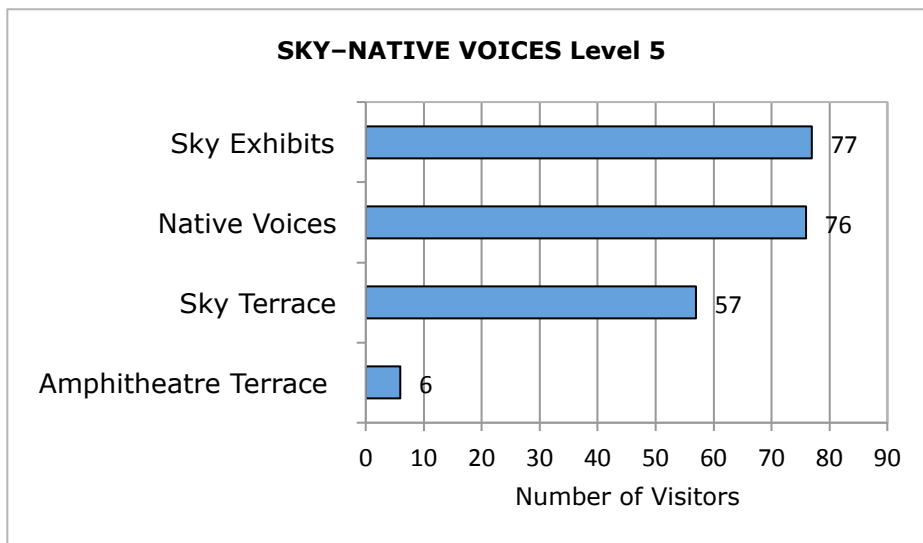


Figure 15. Number of visitors to exhibit subareas in SKY-NATIVE VOICES.

Significantly more time was spent on Level 5 by adult-only groups (AO) than adults with children (AK). Although the number of activities both groups participated in was similar, more AOs read, talked, and took photos. AOs might also have spent more time watching the long Native Voices video.

Twenty percent of the visitors didn't make it up to Level 5: Most of these people started on Level 2, and went to Levels 3 and 4 (but not to Gems & Minerals) and were making fairly quick stops. Most of them were repeat visitors and spent less than the average time (116 minutes) in the whole museum.

The average time spent on Level 5 was 21 minutes. People spent slightly more time in Native Voices than in Sky or on Sky Terraces, but many interactives engaged them in all three places.

In Native Voices, data collectors noted a lot of careful reading and talking about the exhibits—particularly at the boundaries map at the beginning.



Many people stopped, looked, and talked at the large map on the left wall in the entrance to Native Voices.

Adults and children worked together on the Language interactive, and the Dance video attracted many people.

There were a couple of mentions by DCs about people who seemed to have trouble understanding that the story headsets didn't work when the video was playing.

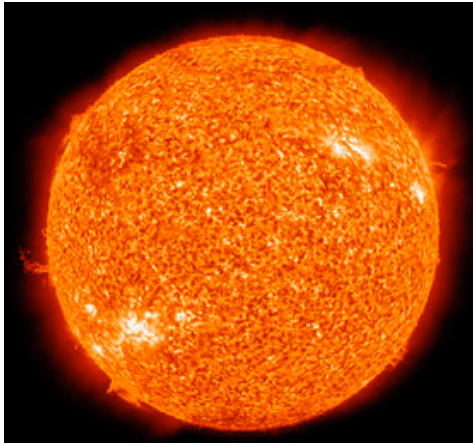
Visitors made 12 references to wanting to remember Native Voices or a Native American story: "The tools and resourcefulness we have as human people. The homage to the first peoples, not just in the archaeology, but as shown in Native Voices." [91]

"I will remember the bear-dancing video from Native Voices and that Native Americans in Utah are not just a piece of Utah history, but still active in current times in Utah." [2]

"What I'd like to remember is my grandson's interest in the Native American stories." [15]

In the Sky exhibits, data collectors specifically noted (11 times) visitors' engagement with the helioscope. During the exit interviews, five different people made references to the helioscope exhibit. For example:

"The sun display. How often do you get to see a live picture of the sun? That was really cool." [12]



The sky gallery also includes a heliostat and viewing table that can present real-time sun imagery or projected NASA images of the sun from space.

Other popular exhibits in Sky included climate change, snowflakes, predicting the weather, and exhibits on the terrace.

DCs noted that visitors had wayfinding issues on Level 5, mainly trying to decide where to go next and how to get there. For example:

Not sure how to get to 4th floor. Finally used elevator.

Were confused as to which way to go to get to 4, started down ramp, came back to use stairs.

Navigation: started back to elevator but then realized that stairs went to next level and came back around.

Asked themselves "Which way around circle?" in Native Voices. Turned left.

Talked to staff or volunteer who explained layout of museum and where exhibits were located.

Group decided to go to dinosaurs but wondered if that meant Past Worlds.

Recommendation for SKY-NATIVE VOICES:

- The highly attractive and memorable sun exhibit currently has misleading interpretive text that should be corrected.
- Improve wayfinding.

3.3 LIFE Level 4

Although none of the people in this study started their visits on Level 4 LIFE, eventually 94 of the 100 tracked visitors went there. Life Main Floor had lots of interactives, cases of taxidermied animals, and a few videos.



The Naturalist Lab had live animals, toys, games, and demonstrations.

The Naturalist Lab was open for exploration by casual visitors, although sometimes it was closed when school programs were scheduled inside (see page 74 for more discussion of the lab). Four dioramas were located at the back of the hall, and a terrace was accessed from a door near the dioramas (terraces are discussed on page 72).

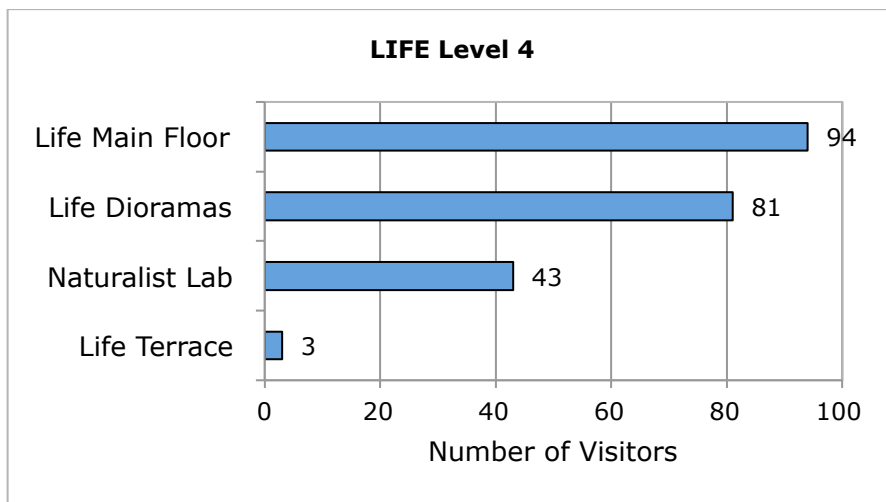


Figure 16. Number of visitors to exhibit subareas in LIFE.

Of the 94 visitors to LIFE, all went to the main area; some missed or skipped the dioramas, and slightly less than half did not go into the lab. Few people went to the terrace.

The time that visitors spent in the LIFE area ranged from less than 5 minutes up to 70 minutes. The average time spent was 19 minutes. Fifty percent of the people stayed for more than 15 minutes. The longest visit (70 minutes) was made by a mother who worked with her two kids, explaining, pointing, reading, and talking about the cells, animals, dioramas, and skulls. They took a break on the terrace to have snacks and made a trip to the bathroom on this level.

Shorter visits (less than 10 minutes) consisted of seeing most of what was there but not engaging with any one thing for a longer time.

Many groups worked together on the interactives. The cell puzzles, diorama wheels, microscopes, and live animals were very popular. Four groups spent more than 20 minutes just in the Naturalist Lab. And several people were very captivated by the DNA exhibit, with lots of comparing and discussing. One person remembered it in the exit interview: "The genetics exhibit was amazing—I can't even wrap my mind around it." [64]



The DNA wall with a visitor tracking the sequences with his fingers—a common behavior.

More visitors pointed, read out loud to each other, and called each other's attention to things in LIFE than in other parts of the museum.

DCs noticed various reactions to the human evolution wall:

Skipped human evolution wall, kid thought skulls were creepy.

Read the human evolution wall carefully, touching all the skulls and talking about it a lot.

Reading together, talking, asking & answering questions, demonstrating, pointing out difference. Using finger as read words on panel. Moved skulls—pointing, asking child to point out differences. Touching child's skull to make comparisons.

Took a picture with human skulls before entering Land.

Spent time looking at and talking about human evolution wall. Older man made negative comments about presentation of human evolution.

One first-time visitor was struck that the area was really about them:

"The life and cells area, photosynthesis, it all relates to my body, plants and to life." [63]

Two visitors named the human skull display as the thing they wanted to remember, and at least one came just to see the skulls:

"We came specifically to see the Neanderthal skulls because my daughter asked me a question first thing in the morning..." [7]

And another thought they'd like to do more research:

"We want to remember to look up that little one from Indonesia when we get home." [D32]

DCs noted a few issues about wayfinding here.

Was confused about getting from Sky to Life.

Did not see Dioramas. Left floor by walking down stairs to First Peoples.

Didn't notice the Land Walk so turned around and went back the way they came.

Came here after Gems & Minerals by going up the stairs. Seemed a little lost; sat down to orientate themselves.

Recommendations for LIFE:

- The Naturalist Lab is a good area for a juice box break for little kids.
- Make a photo-op site next to the human skulls exhibit.
- Since this is a frequently used location for a bathroom break, improve directional signage to bathrooms.
- Increase directional signage to diorama area, terrace, and entry to ramp for LAND.
- Tell the keratin story more strongly and clearly. Add graphics to support it.



The life outside the LIFE exhibits is reflected in the terrace windows.

3.4 LAND Level 3

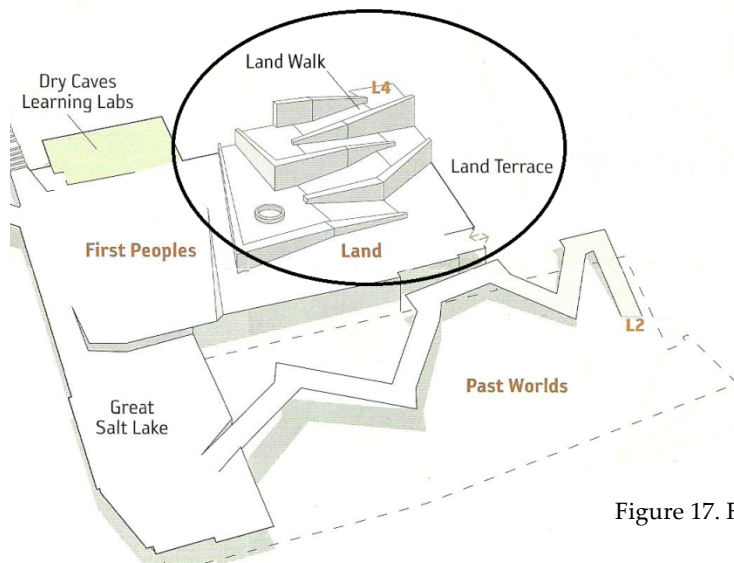


Figure 17. Floor plan of the LAND area.

Ninety-two of the 100 tracked visitors went to LAND on Level 3. Most of them went to the Main Floor and the Walk, coming down from Level 4 or going up from Level 2. Only nine visitors actually started on this level. Only three people went to the terrace.

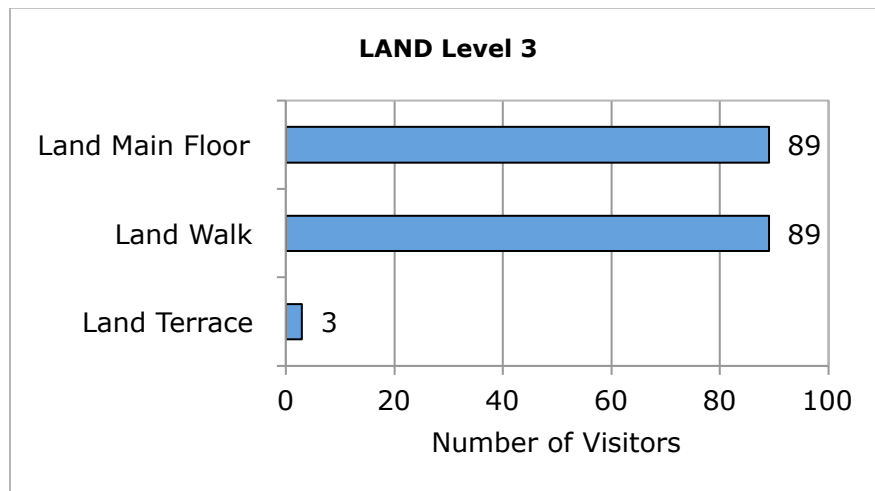


Figure 18. Number of visitors to exhibit subareas in the LAND area.

The average stay time in Land was 14 minutes. Many of the exhibits were popular with visitors, including the water erosion table, plate tectonics, wind, earthquake, smells and sniffs, and the various books (e.g., plants, past-present). Parents had to lift small children up to the smell activities. A DC noted:

Went immediately to water erosion table and all played together. Parents had to convince kid to move on, and it took several attempts.



The popular erosion table.

DCs also noted several times that visitors seemed to enjoy looking at the view down into the dinosaurs from Land; some took photos of it. Constructing the earthquake-proof building was often worked on by entire groups who tried it more than once. DCs often noted that visitors were talking about/discussing the exhibits they were using.

There were a few malfunctions noted by DCs during the observation periods. The water erosion table was closed or being fixed a couple of times; the earthquake interactive was missing a part (the brace) a few times; and once the globe computer needed to be rebooted. One DC noted an accessibility issue at the smells with a wheelchair user:

She tried to wave the smells over to grandpa, who couldn't get close enough.

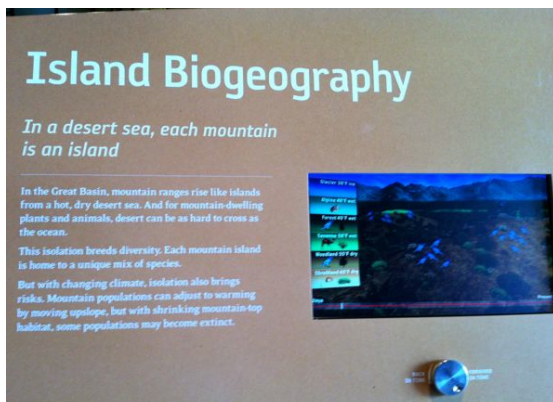
DCs noted some confusion at the seismic interactive by three of the seven visitors who attempted to use it:

Seismic jump but looking for line on barrel and not on screen in front of them.

Jumped in front of seismic machine but not where it said to jump.

Stamped foot at first, then told child to jump.

We were confused about the relationship of the computer with the time-frame slider and the text for "Island Biogeography." There are so many ideas packed together here—diversity, isolation, elevation, camels, migration, climate change, camels, extinction, geologic time. The take-away from the computer seems to be "climate change has happened many times" but what is the "so what?"



View of label panel and computer interactive.

The third paragraph, which deals with change over time, would probably work better as a separate caption for the computer.

Comments from two exit interviews that related to Land were:

"The exhibits on the formation of the Rockies and the other geologic aspects were one of the highlights." [6]

"I want to remember the geology that I learned today; the three kinds of rocks as I'm up in the mountains a lot hiking." [60]



Another view of how the inside architecture related to the outside natural area.

Recommendations for LAND:

- Make door to Land Terrace more obvious, so people will know they can go out there.
- Put steps or stools near some of the sniff/smell activities so that younger children can reach them.
- Keep up to date with repairs and stock spare parts for interactives.
- Put a separate block of text for the computer interactive that is next to the Island Biogeography text label to clarify the relationship of those two exhibits. Perhaps re-write for clarity and comprehension of the main point.
- Remediate the directions for the seismic jump activity to make sure more people understand what to do and are successful at the interaction.

3.5 FIRST PEOPLES–GREAT SALT LAKE Level 3

A lot is going on at Level 3. The First Peoples, Dry Caves Lab, and Great Salt Lake exhibit subareas are located at the top of the Dino Walk ramp. LAND is adjacent, and a walkway across CANYON leads to Collections Storage, the back view of the Collections Wall, Gems & Minerals, and the Special Exhibits gallery (which was closed during this study).

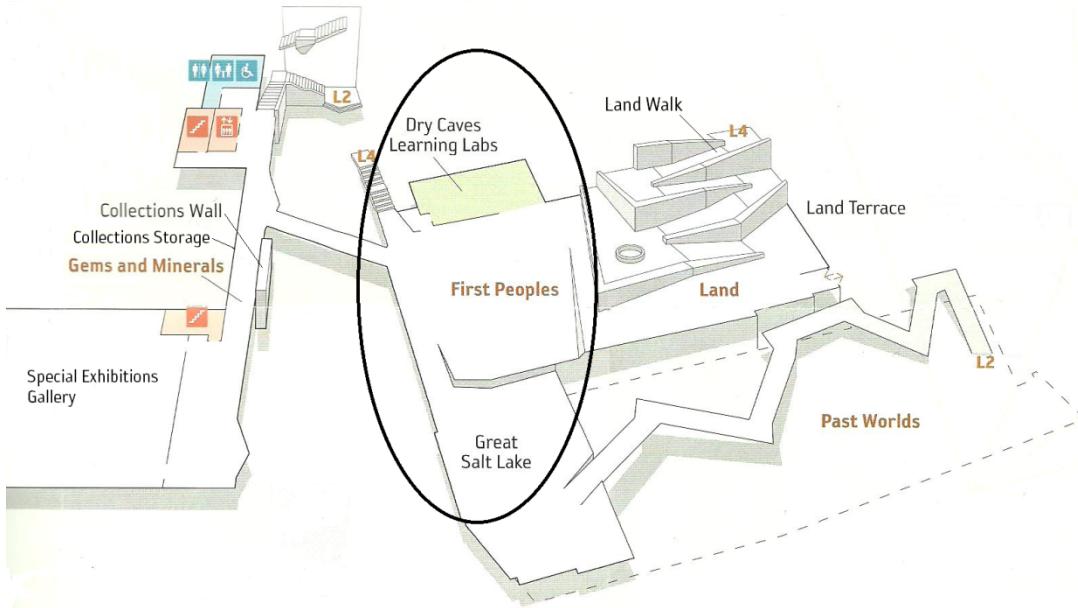


Figure 19. Floor plan of the FIRST PEOPLES–GREAT SALT LAKE area.

Everyone (N=100) passed through the FIRST PEOPLES–GREAT SALT LAKE area on their way up or down to other levels of the museum.

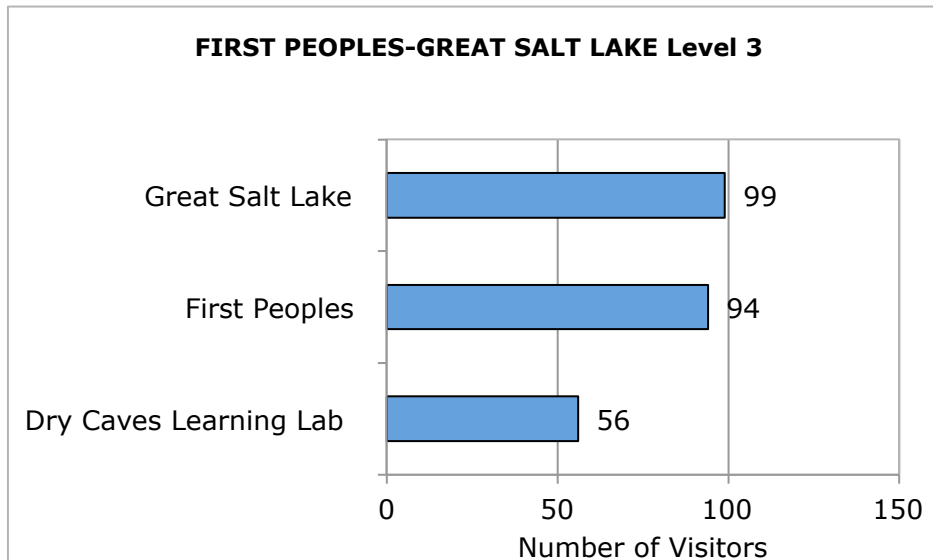


Figure 20. Number of visitors to exhibit subareas in FIRST PEOPLES–GREAT SALT LAKE.

This area is a hub with many choices about how to proceed. There seemed to be some wayfinding issues, as indicated by the number of short visits that were recorded (see histogram below) and DC comments:

Second time in First Peoples they came in from the other way. They went briefly into gallery looking for the way out.

Walked through area to get to dinosaurs.

After Life, walked back through Land and First Peoples to GSL.

Brief stop & read until met by partner. Left for rocks & minerals.

There were many interactives in the First Peoples exhibit subarea, and the pottery, weaving, tools, and Median Village dig were especially popular. The Dry Caves video attracted visitors to this area, where many people took the opportunity to sit down and rest.



Pottery-building, a popular interactive in First Peoples. Visitors are invited to try their hand at a number of techniques.

In this area, DCs made more mentions of visitors having contact with gallery interpreters, staff members, or volunteers than they did in most other areas. One noted:

There were two GIs in the gallery so after they saw the artifacts in Meridian (sic) Village, they were able to make a necklace and use a drill.

Visitors commented about things they remembered here:

"I was interested to learn that the Great Salt Lake was not always there and how it has changed." [D38]

"I was surprised to learn people were in Utah 11,500 years ago—that fact really stuck in my head." [56]

"The shoes...I was fascinated by the reconstruction of the shoes." [79]

No visitor and no DC mentioned "Range Creek" by name.

Thirty-five of the 100 people made multiple visits to this area, meaning that there were a total of 135 unique visits made here. In contrast, in the other six areas of the museum (not counting CANYON), only 1 to 6 people made more than one visit to the same place (that is, they came in, left, and returned later).

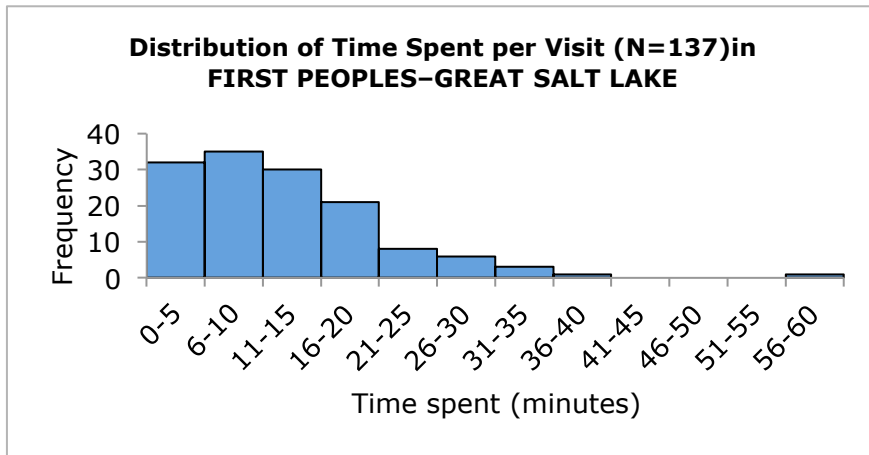


Figure 21. Histogram of time spent in FIRST PEOPLES-GREAT SALT LAKE area. Average time spent per visit was 12 minutes. Multiple visits were not combined on this graph.

The average time spent *per visit* for 137 visits was 12 minutes. If the stay-times are combined for the 100 individuals, i.e., with their return visit times added together, the average time spent was 17 minutes. The difference between the two data sets was because the multiple visits tended to be short, e.g., sometimes only a few minutes as some visitors backtracked in an effort to find their way.

The longest visit to this area was 59 minutes spent by an adult-only out-of-state couple on their first visit. Most of their time was taken up with a special activity. The DC noted: *After museum staff told them about a hawk watch activity/lecture, they spent time looking for where activity was located (in Dry Caves). Made comment about needing more signage. Had not been given a map.*

Recommendations for FIRST PEOPLES-GREAT SALT LAKE:

- Improve wayfinding for this important hub of traffic circulation (and confusion)



Among the Great Salt Lake exhibits, the lake formation interactive seemed to be the most engaging.

3.6 GEMS-COLLECTIONS Level 3

Gems and Minerals, Collections Wall (back view), and the glass door looking into Collections Storage are located off the beaten path, across the Canyon from the other Level 3 exhibit areas.

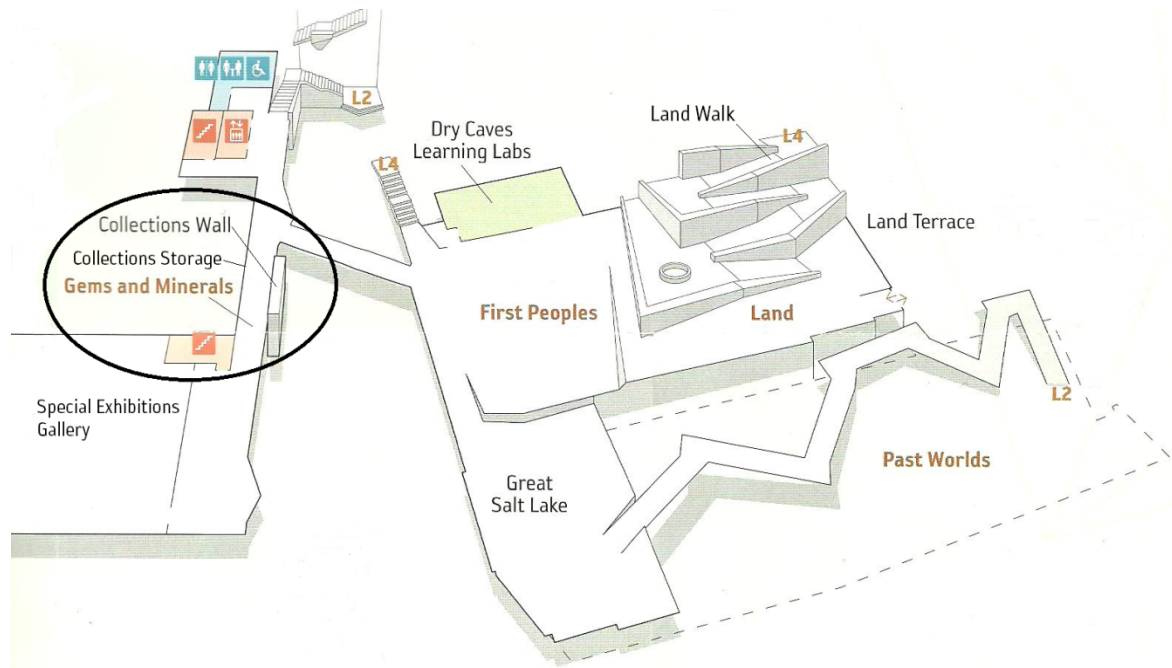


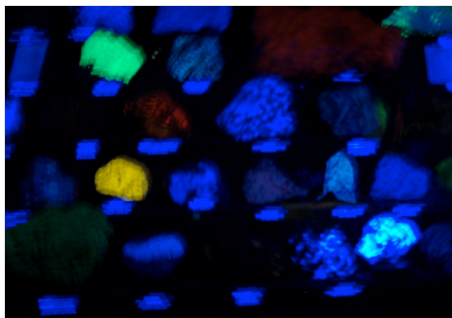
Figure 22. Floor plan of the GEMS-COLLECTION area. It was out of the main flow.

Forty percent of the visitors found their way to GEMS-COLLECTIONS area during their visit, which made it the least-visited area of the museum. It was probably an issue of wayfinding, and the DCs commented about this:

Accidentally ended up here while looking for elevator.
Were trying to find exit but ended up in minerals.
Stopped briefly on way down back to canyon.

On the other hand, a few people made a point of starting their visit here. As a DC noted, *This was the first place a child who had been here previously took his mother.*

Average time spent was 8 minutes. The ultraviolet interactive was very popular.



Rocks glowing under UV light.

DC comments about lengthier visits included:

Looking & reading about specimens, took photos at ultraviolet case.

Stopping at most cases & reading labels & lots of discussion with partner.

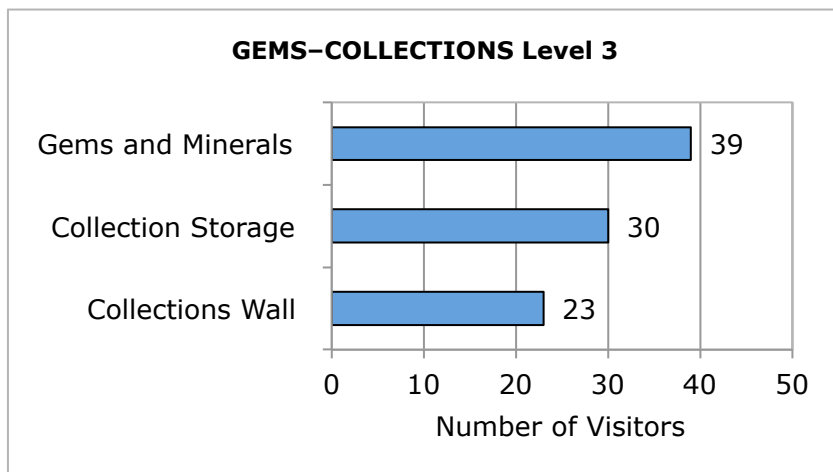


Figure 23. Number of visitors to exhibit subareas in GEMS-COLLECTIONS.

There were two remarkable data findings for this area of Level 3:

- People stayed relatively longer here than in any other area, given the size of the gallery. That is, visitors moved more slowly through this area compared to the others. (See discussion of sweep rate index on page 26-27.)
- There was more “pointing” behavior seen here than anywhere else. People pointed at the rocks, items in storage, and artifacts in the back of the Collections Wall. Also, adults-only groups were seen pointing more often here than anywhere else and as often as adults with kids.

Granted there were few hands-on opportunities in the GEMS-COLLECTIONS area, so it might not seem surprising to have a lot of pointing. But people point because they see something interesting to them and are motivated to share (e.g., “Look at *that!*”), not just because there is nothing else to do.

Six visitors (that is, 15% of the 40 visitors who went there) commented specifically about this area in their exit interview. For example:

“I would like to remember my trip to the Utah Natural History Museum for the wonderful rocks & minerals & gems that they have from a fantastic donation from Merlin J. Norton and his collection of rocks. I’m very jealous.” [6]

“This is the first time we ever saw the glowing rocks and minerals over there, so a forgotten corner of the museum that we saw for the first time.” [10]

Thus, although the majority of the sample did not visit this area, the people who found it or sought it out had a good and memorable experience.

It should also be noted that during this study, there was no installation in the Special Exhibitions gallery, and therefore, no wayfinding aids directing people there—which would have taken guests through the GEMS–COLLECTIONS area. It will be interesting to note the number of people who see this area and the amount of time they spend there when a special show is running in the gallery.

Recommendations for GEMS–COLLECTIONS:

- Improve wayfinding for this rewarding area that is outside of the general “flow” of the other exhibits.
- This area is intimate and refreshingly small. Resist the idea of making it bigger.

“I would like to remember my trip to the Utah Natural History Museum for the wonderful of rocks & minerals & gems that they have from a fantastic donation from Merlin J. Norton and his collection of rocks. I'm very jealous.”

3.7 PAST WORLDS Level 2

Nearly everyone went to see the dinosaurs. Forty-six percent of the visitors in this study started their visit on Level 2, through the Past Worlds Main Floor and up the Dino Walk ramp.

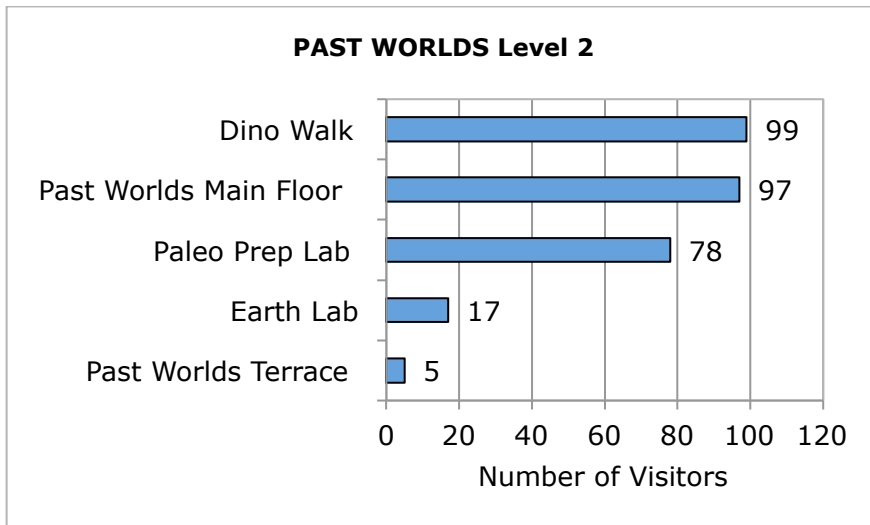


Figure 24. Number of visitors to PAST WORLDS exhibit subareas. More than three-quarters of the visitors stopped at the Prep Lab, but fewer went into the Earth Lab or out on the Terrace.

This is the most popular and favorite part of the museum for many visitors. One-third of the participants in the exit interviews mentioned or made reference to the dinosaurs or Past Worlds or activities in Past Worlds. When asked what they wanted to remember about their visit, most simply said, "Dinosaurs!" (Only one named "Past Worlds" specifically.) They said that their kids loved dinosaurs or compared the exhibit favorably to other museums. A few mentioned specific activities in the Past Worlds area, including the "wall of skulls" (Ceratopsian wall, 2 mentions), the dino dig, Cleveland-Lloyd, "light-up flooring," and Pleistocene (one mention each). Three visitors remarked on the attractive display or flow of the dinosaur exhibits.



Some visitors referred to this as the "wall of skulls" on Dino Walk.

The popular Cleveland-Lloyd video on the Dino Walk was visually arresting because of its large size and complexity (4 screens). Adults in particular were noted as watching the whole thing.

Somewhat fewer people watched the video next to the Paleo Lab, which was smaller and off to the side, located high on the wall. But one person found it memorable: "The explanation of a fossil's journey from the excavation site to the museum was very interesting." [49]

The average time spent in PAST WORLDS was 20 minutes. Data collectors mentioned places where many visitors spent a lot of time: the Cleveland-Lloyd video and voting activity on the Dino Walk, at the Dino dig, Earth Lab, and on the main floor. DCs noted that some people were moving faster along the Dino Walk ramp than they did through other areas. Perhaps this is because if you stop you feel like you are blocking traffic. DCs also noted that most visitors seemed to like the glass floors, crossing and studying them multiple times. But they also mentioned several times that some visitors (both kids and adults) showed hesitations over crossing them.



This kid was not among the other children and adults who tried to avoid walking on the see-through glass floors.

Many of the people stopped to take photos of the exhibits. A child who was finding bones in the Dino Dig said that the dinosaurs were "broken." "A fossil's journey," the video beside the open view into the work space cues visitors to the sequence and types of work that are underway. As in other exhibit areas, there was a lot of talking, reading, pointing, and using the interactives. More people used interactives on the Main Floor than on the Dino Walk, where the hands-on opportunities were mainly the ID wheels.

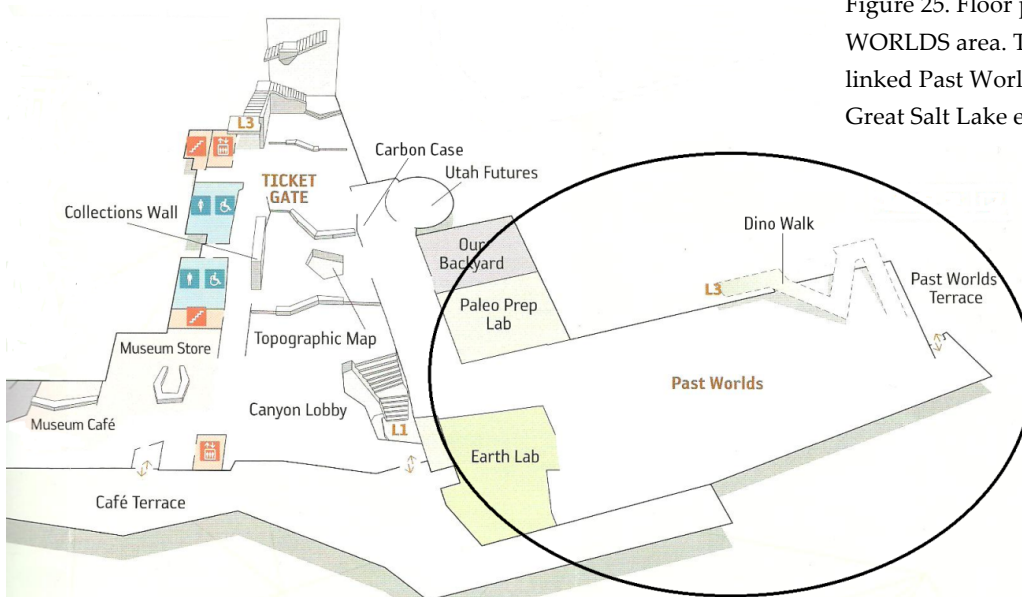
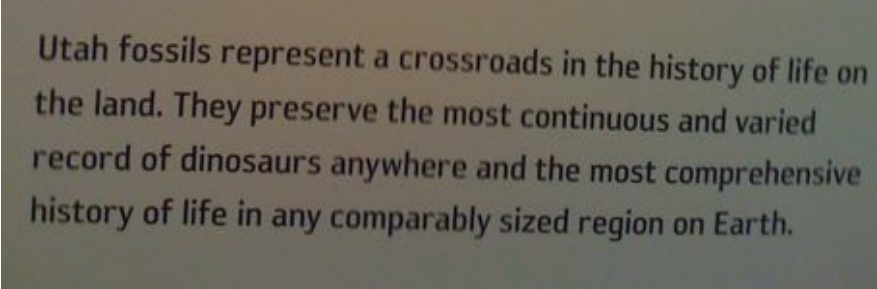


Figure 25. Floor plan of PAST WORLDS area. The Dino Walk linked Past Worlds Main Floor to the Great Salt Lake exhibits.

Two of the three people who spent the most time here (50 to 60 minutes) were the visitors noted earlier (page 24) who spent the longest time in the museum. The other was a mom and two young children, repeat visitors who took advantage of all areas. The DC noted of her: *On Dino Walk mom read signs to kids, pointed, carried little boy and lifted him up to see. Watched CL video intently as kids ran ahead. Main floor: kids fascinated by glass floors. All played in Dino dig and mom talked about the different types of bones they found, even going back to walk to compare bones. Kids didn't want to leave dig, little boy kept running back to it. Went through the rest pretty quickly, but stopped at the T-Rex and to use Kaiparowits interactives, and play in the footprint. Also stopped to use What Was My Dinner interactive. Prep Lab: watched video, watched lab workers. Earth lab: played for a long time with dinosaur puzzles that were left out.*

Recommendations for Past Worlds:

- This is the last paragraph in the PAST WORLDS introductory label. The last sentence contains the superlative that would work well as the opening sentence on this sign!



Utah fossils represent a crossroads in the history of life on the land. They preserve the most continuous and varied record of dinosaurs anywhere and the most comprehensive history of life in any comparably sized region on Earth.

3.8 FUTURES-BACKYARD Level 2

Level 2 of the museum was divided into three areas for this tracking study. The CANYON is discussed starting on page 45. In this section (Level 2 FUTURES-BACKYARD), data will be summarized for three exhibit subareas: Utah Futures, Our Backyard, and the Carbon Case. PAST WORLDS will be discussed separately (starting on page 66).

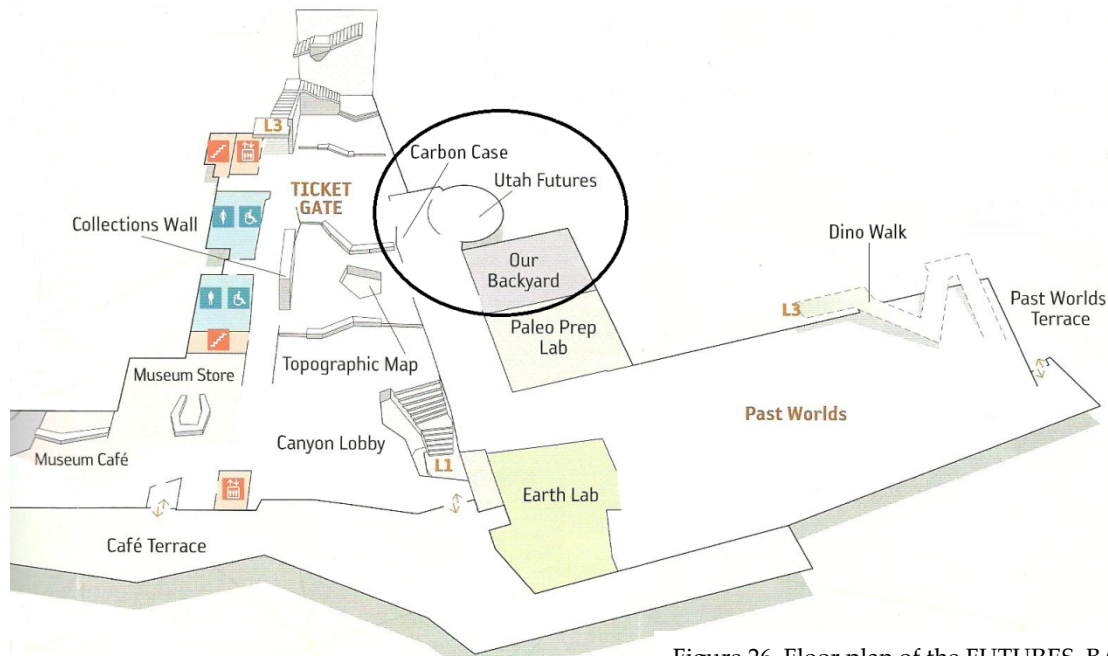


Figure 26. Floor plan of the FUTURES-BACKYARD area.

It's noteworthy that this area is largely a hallway that connects the CANYON area with the popular PAST WORLDS. Foot traffic moves fairly fast here as many people are on their way up, eager to get to the dinosaurs, or on their way down, often eager to find the exit.

The average total time spent in this area was 9 minutes. Adults with children (many of them repeat visitors) engaging in Our Backyard accounted for much of the time spent.

In fact, visitors who stopped and spent significantly more time in this area were groups with young children who went to Our Backyard. The Water Table was especially engaging for young kids. Many parents participated, helping guide their children's activities. Others waited and watched, some on their cell phones. Live animals, the cave, and costumes attracted attention. DCs noted that some visitors were very purposeful or intentional in their visits to Our Backyard, with children leading adults to the door, and some were visibly reluctant to leave: *Kid ran straight to Our Backyard and both parents actively played with him. Mom asked boy if he wanted to leave and see dinosaurs and he said no, kept playing at stream table.*

Four subjects—all of them repeat visitors—mentioned Backyard in the exit interview. Here’s what two of them said:

“We like all the things that are designed especially for the little kids, especially the Backyard area with the insects and the caves.” [99]

“The hands-on stream in Our Backyard was really fun for my son.” [61]

Next door is Utah Futures, an area that conceptually appeals to an older audience, yet the interactive nature of the computers and real-time responses to group input made it attractive to families as well as adults. The area has five stations; people worked alone and together, seated and standing. Many people went in, looked around briefly, and left.

DC observations in Utah Futures ranged:

Played futures game briefly but had trouble getting the hang of it.

Futures: played game as a family, several times all the way through.

The whole group played the Utah Futures game and discussed some of the options.

Watched a group of kids play game.



The entrance to the exhibits on the second level is through a hallway that includes Utah Futures and Our Backyard.

The Carbon Case—a topic unto itself, but not a showstopper—sits at the intersection of the Canyon and Utah Futures. It contains a variety of attractive objects (e.g., animal, mineral, clothing) that share an abstract concept (carbon cycle), which most visitors did not spend time pondering.

If the purpose of this case is to tie together the interpretive themes of Levels 5, 4, 3, and 2, it could be revamped to share more of the design features of each level, and, thereby, serve as a better, more obvious introduction or conclusion to the museum’s themes.

Out of 100 people, 29 noticed it. Many people just glanced at the case while walking by it. A few took a photo of the endearing deer.

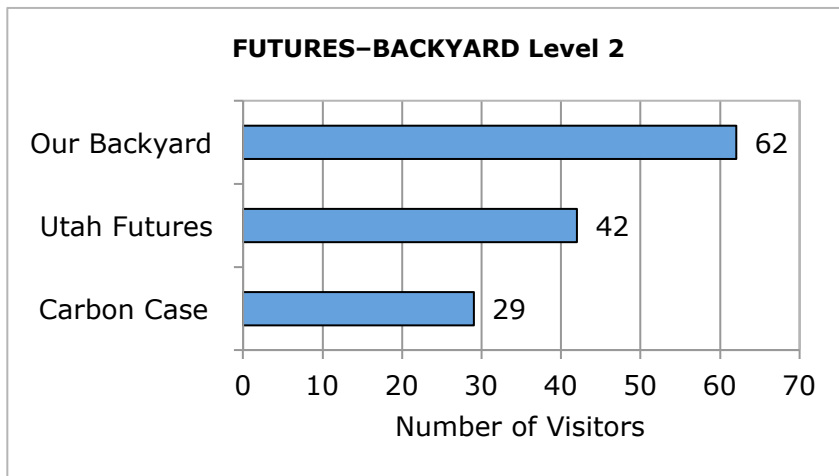


Figure 27. Number of visitors to FUTURES-BACKYARD area.

Recommendations for Utah Futures, Our Backyard, and the Carbon Case:

- Make this entrance to Level 2 look more welcoming and indicate that it is an entrance to Past Worlds and other exhibits, not just Utah Futures.
- Tie the Carbon Case interpretation to the content of other levels in a quick and obvious way.
- Put an introductory sign at Our Backyard to inform visitors about the special purpose and audience for this space.

3.9 TERRACES and LABS

TERRACES

All terrace areas were included in this study: Sky and Amphitheatre Terraces on Level 5, Life Terrace on Level 4, Land Terrace on Level 3, and Past Worlds Terrace and Canyon Terrace on Level 2.

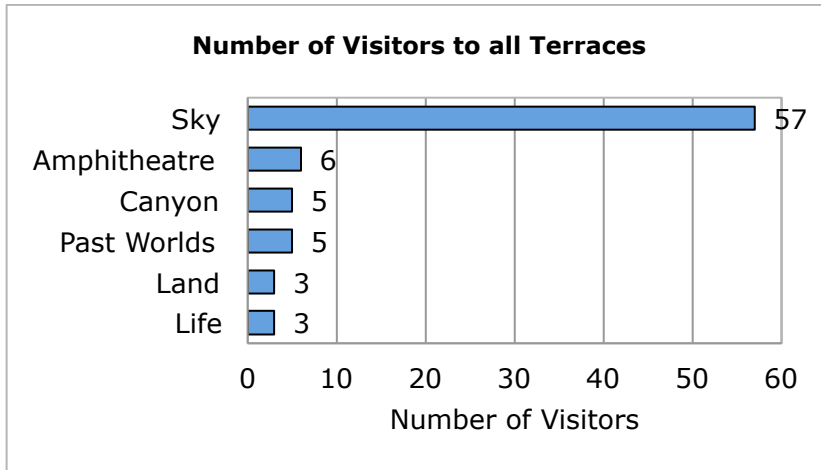


Figure 28. Number of visitors to terraces. Sky Terrace had the highest visitation rate.

Visitation to the terraces was very low with the exception of Sky Terrace. Fifty-seven visitors went to Sky Terrace, while the other terraces each had between three and six visitors (see Figure 28). The high visitation rate to Sky Terrace was due to its visibility from the main exhibit area. Other terraces are less visible from main exhibit spaces and were often missed by visitors. Additionally, visitors may simply not have known there were terraces to enjoy due to orientation and wayfinding issues.



View from the Sky Terrace.

Weather may have impacted overall visitation numbers as the terraces were closed several days during the data collection period due to snow.

DC comments indicated that visitors enjoyed being outside, especially when the weather was nice:

*Sat on rock to eat snacks and drinks. Played around the area.
Kids sat in the lounge chairs while Mom checked out the scenery.*

*Spent a long time looking at view and pointing out mountains and other points of interest.
Both smiled a lot up here.*

Many people tried to match up the names of mountains on the map (at Sky Terrace) with what they could see. This led to high levels of talking, reading, pointing, and looking at scenery. Some visitors took advantage of the surrounding vistas and snapped photographs of themselves and/or the landscape.

A few visitors did wayfinding activities on the terraces, and DCs commented:

Went to Land Terrace then back to Past Worlds Terrace referring to map. Went back in when another visitor did. Did not scan their ticket.

Walked down from the Native Voices Terrace. Then thought they should go back up instead of entering on Level 4.

Door not working right to exit. Couldn't get back in from Amphitheatre Terrace.

Recommendations for terraces:

- Increase orientation to the museum and on each level so that visitors are aware of the terraces.
- Increase wayfinding on terraces to assist visitors moving from one level to another or returning inside using ticket scanner.
- Make sure they can get back in.



Terraces link the museum's exhibits directly with Utah's spectacular landscapes.

LABS

There were three labs included in this study: Naturalist Lab on Level 4, Dry Caves Lab on Level 3, and Earth Lab on Level 2. Since Paleo Prep Lab is not a space visitors can enter, it will not be included in this discussion.



Visitors could look through the window into the Paleo Lab, but they could not go in.

Dry Caves Learning Lab and Naturalist Lab had moderately high visitation rates, while Earth Lab had a lower visitation rate (see Figure 29). Visitation numbers could have been affected by Lab closures: DC comments indicated that the Naturalist Lab was closed for at least seven visitors, Earth Lab for nine visitors, and Dry Caves for one visitor.

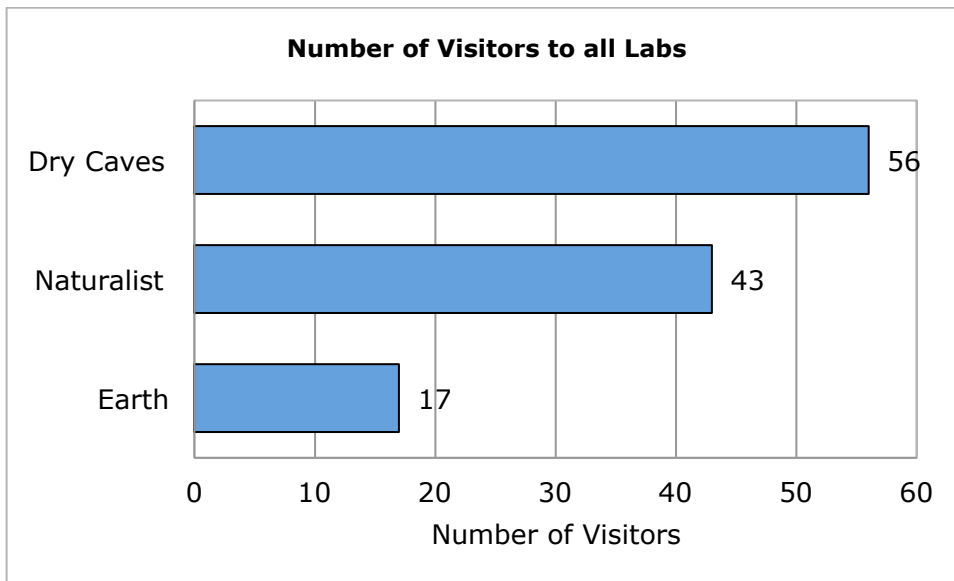


Figure 29. Number of visitors to labs. Dry Caves and Naturalist Lab had around a 50% visitation rate.

In Earth Lab and Naturalist Lab, groups with children visited in higher numbers than adult-only groups. Almost equal numbers of both groups visited Dry Caves.

Visitor activities in the labs were similar to the rest of the museum. There were high levels of talking and reading, while reading out loud, watching others use interactives, and taking photos occurred less frequently.

Two items of note:

- Earth Lab had the highest percentage (47%) of visitors in the whole museum that worked together on an activity.
- Naturalist Lab had the highest percentage (14%) of visitors to talk with a staff or volunteer in the entire museum.

The Labs were popular with families, evidenced in DC comments:

Naturalist lab doing a lot of puppet play with children. Subject & children left puppet table to continue exploring rest of lab with puppets. Put puppets down only when going back to main floor.

Mom worked with children to ID moth/butterfly specimens on the table. Worked with volunteer on id'ing skulls. The girl, who was about 6, worked with the volunteer on all skulls. The 2-year-old lost interest, he and his Mom then worked on other activities in the room, looking at pictures, doing a puzzle, and playing with the stuffed animals.

DCs noted there was sometimes confusion about who the Labs were for or what visitors were allowed to do:

Another visitor says of lab "This is for little kids..." His wife says "Well I'm a little kid. Today." In Naturalist Lab said, "I think they have classes in here." (Didn't want children to touch anything).

One visitor mentioned an activity in Dry Caves as the thing they most wanted to remember:

"The information concerning the owls. Itching it was fascinating. It was a unique thing that you did to bring in the actual owl. To actually get to see and learn what they are all about...all the ins and outs about them. It was very interesting." [46] (This refers to the hawk lecture that took place on October 27, 2012).

Recommendations for lab areas:

- Increase signage and orientation so that visitors feel welcomed to the labs and understand what they can do there.
- Labs offer an opportunity to interact with staff or volunteers.
- Inform visitors at the museum's entrance about special activities taking place in the labs.

“I think the dinosaur exhibit is probably the centerpiece of the museum
so it's always enthralling to walk through that.”

SECTION 4: SELECTED STORIES

4.1 SIX CASE STUDIES

What do visits to the Natural History Museum of Utah look like from the subject’s point of view? To explore that question, this section takes a closer look at six visitor groups from among our sample.



The six subjects were selected because they shared one thing in common—they all made 15 stops during their time at the museum. (Fifteen was the average number of stops made by the entire sample, out of the possible 25 defined for the study.) Beyond that similarity, each group spent a different amount of time at the museum (ranging from 1 hour, 31 minutes to 2 hours, 40 minutes) and varied in all other characteristics—first-time and repeat visitors, group size and makeup, residence and membership status, and on which level they began their visit. See Table 8.

Case Study	Subject	Total time	Total stops	No. in group	Group makeup	Sketch
1 (#D34)	Male, First-time	1:20	15	2	With another adult	Read, talked, took photos; wayfinding issues.
2 (#87)	Male, Repeat	1:31	15	4	With 2 girls (3 and 5) + grandma	Kids led the way, adults talked and helped with interactives.
3 (#36)	Female, Repeat	1:56	15	6	With another adult and 4 young kids	Led group, focused a lot of attention on an active toddler.
4 (#70)	Female, Repeat	1:59	15	2	With 3-year-old son	Talked with and helped child intently. Path was erratic.
5 (#44)	Female, First-time	2:26	15	2	With another adult	Read and did interactives, mostly by herself.
6 (#50)	Female, First-time	2:40	15	8	With 3 other adults and 4 kids	Very engaged with group, talking and doing interactives.

Table 8. Case study profiles. Shows subjects’ demographics and group makeup; total time spent and number of stops made; and a sketch of each group. Details on each group’s visit can be found on the following pages.

The table on this page compares the times spent for all six case study subjects in the eight areas of the museum.

Case Study IDs	CS 1 #D34	CS 2 #87	CS 3 #36	CS 4 #70	CS 5 #44	CS 6 #50
Starting level→	5	2	5	5	2	5
AREA↓						
SKY-NATIVE VOICES	:23	:13	:20	:12	:24	:51
LIFE	:11	0	:23	:13	:11	:23
LAND	:10	:10	:21	:18	:22	:18
GEMS-COLLECTIONS	0	:03	0	0	:05	0
FIRST PEOPLES-GREAT SALT LAKE	:06	:09	:19	:18	:25	:15
PAST WORLDS	:15	:10	:17	:20	:34	:27
FUTURES-BACKYARD	:01	:08	:09	:13	:02	:12
CANYON	:08	:34	:04	:18	:20	:06
Total time	1:20	1:31	1:56	1:59	2:26	2:40

Table 9. Case study visits. The arrows indicate the direction of travel, from Level 5 down to Level 2 or in the opposite direction. If a subject visited an area twice, the times are combined.

In the individual profiles that follow, each subject’s visit is described briefly. The charts track the order (from the first row of the chart to the last) in which that person visited the museum and the exhibit subareas. Case study subjects are presented in order from shortest visit to longest visit.

A few observations jump out from these charts and profiles, while others doubtless can be found.

- Three of the six subjects spent more time in the areas at the beginning of their visits than at the end.
- Like the larger sample, four of these six subjects didn’t make it to GEMS-COLLECTIONS. Those who did started at Level 2.
- Subject #87 (led by the children and with grandma in tow) fairly sped through the museum, making some of the briefest stops. A large part of their visit was spent in the store and café.
- Of the three subjects who visited the FIRST PEOPLES-GREAT SALT LAKE area twice, two of them were having wayfinding challenges.

When reading each of the case studies below, think about what activity or feature in the exhibit environment could be added or strengthened to enhance that person’s visit.

Case Study 1

Area and order visited	Time spent in area	Exhibit subareas and order visited ("spent most time" in bold)
CANYON	:05	
SKY	:23	Sky Terrace
		Sky Exhibits
		Native Voices
		Amphitheatre Terrace
LIFE	:11	Life Main Floor ("diversity of life")
		Dioramas ("human skulls")
FIRST PEOPLES-GSL	:06	First Peoples
		Dry Caves Lab
LAND	:10	Land Main Floor
		Land Walk (erosion table)
FIRST PEOPLES-GSL (2 nd visit)	:01	Great Salt Lake
PAST WORLDS	:15	Dino Walk
		Past Worlds Main Floor
		Paleo Prep Lab
FUTURES-BACKYARD	:01	Utah Futures
CANYON	:03	
TOTAL	1:20	15 stops

(#D34) Male, First-time visitor
Came with one other adult
Spent 1 hour, 20 minutes

This senior couple from Florida began on Level 5. The subject read and talked during his visit, while using relatively few interactives. One exception was the erosion table, which wasn't working, and he asked a staff person for help. The subject had wayfinding problems and feared they had missed something. Seemingly uncomfortable with the "exploration" model of a visit, he remarked, "I can't seem to know whether to go left/right—it's not one straight path. You should have arrows...." He took many pictures of both scenery and exhibits, particularly in Past Worlds. He'd noticed that the store had no postcards, so perhaps he was creating his own record.

He'd like to remember...

"Dinosaurs. I always was intrigued by the size and...it was unbelievable, the dinosaurs. I wonder how they really got extinct, you know, I kind of believe it: I think something hit the earth and wiped them out. Must be, why would they all disappear at the same time otherwise?"

Case Study 2

Area and order visited	Time spent in area	Exhibit subareas and order visited ("spent most time" in bold)
CANYON	:03	
FUTURES-BACKYARD	:08	Carbon Case Backyard (water table)
PAST WORLDS	:10	Paleo Prep Lab Past Worlds Main Floor Dino Walk
FIRST PEOPLES-GSL	:07	Great Salt Lake First Peoples
LAND	:10	Land Main Floor Land Walk (erosion table)
FIRST PEOPLES-GSL (2 nd visit)	:02	First Peoples (Median Village)
GEMS-COLLECTIONS	:03	Collection Storage Collection Wall Gems & Minerals
SKY	:13	Sky Exhibits Native Voices
CANYON	:31	
TOTAL	1:31	15 stops

(#87) Male, Repeat visitor
Came with two girls (5 and 3) and grandma,
Spent 1 hour, 31 minutes

His kids directed this visit, apparently very familiar with the museum. The subject (a museum member) was very comfortable as he allowed the girls to wander freely, sometimes running in opposite directions, a whole level ahead or behind, and never asking them to wait or come back. The adults followed at their own pace, talking a lot together, but also helping the children, working with them on activities, and reading. Walking up from Level 2, the group stopped (perhaps accidentally?) at Gems before taking the elevator to Sky and bypassing Life. Grandma, a first-timer, took a lot of pictures of the building and the exhibits (but none of the children).

He'd like to remember...

"The girls really liked the Dino dig and all the places they could jump around."

Case Study 3

Area and order visited	Time spent in area	Exhibit subareas and order visited ("spent most time" in bold)
CANYON	:04	
SKY	:20	Sky Exhibits
		Sky Terrace
		Native Voices
LIFE	:23	Life Main Floor
		Dioramas
LAND	:21	Land Walk
		Land Main Floor
FIRST PEOPLES-GSL	:19	First Peoples
		Dry Caves Lab
		Great Salt Lake
PAST WORLDS	:17	Dino Walk
		Past Worlds Main Floor
		Paleo Prep Lab
FUTURES-BACKYARD	:09	Backyard [probably]
		Utah Futures
TOTAL	1:56	15 stops

(#36) Female, Repeat visitor

Came with one other adult and four small kids,

Spent 1 hour, 56 minutes

The group began its visit on Level 5. She appeared to lead the group, directing their attention to specific exhibits and explaining the interactives, particularly to the children. She spent a great deal of time interacting with all the children, but one toddler in particular was very active and running throughout the visit, and she worked with this child continuously. She herself did almost no reading, but seemed familiar with the exhibits—enough to point things out to her companions.

She'd like to remember...

"The Native Voices exhibits; I'll have to come back to explore them more. I like all the interactives for the kids. You need a membership to see all the exhibits because there is so much to see and do."

Case Study 4

Area and order visited	Time spent in area	Exhibit subareas and order visited ("spent most time" in bold)
CANYON	:02	
SKY	:12	Sky Exhibits
		Native Voices
LIFE	:13	Amphitheatre Terrace
FIRST PEOPLES-GSL	:13	Life Main Floor
LAND	:18	First Peoples
		Dry Caves Lab
FIRST PEOPLES-GSL (2 nd visit)	:05	Land Main Floor
		Land Walk
PAST WORLDS	:20	First Peoples
		Great Salt Lake
		Dino Walk
		Past Worlds Terrace
FUTURES-BACKYARD	:13	Past Worlds Main Floor
CANYON	:16	Paleo Prep Lab
TOTAL	1:59	Backyard
		15 stops

**(#70) Female, Repeat visitor
Came with 3-year-old child,
Spent 1 hour, 59 minutes**

This subject was very actively engaged with her 3-year-old son—talking with him, pointing things out, helping with interactives and other activities, taking photos, and also finding time to read. They began on Level 5 and their journey through the museum was not straightforward due to wayfinding mix-ups; their 15 stops included two in First Peoples when they first went into Land, then backtracked to get to Past Worlds. The child was most interested in dinosaurs, even asking to “build a dinosaur” at the Earthquake interactive.

She’d like to remember...

“The interactive displays that I experienced with my son. Given that he is my last child, I’m trying to do more than I was able to do with my others...that I was able to afford. So I’m trying to remember where there are learning points for him that maybe he couldn’t get involved in this time, but that he can get involved in at a later time. I felt like they were a little too old for him right now. Maybe when he is around the age of 4 or 5, I could bring him back and he would have the patience to sit through.”

Case Study 5

Area and order visited	Time spent in Area	Exhibit subareas and order visited ("spent most time" in bold)
CANYON	:02	
FUTURE-BACKYARD	:02	Carbon Case
PAST WORLDS	:34	Paleo Prep Lab
		Past Worlds Main Floor
		Dino Walk
FP-GLS	:25	Great Salt Lake
		First Peoples
LAND	:22	Dry Caves Lab
		Land Main Floor
LIFE	:11	Land Walk
		Life Main Floor
SKY	:24	Dioramas
		Native Voices
GEMS-COLLECTIONS	:05	Sky Exhibits
		Gems & Minerals
CANYON	:18	Collection Storage
TOTAL	2:26	15 stops

(#44) Female subject, First-time visitor

Came with one other adult,

Spent 2 hours, 26 minutes

An out-of-state visitor, this subject read thoroughly throughout her visit and used many of the interactives. She and her companion were often separated: They talked less frequently together than did other case study subjects, although she talked on her cell phone several times. Occasionally, the pair would meet and do something together such as the Earthquake or Cell interactives. They started their visit on Level 2, working their way gradually up to Level 5, then stopped briefly in Gems on their way down.

She'd like to remember...

"All of the experiential exhibits, the interactives; they encouraged you to think scientifically. Also, the special focus on Utah."

Case Study 6

Area and order visited	Time spent in area	Exhibit subareas and order visited ("spent most time" in bold)
CANYON	:06	
SKY	:51	Sky Exhibits
		Sky Terrace
		Native Voices
LIFE	:23	Life Main Floor
		Dioramas
LAND	:18	Land Walk
		Land Main Floor
FIRST PEOPLE-GLS	:15	First Peoples
		Great Salt Lake
PAST WORLDS	:27	Dino Walk
		Past Worlds Main Floor
		Paleo Prep Lab
FUTURES-BACKYARD	:12	Earth Lab
		Backyard
		Carbon Case
TOTAL	2:40	15 stops

**(#50) Female subject, First-time visitor
Came with four adults and four children,
Spent 2 hours, 40 minutes**

Special interest in "plant life, global warming, and the human impact on global warming."

Very engaged with her large group during their long visit—talking frequently to the other adults and doing interactives with the children. In Life, they did a special activity with a volunteer, discussing the skulls in Our Family Tree. Subject separated from the others in Land to read and do the interactives thoroughly on her own, then rejoined the group for the rest of the visit. They spent the most time on Level 5, where she watched the Native Voices video and took pictures on Sky Terrace, but seemed to spend her time mostly discussing the exhibits with the other adults.

She'd like to remember...

"The company, the experience of going through the museum together."

What can we learn from this Case Study exercise?

An individual visitor's museum experience is a unique mix of social, personal, and physical factors; there is no "average" visit. Whether the visitor is a first-timer or repeat, comes with a large or small group, or stays a long or short time, each one will make his or her choices based on individual preferences and other personal circumstances as well as the environment designed by the museum.

While the museum can study and learn about visitor behaviors and needs, we have little control over which visitors come and what their motivations might be. But taken together as a population of visitors, we see the patterns of similarities and trends that help us make decisions about the many things we do have control over—e.g., exhibits, texts, programs, traffic flow, wayfinding, marketing, and remediation of existing exhibits and planning new ones.

All the components of any one visit work together to afford learning. As exhibit developers, we try to offer a variety of ways to engage (reading, interactivity, videos, etc.), provide comfort in the form of adequate wayfinding and seating, and help visitors feel successful so that they have meaningful and memorable visits that they want to repeat no matter who they are or how long they stay.

4.2 SEVEN ADULT-ONLY REPEAT VISITORS

Many visitors come to NHMU with children. In fact, a majority of repeat visitors include groups with children, and members are more likely to come with children. Since the museum seems to have successfully encouraged visitors with children to be repeat visitors, we were curious about what characterized adult-only repeat visitors (AO-Rs), which consisted of 7 people out of our sample of 48 repeat visitors. What features might help the museum to satisfy this group and assure that more of them come back?



Adult-only groups make up a special audience with a lot of potential for repeat visitation and staff contact.

Overall, there were many similarities in the AO-R group of visitors compared to all the others: Demographically, they are similar to the total sample in terms of gender and residence. Most came in groups of two or three, as opposed to alone or in a larger group. They spent a similar range of time in the museum to the total sample—from 1 hour to slightly more than 3 hours—and averaged almost the same stay time, 1 hour and 57 minutes.

They made an average of 14 stops in the 25 exhibit subareas during their visits—about the same as for all visitors, who averaged 15 stops. Five of the seven missed or skipped the GEMS-COLLECTIONS area, same as the overall audience trend. And every AO group did some interactives, the same as the overall sample.

Subject #	91	67	56	55	42	13	1	AVG
Start Level	5	5	2	2	5	5	2	
Number of Areas Visited	6	5	7	5	6	5	6	
Number of Stops	13	10	18	13	16	12	16	14
FUTURES- BACKYARD	0	:02	:04	:06	:03	0	:06	
PAST WORLDS	0:9	:26	:18	:12	:27	:07	:23	
FIRST PEOPLES- GREAT SALT LAKE	:23	:18	:17	:13	:26	:07	:15	
GEMS- COLLECTIONS	:07	0	:06	0	0	0	0	
LAND	:21	0	:08	:09	:27	:13	:21	
LIFE	:31	:29	:10	:08	:35	:10	:03	
SKY-NATIVE VOICES	:27	:26	:30	0	:49	:15	:28	
Total Time	2:22	2:31	1:41	1:07	3:04	1:00	1:52	1:57

Table 10. AO-R visitors. This table shows all AO-R subjects, the number of stops they made (of the 25 possible subarea stops that were defined), and the times they spent in the seven different levels or areas of the Museum during their visits, as well as on their overall visit. The CANYON is not included in this tally. (Total time includes time spent in other areas not mentioned on this table.)

There were a few trends that may suggest some differences between AOs and AKs:

- Only one of the AO-Rs was a member of the museum, whereas repeat AK visitors were often members.
- Only one in seven stated a special interest in natural history. The rate was somewhat higher (one in four) for the whole sample and for groups of all repeat and first-time visitors.
- They looked at the Carbon Case at a higher rate (5 in 7) than did the overall sample (29 in 100). Four of the AO-Rs that stopped at the case read and talked while there, and one tried to use his cell phone for a Trailhead item.

Several trends could reflect the lack of children in these groups. In the FUTURES-BACKYARD area, AO-Rs didn't stop or made very short visits at Our Backyard, because that area was designed for children. While AO-Rs did many interactives themselves, they were less likely to watch or assist someone else to do them. They were also more likely to talk with staff members or volunteers. Finally, though the sample size is very small, three of the seven AO-Rs showed some interest in using their cell phones for the Trailhead computer, a higher rate than for the general sample.



The road leading to the museum could use better directional signage for first-time and repeat visitors.

Two other notable findings from the seven AO-Rs were included in their remarks to the data collectors:

- Three expressed complaints about their experience: They couldn't get the Trailhead link to work; they couldn't find their way from Level 5 to Level 4; or they had a hard time finding their way to the museum itself (despite having visited before) because they didn't see enough street signs.
- Four of the AO-R visitors brought newcomers with them to see the museum. This data was captured anecdotally, i.e., they mentioned this fact on their own, so data on this issue for all subjects is not complete. But this finding might capture one of the major motivations for these adult-only groups to return to the museum.

In the exit interview, four of the AO-R responses reflected thematic responses:

"The tools and resourcefulness we have as human people. Homage to the first peoples, not just in archaeology but as shown in Native Voices. Also, acknowledgement of global warming." [91]

"How much of the building is covered with solar cells and where did all the salt in Utah come from." [1]

"I would like to remember more of the geology stuff, the rocks. They need more of it, more in-depth information." [13]

"The dinosaurs, and the architecture and solar panels. I want to know more about the architecture and design." [67]

One subject who was NOT an AO-R but was in an AK group expressed an interest in coming back alone, without the kids.

"I'd actually like to come here by myself sometime and have a chance to read the exhibits." [89]

Recommendations:

- Keep up the good work that has appeal to a broad audience, for example, the way the interactives have appeal to adults as well as kids.
- Since the Trailhead computer was potentially of greater interest to these AO visitors, improving its workability might be helpful to appeal to this group.
- Advertise other things that might appeal to AO audiences, such as quieter visiting hours, thematic tours, or special events.

SECTION 5: CONCLUSIONS

5.1 CONCLUSIONS AND RECOMMENDATIONS

Evidence from what people did and said gives us information about the strengths and the challenges of the Natural History Museum of Utah experience, both as a whole and within specific areas and exhibits. First we will consider the things that are working well—the strong points—and then we'll suggest opportunities for improvement that address the challenges and issues that arose from the data.

Strengths

The strengths include the building's beautiful architecture, the views out of the windows and from the terraces, and the look and feel of the spaces, along with the flow of the themes, especially the focus on Utah. Considerable evidence supports that the exhibits are engaging, and people read, talk, point, and learn together in adult groups and as families. Families especially enjoyed the interactive and hands-on activities, and parents liked watching their children being engaged.

When visitors return to the museum, they often revisit favorite places that are spread throughout the building, and they bring friends and family from out of town. Some families with young children made a beeline for the Our Backyard exhibits, where kids might spend extended amounts of time with the stream.

The "whole-museum" experience was primary for most groups, evidenced by the number of areas people covered in one visit. For most people the amount of things to do was not overwhelming, although some people ran out of time before they got to see it all.

On Level 5, when people went out on the terrace to enjoy the scenery, they learned about the building's solar panels. Visitors enjoyed finding out about Native Americans' dances and languages and where they lived, as well as seeing the archaeological evidence for ancient people's artifacts, tools, and skills in First Peoples. Visitors of all ages engaged with the DNA, cells, taxidermy mounts, live animals, and dioramas in the LIFE area. They learned about changes through time of early humans, ancient seas and rocks, landforms and plants. Visitors pointed at, talked about, and took photos of the dramatic dinosaurs, played with the fossil and bone puzzles, and listened to different theories of what happened at the Cleveland-Lloyd dig site.

Opportunities

Repeat visitors, a group the museum hopes to cultivate and grow in the future, cited several reasons for coming back, including to answer a question, to look for something new, to show off the museum to friends who've never been there, and to bring the kids to play for the afternoon. Keeping the interactive exhibits in working condition is foremost for these visitors, who could be disappointed to find a favorite one out of order.

Currently most repeat visitors are in family groups, but there is an opportunity for the museum to grow its adult-only visitors as repeat visitors. Marketing campaigns could highlight the quietest times of the museum (low visitation, no school groups) when adults could feel relaxed and unpressured in an environment conducive to reading, discussing, and using the interactives without competing with a 4-year-old. Marketing can continue to highlight the museum as a dramatic new "adults, too" destination, because many adult groups seemed to bring out-of-town visitors.

Marketing the special exhibits to NHMU members and audiences that most closely relate to the topics of those exhibits could keep that space truly special for them and not take time away from a casual first-time visit to the whole museum. If people try to squeeze another 7,000 square feet into their visit, the experience could become diluted, rushed, or incomplete.

The demographics of the study's sample show an absence of Utah residents who live 50+ miles from the museum. Are they a target audience to be developed, possibly through roadside advertising along interstate Routes 80 and 15? The focus on Utah and its natural landscapes seems like a possible draw for those visitors.

Challenges and issues

The biggest challenge to visits for some people, especially first-time visitors (but not restricted to them), is finding their way. The Level 1 entry area lacks any orientation information; the brochure handout is complicated at first glance; and directions for how to use the building (start at the top and work down?) are inconsistently offered by visitor services. If visitors don't know the basics of what is here, where to start, and what the place is about, they can waste precious time and energy being confused or wondering (where am I?) or feeling inadequate (what did I miss?). Visitors who are properly oriented and know where they are going are more likely to feel comfortable during their visit and be available for learning.

Better wayfinding aids are needed on Level 1; in the CANYON (especially getting off the elevator and at the ticket-taking spot); at the entrance to the exhibits near Utah Futures; on Level 5, getting from LIFE to LAND on the ramp; finding GEMS-COLLECTIONS; finding the bathrooms on Level 3 near LIFE; and getting onto and off of the terraces. While there is a natural flow in the building architecture that visitors are following, many visitors were confused about where they were and how they got there. This confusion can distract visitors and detract from an overall positive museum experience.

Other challenges were created by little interruptions—a broken interactive, confusing label text, misleading displays—that can nonetheless have a big impact on visitors' feelings about themselves or the museum. For example, *Is it me, or is something wrong with this interactive?* (at the seismic jump). *The label says it's a "live feed" but I'm noticing a repeating pattern of the same visual sequence* (at the Helioscope exhibit). *How do I get this to work?* (Trailhead cell phone).

To achieve the goals of communicating the themes and messages about evolution, ecology, biodiversity, and energy flow—which do not seem to be coming through strongly in our investigative exit interviews—it will take more discussion with NHMU staff members and remediation of area introduction labels, for starters.

Likewise, the unifying theme of keratin in the LIFE area might be an obtuse message to most people, and it would take some remediation to clarify it, if it is important.

To achieve the goal of having every visitor make contact with a staff person—other than at the ticket desk on Level 1, or in the labs with demonstrations—the roving interpreters probably need more training in the best ways to initiate or invite interactions with casual visitors on the exhibit floor.

Recommendations

Specific recommendations were made in this report in the different sections where we reviewed the data by levels. They are briefly summarized again below, starting with conceptual and physical orientation issues:

- Rewrite introductory label in the CANYON to make it more relevant to the visitor experience in the whole museum.
- Increase directional signage in the CANYON, especially where people get off the elevator by the store, but also elsewhere to clearly mark pathways to stairs and elevators at the back of the CANYON.
- Improve wayfinding for the important hub of traffic circulation and confusion at FIRST PEOPLES-GREAT SALT LAKE.
- Increase directional signage to bathrooms, diorama area, terrace, and entry from LIFE to the ramp for LAND.
- Get people to use the labs more by leaving the games and activities on the tables so that the area looks inviting.
- Make doors to the terraces more obvious, so people will know they can go out there. Make sure directions are clear and electronics are working so they can get back in.
- Tie the Carbon Case to the levels. Reinterpret it to make it serve as an introduction and/or wrap-up conclusion for the energy flow concept in the museum.
- Put an introductory sign at Our Backyard to inform visitors about the special purpose and audience for this space.
- Fix or move or make a program out of the highly attractive and memorable Helioscope exhibit, which currently has misleading interpretive text.
- Interpret the computer interactive that is next to the Island Biogeography text label to avoid confusion between those two exhibits.
- Keep up to date with repairs and spare parts for the popular Erosion Table and Earthquake interactives.
- Remediate the directions for the seismic jump activity to make sure more people understand what to do and are successful at the interaction.
- Interpret the vantage point of the Ice Age Dinner Party for its place in geologic time, i.e., note the similar Pleistocene animals overhead.
- Make a photo-op site next to the human skulls exhibit—and at other places.
- Rewrite the last paragraph in the Past Worlds Main Floor introductory label to be the first. People want to know how special Utah is!
- Increase comfort for the little ones by adding a juice box break in or near the Naturalist Lab.
- Put steps or stools near some of the sniff/smell activities so younger children can reach them or remount some lower so people in wheelchairs can use them.
- Clarify the purpose and process of using the Trailhead computer. Make the in-house and outside opportunities/choices for exploration more separate and distinct.
- Continue to increase staff engagement with visitors in lab areas.

5.2 NEXT STEPS

The data collected in this study form a solid basis for asking more research questions and provide a database for comparisons with future studies.

- The next logical step in evaluating the effectiveness of the NHMU exhibits is to develop a short and clear list of intended message objectives against which a more thorough exit interview study can be planned, administered, and analyzed. Review the original intended content themes. State the afforded content themes in full “big idea” sentences, then translate them into visitors’ language.
- It is probably not a bad idea to do some fixes and remediations to freshen and tighten orientation and conceptual designs before a thorough exit survey is done with visitors. Strengthening the suite-of-exhibits flow is recommended.
- We strongly suggest that the museum sample the demographics of its visitors on a regular basis, e.g., four times a year, to get a true understanding of the seasonal and annual trends or significant changes in visitor numbers and characteristics. Data that will add to samples already made for WMTS and STS include: Gender; visit status (first-time at new building/repeat); membership status; zip code; group make-up (adults only/adults with kids). Additional data could include University affiliation and group size (# adults/# kids). Other questions could include motivation for coming to the museum today (e.g., see exhibits in Special Exhibition Gallery, program, bring friends from out of town).
- Visitor studies should be done on every new show in the Special Exhibits Gallery to gauge the effectiveness of this area and its relationship to the rest of the museum. Do people go through quickly if they are returning to the museum to see something new plus revisit their old favorites? What percentage of guests goes through the special shows thoroughly? Does the special exhibit distract first-time visitors from the rest of the museum—especially if two hours for the whole visit is, in fact, a typical time budget that’s unlikely to change?

The next steps for the evaluators are to increase their proficiency in using iForm, both in the data collection process and in streamlining access to the data for analysis. For details, see Appendix 6.

5.3 THANKS

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(Sound of clapping)

5.4 REFERENCES

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5.5 APPENDICES

Available on request from NHMU:

- 1 MASTER EXCEL SPREADSHEET
- 2 SCRIPTS FOR RECRUITMENT AND INTERVIEW
- 3 iFORM SCREEN SHOTS
- 4 AO AND AK, F AND R % OF ACTIVITIES BY AREA
- 5 EXIT INTERVIEW CONTENT CHARTS
- 6 IDEAS FOR FACILITATING iFORM DATA COLLECTION AND ANALYSIS