Museum Visitor Studies, Evaluation & Audience Research
Randi Korn & Associates, Inc.
118 East Del Ray Avenue
Alexandria, VA 22301

# Summative Evaluation: *Altered State: Climate Change in California* Exhibition

***Prepared for the***
**California Academy of Sciences**
**San Francisco, CA**

# TABLE OF CONTENTS

# LIST OF TABLES AND FIGURES

# EXECUTIVE SUMMARY

## INTRODUCTION

This report presents the findings from a summative evaluation of *Altered State: Climate Change in California* conducted by Randi Korn & Associates, Inc. (RK&A) for the California Academy of Sciences (the Academy). RK&A conducted observations to examine the duration of time spent at individual exhibits, time spent in the exhibition as a whole, and behaviors. Interviews were conducted to examine visitors' overall experiences and the meaning they gleaned from the exhibition. The summary below highlights key findings.

**Selected highlights of the study are included in this summary.**
**Please consult the body of the report for a detailed account of the findings.**

## PRINCIPAL FINDINGS: OBSERVATIONS

RK&A conducted timing and tracking observations with 111 visitors, ages 9 years and older, in August 2009.

### DATA COLLECTION CONDITIONS

- A majority of observations took place on weekdays (71 percent). More than one-half of visitors experienced a moderate level of crowding.

### VISITOR DESCRIPTIONS

- Slightly more males than females were observed (56 percent and 44 percent, respectively). Eighty-six percent of visitors observed were adults.
- Nearly one-half of visitors attended the exhibition in an adult-only group (45 percent), while one-third visited in a group comprised of adults and children.
- Of the visitors accompanied by children, 43 percent were accompanied by children 9 to 11 and 41 percent by children 5 to 8.

### OVERALL VISITATION PATTERNS

- Visitors' total time spent in the exhibition ranged from 17 seconds to 39 minutes and 27 seconds, with a median time of nearly four minutes.
- About one-half of visitors spent between one and five minutes in the exhibition. One-quarter spent between six and 10 minutes in the exhibition.
- Males spent more time in the exhibition than did females (median time of five minutes vs. 2.5 minutes).
- *Altered State* included 39 exhibits at which visitors could stop. Visitors stopped at between one and 23 exhibits, with the median being five exhibits.
- Males made more stops than did females (median of six stops vs. three stops).

### VISITATION TO EXHIBITION SECTIONS

- Overall, visitors stopped in a median of three sections. The Impact Module: Changing Oceans attracted the most visitors (75 percent), followed by the Arena for Engagement (67 percent).
- The Impact Module: Endangered and Extinct Organisms attracted the fewest visitors (42 percent).
- Males stopped in more sections than did females (median of three sections vs. two sections).
- Visitors spent the most time in the Arena for Engagement (median time = 2 minutes, 11 seconds).
- Visitors spent the least time in the Impact Module: Endangered and Extinct Organisms (median time = 38 seconds).
- Of the five sections, visitors made the most stops in the Arena for Engagement (median = three stops), and made a median of one stop in all other sections.

### VISITATION TO INDIVIDUAL EXHIBITS

- Visitors spent the most time at Carbon in Our Lives (median = 1 minute, 21 seconds).
- Visitors spent the least time at Doing Things Differently: Plant a Tree, Help the Planet (median = 10 seconds).
- The exhibit at which the most visitors stopped was the Carbon Café (41 percent).
- No visitors stopped at the Hey! What Can We Do? A Vision for the Bay panel.

### BEHAVIORS

- The most commonly observed behaviors were discussing exhibit content, pointing to/looking at specimens, and using interactives (59 percent, 59 percent, and 41 percent, respectively).
- Few visitors took sustainability cards or looked at the floor graphics (6 percent and 4 percent, respectively).
- No visitors were seen misusing exhibits, suggesting that the interactives were intuitive to use and engaging.

## PRINCIPAL FINDINGS: ON-SITE INTERVIEWS

RK&A conducted in-depth interviews with 44 visitor groups, ages 18 years and older, in August 2009.

### DEMOGRAPHICS

- 55 percent of interviewees were female and 45 percent were male, with a median age of 46 years.
- Roughly one-half of interviewees were accompanied by children, who ranged in age from 2 to 17, with a median of 9 years.

### OVERALL EXPERIENCE

- Overall, interviewees described the exhibition as interactive, memorable, and thought-provoking.
- Several interviewees praised that the exhibition "raises awareness."

### SPECIFIC EXHIBITS/SECTIONS

- The Carbon in Our Lives interactive was mentioned by interviewees unprompted, meaning they discussed this exhibit before being asked specifically about it. Overall, interviewees experienced the Carbon in Our Lives as interactive, highly educational, and engaging. The interview data suggest that this exhibit was not simply hands-on, but "minds-on" as well.
- The Polar Ice: Critical Zone interactive was confusing for interviewees; they did not know how to operate the exhibit. As a result, few understood the exhibit's core message.
- The Tag Board exhibit, in which visitors can provide handwritten comments and ideas about climate change on a discussion board, was moderately successful. Some interviewees experienced this exhibit as personal and reflective. Others referenced specific postings made by other visitors, which indicates they had not only posted a comment but also spent time reading the existing postings.

### EXHIBITION LAYOUT

- Some interviewees expressed a preference for an exhibition providing more guidance and direction; a few of these suggested adding an introductory area. Analysis indicates that visitors were in search of a cognitive framework, rather than a deliberate, guided path through the exhibition.

### UNDERSTANDING OF OVERALL MESSAGES

- Overall, the majority of interviewees understood that the subject of the exhibition was climate change. The depth and sophistication of interviewees' explanations varied, but most could accurately identify the exhibition's core subject matter.
- In terms of the Museum's intent, most interviewees discussed the Academy's intent to raise awareness about climate change and to promote ideas and solutions to help prevent and slow climate change. The responses ranged in their level of sophistication and reflection.
- Nearly all interviewees did not perceive the exhibition's focus on California; they did not see a connection between the California exhibits and the subject of climate change.

### LEARNING ABOUT CLIMATE CHANGE

- Most interviewees learned something new about climate change. For example, interviewees referenced the rapid rate of climate change, spring's early arrival, changes in animal migration patterns, and fires.
- Several interviewees said they had not learned anything new about climate change and said the exhibition reinforced ideas they already knew.
- A few interviewees did not learn anything new about climate change and said they would prefer that the exhibition provide more scientific data.
- Most interviewees were able to cite evidence of climate change, including droughts, floods, and rising sea levels.

### SOLUTIONS TO CLIMATE CHANGE

- Most interviewees were able to cite solutions to climate change. Many named examples such as limiting the use of wrapping paper, while some cited generic solutions such as recycling.
- The majority of interviewees were pleased with the range of solutions provided in the exhibition and described them as "helpful." Several, on the other hand, requested more ideas for individual behavior change.

- Many interviewees did not perceive the solutions exhibited as cutting-edge. However, some viewed particular solutions as inventive; reducing meat intake and using denim as insulation were cited.

### AFFECTIVE RESPONSE TO THE EXHIBITION

- Most interviewees expressed positive opinions of the exhibition's presentation of climate change, describing it as balanced and informative. Furthermore, these interviewees' affective response to the exhibition was highly positive; they felt that climate change is daunting and a real and pressing issue, but they also articulated that individual behavior changes can make a significant difference.
- Several interviewees said the exhibition's approach to climate change was unbalanced or inaccurate (e.g., "too sensational").

# DISCUSSION

Overall, visitors had engaging, thought-provoking experiences in *Altered State: Climate Change in California*. Specimens and interactive exhibits such as the Carbon Café were key to visitors' positive experiences. In terms of learning, the majority of interviewees said they had learned something new about climate change and were able to cite solutions to the problems. Furthermore, interviewees' affective and attitudinal responses to the exhibition are noteworthy; visitors echoed the core message that individuals can make a significant difference by changing their behavior. While the exhibition was successful on a number of levels, the study identified aspects worthy of remediation: the exhibition layout and orientation, the Polar Ice: Critical Zone interactive, and the need for additional scientific information for skeptics and knowledgeable visitors.

## EXHIBITION DESIGN

*Altered State: Climate Change in California* is a good example of an exhibition that balances elements of an informal learning setting (e.g., intentionally designed settings for learning about science) with those of an everyday setting (e.g., unpredictable and spontaneous science learning that occurs in everyday life) (National Research Council, 2009). The open design allows visitors to follow their individual interests rather than a planned exhibition path; thus, *Altered State* is truly an informal, free-choice learning environment that mirrors everyday learning. However, while the overall design creates a discovery learning environment, the multiple entry and exit points hamper learners who desire a clear structure. Many interviewees said the exhibition layout prevented them from understanding "the big picture." Adding select partitions to *Altered State* might alleviate this issue by creating a more structured learning environment. Furthermore, since partitions would reduce the number of entrance and exit points, it is possible that visitors would spend more time at individual exhibits and in the exhibition as a whole. Classic studies from the 1930's demonstrated that when visitors see an exit they will leave the exhibition—an effect called the "exit gradient" (Melton, 1935). By blocking the sightlines to the café and turning visitors' attention inwards toward the exhibition, the holding time of *Altered State* could be greatly improved. Additionally, the inclusion of additional seating, especially at videos, may help visitors slow down in the exhibition.

## INTRODUCTION

As soon as visitors walk into an exhibition, they are on a sense-making mission, wanting to know the basics of the exhibition—including its central thesis (Grayburn, 1977). Along these lines, some *Altered State* interviewees desired an overarching conceptual framework—a few specifically mentioned the absence of an introductory area—while others wanted, but could not identify, clear connections among the exhibition's core messages and many themes. Introductory panels are imperative. They can set the conceptual stage for visitors, and if they are well written, they can convey the overarching concepts and intent of an exhibition and connect sub-themes. Although interviewees gleaned aspects of *Altered State*'s intended messages, they currently perceive disparate themes and do not comprehend the exhibition's overarching concept (i.e., the exhibition's focus on climate change in California). Visitors' need for a conceptual orientation is consistent with RK&A findings in many other evaluations, including the Academy exhibition *Water is Life* (RK&A, 2008).

## INDIVIDUAL EXHIBITS

Overall, the data suggest that the interactives in the Arena for Engagement are effective; of the five sections, visitors spent the most time in the Arena for Engagement and made a median of 3 stops (versus one stop in the other sections). The interactive exhibits are successful in reaching adults and children alike, as adults were as likely to use interactives as were children.

Among the interactives in the Arena for Engagement, a distinction can be made between exhibits that were hands-on and those that were "minds-on"; the interview and observation data suggest that a couple of the exhibits are minds-on (Carbon in Our Lives and Carbon Café) while others are hands-on (Polar Ice: Critical Zone media interactive). Hands-on exhibits can engage visitors; they offer a tactile experience while communicating a concrete and thought-provoking message. The Carbon Café and Carbon in Our Lives are highly successful in this regard. Visitors spent the most time at Carbon in Our Lives (median = 1 minute, 21 seconds), and Carbon Café attracted the highest number of visitors. While interviewees who visited these two exhibits discussed the exhibits in detail and understood their core messages, those who visited the Polar Ice: Critical Zone interactive expressed confusion about how to use the exhibit and could not discuss the exhibit's intent or overall message. The interview data suggest that both the instructions and the activity need to be clarified for visitors. Furthermore, Polar Ice: Critical Zone needs to help visitors understand how the exhibit activity connects to its main message.

In light of the successes of the Carbon Café and Carbon in Our Lives, Academy staff wondered if they should add other interactive exhibits to *Altered State*. Staff should think about what makes these two exhibits compelling—their large-scale size, low-tech feeling, highly relevant content—and apply these qualities to other exhibits that would benefit from hands-on experiences. It is also worth noting that visitors also frequently looked at specimens. Other studies RK&A has conducted have demonstrated that natural history museum visitors highly value authenticity and seeing "the real thing" (RK&A, 2009; Korn, 1995). That said, exhibitions that provide a range of experiences—text to read, videos to watch, specimens to look at, and interactives to use—work best for visitors (RK&A, 2000). Too much of any one thing in an exhibition, whether text, graphics, or interactive, can seem monotonous and negatively affect the quality of visitors' experiences.

## VISITORS' AFFECTIVE AND LEARNING EXPERIENCE

One of the resonant successes of *Altered State* was visitors' attitudinal and affective response to the tone of the exhibition. Interviewees said the presentation of climate change was balanced and noted that while climate change is daunting, it is possible for individuals to change their behaviors and reverse the situation. Thus, *Altered State* is successful in conveying that individual behavior changes can make a difference.

*Altered State* was less successful in affecting visitors who have a sophisticated understanding of climate change or those who are skeptical of climate change. While it is nearly impossible to change the minds of visitors who vehemently deny climate change is happening, the exhibition has a role to play for visitors who are skeptical about certain aspects of the issues, for example, the role of humans or the rapid pace of climate range. To accommodate visitors' varying science information needs, consider placing the science panels and multimedia that explain the evidence for climate change in more prominent locations. Also consider discussing how scientists know what they know about climate change to emphasize the multiple lines of evidence supporting climate change.

## RECOMMENDATIONS

- Modify the exhibition's layout to encourage longer dwell times.
- Provide conceptual and physical orientation to the exhibition via the exhibition layout and an introduction area or text panel. Reinforce the organizational structure through section headers and graphics/text at individual exhibits.
- Bolster the connection between climate change and California.
- Remediate or remove the Polar Ice: Critical Zone exhibit.
- Provide seating at key videos.
- Consider moving the side panels that present science to more prominent positions (e.g., rather than placing them on the sides of the modules, place them on the large, main surface).
- Consider for skeptics and visitors wanting more in-depth information, exhibits that address how scientists study climate change and the growing body of evidence.

## REFERENCES CITED


Grayburn, N. (1977). "The Museum and the Visitor Experience" in *The Visitor and the Museum.* (Ed. Linda Draper). Washington, D.C.: American Association of Museums.

Korn, R. (1995). An Analysis of Differences Between Visitors at Natural History Museums and Science Centers. *Curator. 38*(3): 150-160.

McLean, K. (1993). *Planning for People in Museums.* Washington, D.C.: Association of Science-Technology Centers.

Melton, A. (1935). *Problems of Installation in Museums of Art.* American Association of Museums Monograph New Series No. 14. Washington, D.C.: American Association of Museums.

National Research Council. (2009). *Learning Science in Informal Environments: People, Places, and Pursuits.* Committee on Learning Science in Informal Environments. Washington, DC: National Academy Press.

Randi Korn & Associates, Inc. (2000). Summative Evaluation: Executive Summaries, Discussion, and Recommendations for Life Tech Gallery, Innovation Gallery, Exploration Gallery, Communication Gallery. Unpublished manuscript. San Jose, CA: The Tech Museum of Innovation.

Randi Korn & Associates, Inc. (2008). *Water is Life* Summative Evaluation. Unpublished manuscript. San Francisco, CA: The California Academy of Sciences.

Randi Korn & Associates, Inc. (2009*).* Audience Research: Visitor Engagement and Learning Preferences Survey. Unpublished manuscript. Los Angeles, CA: Natural History Museum of Los Angeles County.

# INTRODUCTION

This report presents the findings from a summative evaluation of *Altered State: Climate Change in California* conducted by Randi Korn & Associates, Inc. (RK&A) for the California Academy of Sciences (Academy). RK&A conducted this evaluation to examine the extent to which the exhibition achieved its intended impacts. Data for this study were collected in August 2009.

Specifically, the summative evaluation explores visitors':

- Overall experiences in the exhibition, including peak experiences and low points;
- Use and understanding of individual exhibits, including the Carbon in Our Lives, Tag Board, and Polar Ice: Critical Zone interactive;
- Perception of the exhibition's overall messages;
- Perception of the exhibition's intent;
- Learning about climate change;
- Affective and intellectual responses to the exhibition's treatment of climate change;
- Time spent in the exhibition as a whole and at individual exhibits;
- Exhibits at which visitors spent the most amount of time and least amount of time; and
- Behaviors at individual exhibits.

## METHODOLOGY

RK&A used two data collection strategies to assess visitors' experiences in the exhibition: observations and in-depth interviews.

### OBSERVATIONS

Visitor observations provide an objective and quantitative account of how visitors behave and react to exhibition components. Observational data indicate how much time visitors spend within the exhibition and suggest the range of visitor behaviors.

Visitors 9 years and older were eligible to be unobtrusively observed in the exhibition. The data collector selected visitors to observe using a continuous random sampling method. In accordance with this method, the observer stationed herself at the exhibition's entrance and selected the first visitor to enter the exhibition. Since *Altered State* does not have a designated entrance, the observer intercepted visitors at the exhibition's southeast corner. Observers recorded select behaviors, total time spent in the exhibition, and sub-times spent at individual exhibits. Upon completing the observation, the observer then returned to the entrance to await the next eligible visitor to enter the exhibition (see Appendix A for a more detailed description of the observation protocol).

### INTERVIEWS

RK&A used in-depth interviews to examine visitors' experiences in *Altered State*.

Open-ended interviews produce data rich in information because interviewees are encouraged and motivated to describe their experiences, express their opinions and feelings, and share with the

interviewer the meaning they constructed during a visit. Upon exiting the exhibition, visitors 18 years and older were eligible to be selected for participation in an interview following a continuous random sampling method. In accordance with this method, the interviewer stationed him or herself at the exhibition's exit and selected the first eligible adult to exit the exhibition. Since *Altered State* does not have a defined exit, the interviewer intercepted visitors across from the Museum café, at the exhibition's northeast corner. When the visitor agreed to participate, the interviewer invited him or her to answer several questions about their exhibition experience (see Appendix B for the interview guides). When visitors were accompanied by others, they were invited to share their responses. Each interview guide was intentionally open-ended to allow interviewees to discuss what they felt was meaningful. Interviews were audio-recorded with participants' permission and transcribed to facilitate analysis.

## DATA ANALYSIS

### QUANTITATIVE ANALYSIS

Observation data are quantitative and were analyzed using SPSS 12.0.1 for Windows, a statistical package for personal computers. Analyses included both descriptive and inferential methods. Within the body of the report, only statistically significant findings ($p \leq .01$) are presented.[1]

#### *DESCRIPTIVE STATISTICS*

Frequency distributions were calculated for all categorical variables. For ratio-level variables, such as "total time in the exhibition," summary statistics, including the range and median (data point at which half the responses fall above and half fall below), were also calculated.[2]

#### *INFERENTIAL STATISTICS*

To examine the relationship between two categorical variables, cross-tabulation tables were computed to show the joint frequency distribution of the variables, and the chi-square statistic ($X^2$) was used to test the significance of the relationship. For example, "age" was tested against "time spent at exhibit" to determine whether the two variables are related. To test for differences in the medians of two or more groups, the nonparametric Kruskal-Wallis (K-W) test was performed.[3] For example, "total time in the exhibition" was compared by "age group" to determine whether time spent in the exhibition is age-related.

---

[1] When the level of significance is set to $p = 0.01$, any finding that exists at a probability ($p$-value) $\leq 0.01$ is "significant." When a finding (such as a relationship between two variables) has a $p$-value of 0.01, there is a 99 percent probability that the finding exists; that is, 99 out of 100 times, the finding is correct. Conversely, there is a 1 percent probability that the finding does not exist; in other words, 1 out of 100 times, the finding appears by chance.

[2] Medians rather than means are reported in this document because, as is typical, the number of exhibits used and the time spent by visitors were distributed unevenly across the range. For example, whereas most visitors spent a short to moderate amount of time in the exhibition, a few spent an unusually long time. When the distribution of scores is extremely asymmetrical (i.e., "lopsided"), the mean is affected by the extreme scores and, consequently, falls further away from the distribution's central area. In such cases, the median is a better indicator of the distribution's central area because it is not sensitive to the values of scores above and below it—only to the number of such scores.

[3] The Kruskal-Wallis (K-W) test is a nonparametric statistical method for testing the equality of population medians of two or more groups. Nonparametric statistical methods do not assume that the underlying distribution of a variable is "normal" with a symmetric bell-shape, so they are appropriate for testing variables with asymmetric distributions such as "total time in the exhibition." The K-W test is analogous to a One-way Analysis of Variance, with the scores replaced by their ranks. The K-W test statistic $H$ has approximately a chi-square distribution.

### QUALITATIVE ANALYSIS

The interview data are qualitative, meaning that results are descriptive, following from the interviews' conversational nature. In analyzing the data, the evaluator studies responses for meaningful patterns, and, as patterns emerge, groups similar responses. To illustrate interviewees' ideas as fully as possible, verbatim quotations (edited for clarity) are included.

## REPORTING METHOD

For the observation data, information is displayed in tables. Percentages within tables may not always equal 100 owing to rounding. The findings within each topic are presented in descending order, starting with the most-frequently occurring.

The interview data are presented in narrative. The interviewer's remarks appear in parentheses, and an asterisk (*) signifies the start of a different speaker's comments. In the in-depth interview sections of the report, the interviewee's gender and age are indicated in brackets. Trends and themes in the data are presented from most- to least-frequently occurring.

**SECTIONS OF THE REPORT:**

1. Principal Findings: Observations
2. Principal Findings: In-Depth Interviews

# PRINCIPAL FINDINGS: OBSERVATIONS

RK&A conducted timing and tracking observations with visitors in the *Altered State, California Climate Change* exhibition at the California Academy of Sciences (the Academy). A total of 111 visitors, ages 9 and older, were observed in the exhibition in August 2009.

## DATA COLLECTION CONDITIONS

A majority of observations took place on weekdays (71 percent) (see Table 1). More than one-half of visitors experienced a moderate level of crowding (55 percent). All of the multimedia, computer-based, or video exhibits were operational during the evaluation period.

**TABLE 1**

**DATA COLLECTION CONDITIONS**

| CONDITIONS (N = 111) | % |
|---|---|
| **Day of the Week** | |
| Weekday | 71 |
| Weekend day | 29 |
| **Time of Day** | |
| PM | 57 |
| AM | 43 |
| **Level of Crowding** | |
| Moderate | 55 |
| Low | 41 |
| High | 5 |
| **Broken Exhibits** | |
| No exhibits broken | 100 |

## VISITOR DESCRIPTIONS

Data collectors recorded the gender and approximate age of each observed visitor. As shown in Table 2, the total sample of visitors observed included slightly more males than females (56 percent and 44 percent, respectively). Eighty-six percent of visitors observed were adults (18 years of age and older) and 14 percent were children (between 9 and 17 years old).

**TABLE 2**
**DEMOGRAPHIC CHARACTERISTICS**

| GENDER (*n* = 110) | % |
|---|---|
| Male | 56 |
| Female | 44 |
| **APPROXIMATE AGE GROUP** | |
| 9 to 11 years | 3 |
| 12 to 14 | 2 |
| 15 to 17 | 9 |
| 18 to 24 | 18 |
| 25 to 34 | 13 |
| 35 to 44 | 15 |
| 45 to 54 | 20 |
| 55 to 64 | 14 |
| 65 years and older | 7 |

Nearly one-half of observed visitors attended the exhibition in an adult-only group (45 percent), while one-third visited in a group comprised of adults and children (36 percent) (see Table 3).

**TABLE 3**
**GROUP COMPOSITION**

| DESCRIPTION (N = 110) | % |
|---|---|
| Adults only group | 45 |
| Adults and children group | 36 |
| Alone | 16 |
| Children only group | 5 |

Observers also noted the approximate age of any children accompanying the observed visitor (see Table 4). Of the 43 visitors whose group included children, 43 percent were accompanied by children 9 to 11 and 41 percent by children 5 to 8.

**TABLE 4**

**AGES OF ACCOMPANYING CHILDREN**

| AGE GROUP (*n* = 43) | %* |
|---|---|
| Under 5 (Preschool/Toddler) | 26 |
| 5 to 8 (Younger Elementary School) | 41 |
| 9 to 11 (Older Elementary School) | 43 |
| 12 to 14 (Middle School) | 24 |
| 15 to 17 (High School) | 7 |

*Column total exceeds 100 percent because some visitors were accompanied by children in multiple age groups.

## OVERALL VISITATION PATTERNS

### TOTAL TIME SPENT IN THE EXHIBITION

Visitors' total time in the exhibition ranged from 17 seconds to 39 minutes, with a median time of nearly 4 minutes (see Table 5). About one-half of visitors spent between 1 and 5 minutes in the exhibition (48 percent), while one-quarter spent between 6 and 10 minutes (28 percent).

**TABLE 5**

**TOTAL TIME SPENT IN THE EXHIBITION***

| TOTAL TIME (IN MINUTES, (*n* = 111) | % |
|---|---|
| Less than 1 | 13 |
| 1 – 5 | 48 |
| 6 – 10 | 28 |
| 11 or longer | 12 |
| **SUMMARY STATISTICS (*n* = 111)** | **MIN:SEC** |
| Range | 0:17 to 39:27 |
| Median time | 3:57 |
| Mean time | 5:17 |
| (±) Standard deviation | 5:14 |

*The observation form included two additional exhibits near *Altered State, Climate Change in California* (Discovery Cart and Building Green) that were not part of that exhibition. As such, the stops made at the Discovery Cart and Building Green were subtracted to calculate the total number of stops in *Altered State*.

### TOTAL TIME: SIGNIFICANT RELATIONSHIPS

When the total time spent in the exhibition was compared by demographic characteristics and data collection conditions, one statistically significant relationship emerged (see Table 5a). Males spent more time in *Altered State* than did females (median times of 5 minutes vs. 2.5 minutes).

**TABLE 5A**

**DIFFERENCES IN TOTAL TIME BY GENDER**

| GENDER | n | MEDIAN MIN:SEC |
|---|---|---|
| Male | 62 | 5:01 |
| Female | 48 | 2:29 |

$\chi^2 = 5.915$; $df = 1$; $p = .015$

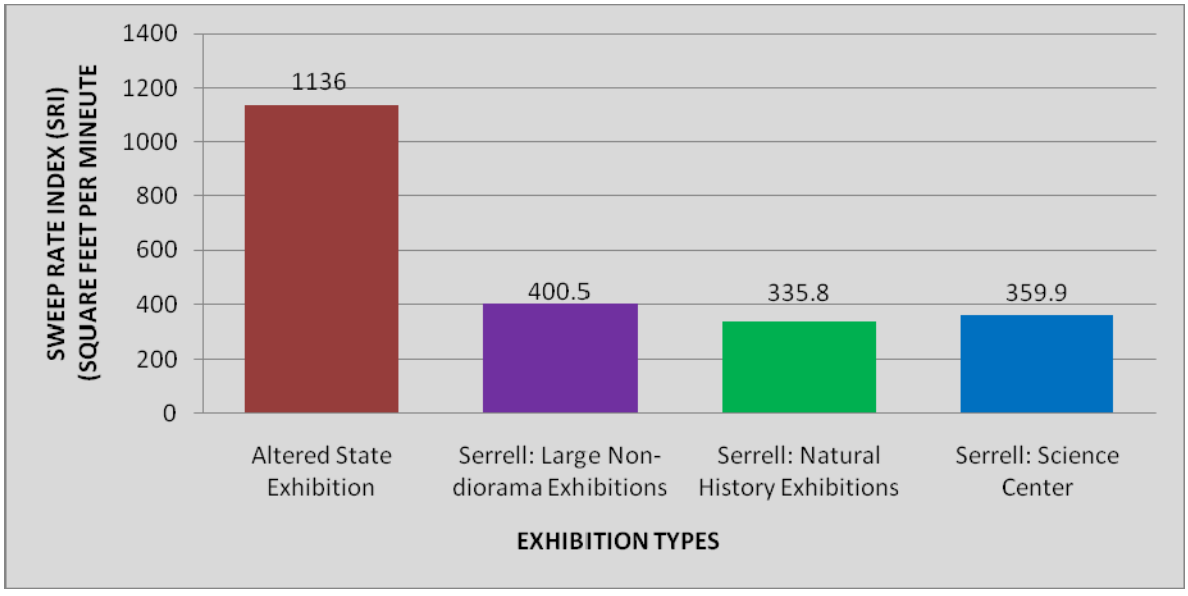
### TOTAL TIME: SWEEP RATE INDEX

To compare the total time spent in *Altered State* with other exhibitions of similar size, RK&A used Serrell's "Sweep Rate Index" (SRI) (Serrell, 1998).[4] The SRI is one measure to compare exhibitions at various museums. It is calculated by dividing the exhibition's square footage[5] by the average total time spent in the exhibition.[6] The lower the SRI, the more time visitors spent per square foot of space.

The SRI for *Altered State* is 1,136 square feet per minute. This SRI is much higher than Serrell's average SRI for large non-diorama exhibitions (>3,900 sq. ft.), natural history exhibitions, and science center exhibitions (see Figure 1). In fact, visitors in *Altered State* are moving about twice as fast as visitors in exhibitions of similar size and exhibition type.

**FIGURE 1**

**SWEEP RATE INDEX (SRI) COMPARISON**




[4] Serrell, B. (1998). *Paying Attention: Visitors and Museum Exhibitions*. Washington, D.C., American Association of Museums.

[5] *Altered State, California Climate Change* is 6,000 sq. ft.

[6] Mean total times were used in the SRI calculation in accordance with Serrell's methods. Throughout the rest of the report, median times are reported, as the median is standard for time data unevenly distributed across its range.

## TOTAL NUMBER OF EXHIBITS AT WHICH VISITORS STOPPED

*Altered State* included 39 exhibits at which visitors could stop. For this evaluation, a "stop" was defined as a visitor standing for three seconds or longer in front of a component. If a visitor returned to a component at which s/he had previously stopped, this return was not counted as an additional stop, but the time spent was included in the total time spent at the component.

Visitors stopped at between one and 23 exhibits, with a median of five exhibits (see Table 6). One-third stopped at fewer than four exhibits (35 percent) and more than one-quarter stopped at four to six exhibits (29 percent).

**TABLE 6**

**TOTAL NUMBER OF EXHIBITS STOPPED AT IN THE EXHIBITION***

| NUMBER OF EXHIBITS, (*n* = 111) | % |
|---|---|
| Fewer than 4 exhibits | 35 |
| 4 to 6 | 29 |
| 7 to 9 | 22 |
| 10 or more | 14 |
| **SUMMARY STATISTICS (n = 111)** | **NUMBER OF EXHIBITS** |
| Range | 1 to 23 exhibits |
| Median number | 5 exhibits |
| Mean number | 6 exhibits |
| (±) Standard deviation | 4 exhibits |

*The observation form included two additional exhibits near *Altered State, California Climate Change* (Discovery Cart and Building Green) that were not part of that exhibition. As such, the stops made at the Discovery Cart and Building Green were subtracted to calculate the total number of stops in *Altered State*.

### *TOTAL STOPS: SIGNIFICANT RELATIONSHIPS*

When the total number of stops made in the exhibition was compared by demographic characteristics and data collection conditions, one statistically significant relationship emerged (see Table 6a). Males made more stops in *Altered State* than did females (median of 6 stops vs. 3 stops).

**TABLE 6A**

**DIFFERENCE IN TOTAL STOPS BY GENDER**

| GENDER | n | MEDIAN NUMBER OF STOPS |
|---|---|---|
| Male | 62 | 6 |
| Female | 48 | 3 |

$\chi^2 = 23.270$; $df = 1$; $p = .000$

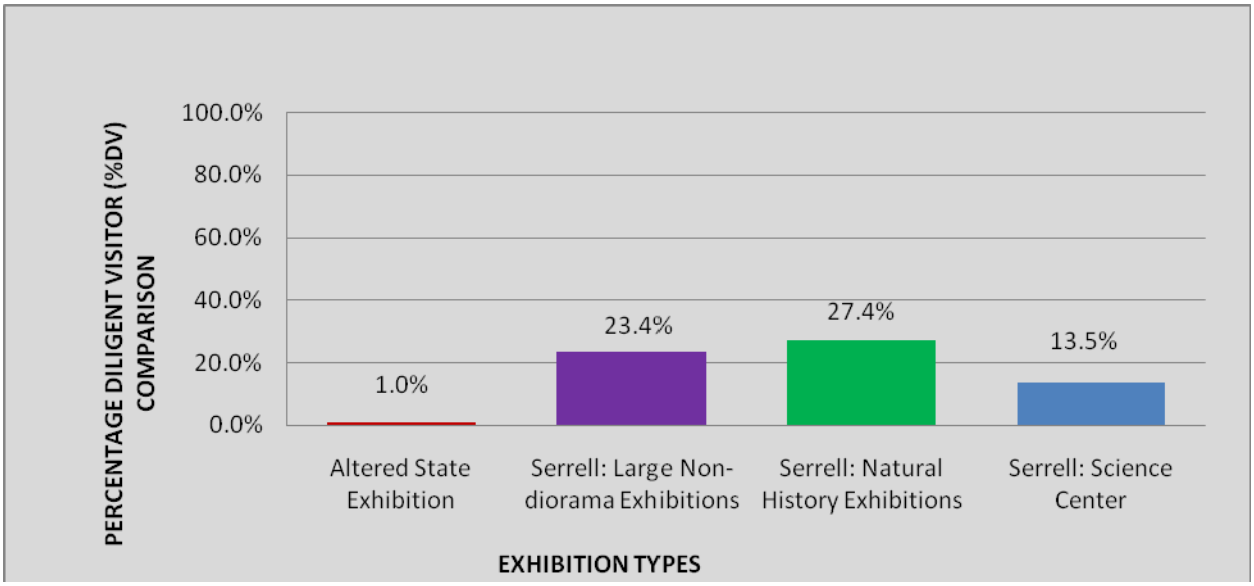
### *TOTAL STOPS: PERCENTAGE DILIGENT VISITOR*

To compare the number of stops visitors made in *Altered State* with those of exhibitions of similar size and venue, RK&A used Serrell's "Percentage Diligent Visitor Index" (%DV).[7] The %DV is obtained by calculating the percentage of visitors who stopped at more than one-half of the exhibits. The higher the %DV, the more thoroughly the exhibition was used.

The %DV for *Altered State* is 1 percent—that is, one visitor stopped at more than one-half of the exhibits (i.e., 19 exhibits or more). This %DV is much lower than Serrell's average %DV for large non-diorama exhibitions (>3,900 square feet), natural history exhibitions, and science center exhibitions, indicating visitors stopped at fewer exhibits in *Altered State* compared with exhibitions of similar size and exhibition type (see Figure 2).

**FIGURE 2**

**PERCENTAGE DILIGENT VISITOR (%DV) COMPARISON**




[7] Serrell, B. (1998). *Paying Attention: Visitors and Museum Exhibitions*. Washington, DC, American Association of Museums.

## VISITATION TO EXHIBITION SECTIONS

*Altered State* features five sections, including four Impact Modules dealing with the science of climate change (Changing Oceans, Melting Snow and Ice, Hotter and Drier Climates, and Endangered and Extinct Organisms) and the Arena for Engagement which encourages visitors to take action, dream of solutions, assess their carbon consumption, and learn surprising facts about their everyday activities.

### VISITATION TO EACH SECTION

Overall, visitors stopped in a median of three sections (see Table 7). The Impact Module: Changing Oceans attracted the most visitors (75 percent), followed by the Arena for Engagement (67 percent). The Impact Module: Endangered and Extinct Organisms attracted the fewest (42 percent).

**TABLE 7**

**EXHIBITION SECTIONS VISITED**

| SECTIONS VISITED (*n* = 111) | %* |
|---|---|
| Impact Module: Changing Oceans | 75 |
| Arena for Engagement | 67 |
| Impact Module: Hotter and Drier Climates | 51 |
| Impact Module: Melting Snow and Ice | 47 |
| Impact Module: Endangered and Extinct Organisms | 42 |
| **TOTAL NUMBER OF SECTIONS VISITED** | **%** |
| One | 11 |
| Two | 33 |
| Three | 27 |
| Four | 21 |
| Five | 8 |
| **SUMMARY STATISTICS (*n* = 111)** | |
| Median number | 3 sections |
| Mean number | 3 sections |
| (±) Standard deviation | 1 section |

*Column total exceeds 100 percent because some visitors visited more than one section.

### *TOTAL NUMBER OF SECTIONS VISITED: SIGNIFICANT RELATIONSHIPS*

When the total number of sections visited was compared by demographic characteristics and data collection conditions, one statistically significant relationship emerged (see Table 7a). Males stopped in more sections in *Altered State* than did females (median 3 sections vs. 2 sections).

**TABLE 7A**

**DIFFERENCES IN TOTAL NUMBER OF SECTIONS VISITED BY GENDER**

| GENDER | n | MEDIAN NUMBER OF SECTIONS |
|---|---|---|
| Male | 62 | 3 sections |
| Female | 48 | 2 sections |

$\chi^2 = 7.068$; $df = 1$; $p = .009$

## TIME SPENT IN EACH SECTION

Of the five sections, visitors spent the most time in the Arena for Engagement (median time = 2 minutes, 11 seconds), followed by the Impact Module: Hotter and Drier Climates (median time = 1 minute, 22 seconds) (see Table 8). Visitors spent the least time in the Impact Module: Endangered and Extinct Organisms (median time = 38 seconds).

**TABLE 8**

**TIME SPENT IN EACH SECTION**

| SECTION | n | MEDIAN MIN:SEC | MINIMUM MIN:SEC | MAXIMUM MIN:SEC | MEAN MIN:SEC | ± MIN:SEC |
|---|---|---|---|---|---|---|
| Arena for Engagement | 74 | 2:11 | 0:04 | 22:52 | 3:33 | 3:49 |
| Impact Module: Hotter and Drier Climates | 57 | 1:22 | 0:03 | 6:53 | 1:47 | 1:35 |
| Impact Module: Changing Oceans | 83 | 0:56 | 0:04 | 5:38 | 1:20 | 1:15 |
| Impact Module: Melting Snow and Ice | 52 | 0:54 | 0:03 | 9:53 | 1:19 | 1:35 |
| Impact Module: Endangered and Extinct Organisms | 47 | 0:38 | 0:04 | 6:19 | 0:59 | 1:16 |

## STOPS MADE IN EACH SECTION

Of the five sections, visitors made the most stops in the Arena for Engagement (median = 3 stops) (see Table 9). In all other sections, visitors made a median of one stop.

**TABLE 9**

**STOPS MADE IN EACH SECTION**

| SECTION | n | MEDIAN | MINIMUM | MAXIMUM | MEAN | ± |
|---|---|---|---|---|---|---|
| Arena for Engagement | 74 | 3 stops | 1 | 9 | 3 | 2 |
| Impact Module: Hotter and Drier Climates | 57 | 1 stop | 1 | 9 | 2 | 2 |
| Impact Module: Changing Oceans | 83 | 1 stop | 1 | 4 | 2 | 1 |
| Impact Module: Melting Snow and Ice | 52 | 1 stop | 1 | 5 | 2 | 1 |
| Impact Module: Endangered and Extinct Organisms | 47 | 1 stop | 1 | 4 | 1 | 1 |

## VISITATION TO INDIVIDUAL EXHIBITS

### TIME SPENT AT EACH EXHIBIT

Table 10a presents the median times of exhibits at which visitors spent 30 seconds or longer. Visitors spent the most time at Carbon in Our Lives (median = 1 minute, 21 seconds), followed by Climate Basics: Temperature Will Rise (median = 1 minute, 13 seconds).

**TABLE 10A**

**TIME SPENT AT INDIVIDUAL EXHIBITS: 30 SECONDS OR LONGER**

| EXHIBIT | NUMBER OF VISITORS WHO STOPPED | MEDIAN TIME (SEC.) |
|---|---|---|
| Carbon In Our Lives mechanical interactive | 31 | 81 |
| Climate Basics: Temperature Will Rise multimedia/panel | 3 | 73 |
| The Melting Point video/panel | 24 | 55 |
| Make a Pledge visitor feedback computer interactive | 8 | 54 |
| $CO_2$rrespondence: Send a Message visitor feedback computer interactive | 11 | 53 |
| Mass Extinction video/panel | 6 | 49 |
| Polar Ice: Critical Zone media interactive | 39 | 47 |
| Carbon Café mechanical interactive | 45 | 44 |
| Dreaming Up Solutions artifacts/panel (video gone) | 43 | 43 |
| Climate Basics: The Ocean—Earth's Heat Regulator multimedia/panel | 11 | 42 |
| California Burning live animal/panel | 17 | 39 |
| Oceans Are Changing video/panel | 34 | 38 |
| Your Two Centers visitor feedback voting | 27 | 37 |
| Taking Action visitor feedback slideshow | 16 | 36 |

Table 10b presents the median times of exhibits at which visitors spent less than 30 seconds. Visitors spent the least time at Doing Things Differently: Using Water More Efficiently (median = 13 seconds) and Doing Things Differently: Plant a Tree, Help the Planet (median = 10 seconds). No visitors stopped at Hey! What Can We Do? A Vision for the Bay.

**TABLE 10B**

**TIME SPENT AT INDIVIDUAL EXHIBITS: LESS THAN 30 SECONDS**

| EXHIBIT | NUMBER OF VISITORS WHO STOPPED | MEDIAN TIME (SEC.) |
|---|---|---|
| Share Your Ideas visitor feedback tag board | 22 | 29 |
| I Had No Idea artifact | 27 | 29 |
| Turning the Tide video/panel | 7 | 28 |
| From Gold Rush to Extinction Rush specimen/panel | 34 | 27 |
| Carbon in Our Lives large-scale graphic/panel | 11 | 27 |
| Risking California's Glaciers video/specimens/panel (live animal gone) | 14 | 25 |
| Climate Basics: Greenhouse Gases in Perspective panel | 7 | 25 |
| A Hotter World video/panel | 7 | 25 |
| Threatening California's Biodiversity specimen/panel | 25 | 24 |
| Doing Things Differently: Creating Marine Protected Areas panel | 8 | 23 |
| A Rising Tide of Change specimen/panel | 16 | 22 |
| Looking at the Past video/panel | 5 | 21 |
| "Climate Is An Angry Beast" quote/cartoon | 9 | 21 |
| Hey! What Can We Do? Opening Corridors of Safety video/panel | 8 | 21 |
| "We See a Tipping Point" quote/cartoon | 18 | 20 |
| California Map Table | 6 | 20 |
| Hey! What Can We Do? Water and Innovation panel | 5 | 17 |
| Doing Things Differently: Using Water More Efficiently panel | 3 | 13 |
| Doing Things Differently: Plant a Tree, Help the Planet panel | 4 | 10 |
| Hey! What Can We Do? A Vision for the Bay panel | 0 | 0 |

## STOPS MADE AT EACH EXHIBIT

Visitors could stop at 39 exhibits. Table 11a presents the exhibits at which 10 percent or more of visitors stopped. The exhibit at which the most visitors stopped was the Carbon Café, followed by Dreaming Up Solutions, A Sea of Change, and Polar Ice: Critical Zone (41 percent, 39 percent, 37 percent, and 35 percent respectively).

**TABLE 11A**

**PERCENTAGE OF VISITORS WHO STOPPED AT EACH EXHIBIT: 10 PERCENT OR MORE**

| EXHIBIT | % |
|---|---|
| Carbon Café mechanical interactive | 41 |
| Dreaming Up Solutions artifacts/panel (video gone) | 39 |
| A Sea of Change video/panel/specimen/live animal | 37 |
| Polar Ice: Critical Zone media interactive | 35 |
| Oceans Are Changing video/panel | 31 |
| From Gold Rush to Extinction Rush specimen/panel | 31 |
| Carbon In Our Lives mechanical interactive | 28 |
| I Had No Idea artifact | 24 |
| Your Two Centers visitor feedback voting | 24 |
| Threatening California's Biodiversity specimen/panel | 23 |
| The Melting Point video/panel | 22 |
| Share Your Ideas visitor feedback tag board | 20 |
| "We See a Tipping Point" quote/cartoon | 16 |
| Melting and the Natural World specimen/panel | 15 |
| California Burning live animal/panel | 15 |
| A Rising Tide of Change specimen/panel | 14 |
| Fossil Fuels and the Changing Ocean quote/cartoon/panel | 14 |
| Hot Times Are Coming specimen/panel | 14 |
| Taking Action visitor feedback slideshow | 14 |
| Risking California's Glaciers video/specimens/panel (live animal gone) | 13 |
| Climate Basics: The Ocean—Earth's Heat Regulator multimedia/panel | 10 |
| Carbon in Our Lives large-scale graphic/panel | 10 |
| $CO^2$rrespondence: Send a Message visitor feedback computer interactive | 10 |

Table 11b presents the exhibits at which less than 10 percent of visitors stopped. The exhibits at which the fewest visitors stopped were Doing Things Differently: Using Water More Efficiently, Climate Basics: Temperature Will Rise, and Info Network (each 3 percent). As noted earlier, no visitors stopped at Hey! What Can We Do? A Vision for the Bay.

**TABLE 11B**

**PERCENTAGE OF VISITORS WHO STOPPED AT EACH EXHIBIT: LESS THAN 10 PERCENT**

| EXHIBIT | % |
|---|---|
| "Climate Is An Angry Beast" quote/cartoon | 8 |
| Doing Things Differently: Creating Marine Protected Areas panel | 7 |
| Hey! What Can We Do? Opening Corridors of Safety video/panel | 7 |
| Make a Pledge visitor feedback computer interactive | 7 |
| Climate Basics: Greenhouse Gases in Perspective panel | 6 |
| A Hotter World video/panel | 6 |
| Turning the Tide video/panel | 6 |
| Hey! What Can We Do? Water and Innovation panel | 5 |
| Looking at the Past video/panel | 5 |
| Mass Extinction video/panel | 5 |
| California Map Table | 5 |
| Doing Things Differently: Plant a Tree, Help the Planet panel | 4 |
| Doing Things Differently: Using Water More Efficiently panel | 3 |
| Climate Basics: Temperature Will Rise multimedia/panel | 3 |
| Info Network computer kiosk | 3 |
| Hey! What Can We Do? A Vision for the Bay panel | 0 |

## VISITOR BEHAVIORS

Observers noted select visitor behaviors depending on the exhibit. The total incidences of the seven most commonly recorded behaviors are presented in Table 12. Detailed information about behaviors at individual exhibits is provided in Appendix A.

## SUMMARY OF BEHAVIORS

The most commonly observed behaviors were: discussing exhibit content, pointing to/looking at specimens, and using interactives (59 percent, 59 percent, and 41 percent, respectively) (see Table 12). Few visitors took sustainability cards or looked at the floor graphics (6 percent and 4 percent, respectively). No visitors were seen misusing exhibits (i.e., using them in ways not intended by the designers), suggesting that the interactives were intuitive to use and engaging.

No statistically significant relationships were found among behavior, demographic characteristics, and data collection conditions. This means, for example, that adults were as likely to use interactives as were children.

**TABLE 12**

**PERCENTAGE OF VISITORS WHO EXHIBITED SPECIFIC BEHAVIORS**

| BEHAVIOR (n = 111) | % |
|---|---|
| Discuss content (39 exhibits) | 59 |
| Point to/look at specimens (7 exhibits) | 59 |
| Use interactive (8 exhibits) | 41 |
| Point to/look at live animals (2 exhibits) | 23 |
| Use seating to watch videos (9 exhibits) | 12 |
| Take sustainability card (1 exhibit) | 6 |
| Point to/look at floor graphics (1 exhibit) | 4 |
| Misuse interactive (8 exhibits) | 0 |

## EFFECT OF SEATING ON TIME SPENT WATCHING VIDEOS

*Altered State* features moveable chairs that visitors and staff can position throughout the exhibition. To determine the effect of having seating available at videos, the evaluators examined the time spent watching videos by use of seating (see Table 13). Visitors who sat while watching videos (i.e., they brought chairs over to the video or used ones already placed there) spent three times longer watching videos than did those who stood (median time of 3 minutes vs. 48 seconds).

**TABLE 13**

**DIFFERENCES IN TIME SPENT WATCHING VIDEOS BY USE OF SEATING**

| USED SEATING | n | MEDIAN MIN:SEC |
|---|---|---|
| Yes | 13 | 3:03 |
| No | 48 | 0:48 |

$\chi^2 = 16.630$; $df = 1$; $p = .000$

# PRINCIPAL FINDINGS: ON-SITE INTERVIEWS

Interview data for the *Altered State: Climate Change in California* exhibition were collected in August 2009 at the California Academy of Sciences. RK&A conducted interviews with 44 visitor groups as they exited the exhibition. Interviewees were asked about their overall experiences, use and understanding of specific exhibits, perception of the overall message, and opinion of the exhibition's tone and approach to the subject of climate change.

## BACKGROUND INFORMATION

### DATA COLLECTION CONDITIONS

RK&A conducted 44 group interviews with a total of 51 visitors, ages 18 years and older. A total of 66 adults were invited to participate in the evaluation and 22 declined, for a 67 percent participation rate.

### VISITOR DEMOGRAPHICS

Of the 51 visitors interviewed, slightly more than one-half were female (55 percent) and less than one-half were male (45 percent). Interviewees ranged in age from 19 to 72, with a median age of 46 years.

About one-half of visitors were accompanied by children, who ranged in age from 2 to 17, with a median age of 9 years.

### VISITATION

The majority of interviewees were visiting for the first time (70 percent), and some were repeat visitors (30 percent). Among repeat visitors, nearly all had visited the Academy two to three times within the last year, and a few had visited four times.

## OVERALL EXPERIENCE

Overall, most interviewees said the exhibition was compelling and thought-provoking, and described their experience as "informative," "interactive," and "meaningful." Many talked at length about it and used emphatic and positive language. For example, several praised the exhibition for "raising awareness," while another said it helps people "understand [their] personal impact [on the environment]." Some others focused their praise on specific exhibits, including the Carbon in Our Lives, Carbon Café, and videos (see the quotation below).

> (Overall, what are your thoughts about the exhibition?) It's good, it's powerful, [it's] meaningful. (What did you like most about this exhibition?) The information presented in the movies—it's summarized quickly to get to the point. . . . It catches your attention. [male, 46].

Several interviewees offered constructive criticism even though they enjoyed the exhibition overall. A few said that docent-led tours or lectures in the exhibition would further explain the exhibits (see the quotation, next page). Another referenced the exhibition layout, explaining that he did not understand how it was organized.

> There wasn't anything particularly that I liked least about it. Maybe a way that [you] could improve it is having [facilitators] to help people interact . . . like you may not get the food [Carbon Café] and the carbon footprint right away . . . somebody there to explain it to visitors [would help]. . . . [Then] they [visitors] may be more pulled in and more involved and actually connect the dots between what they're looking at and then putting the concepts together. [female, 39]

Several interviewees mentioned that their opinions differ from the material presented in the exhibition; however, most did not describe their overall experience in the exhibition as negative (see the quotation below). In contrast, one interviewee heavily criticized the exhibition for "lack[ing] significant data," after indicating that he does not believe global warming to be as extreme a problem as presented in the exhibition.

> I liked it. It's nice. I don't agree with some of it but . . . I agree with some of the stuff they're talking about . . . the polar ice caps was a sea and it was frozen. . . . It's just natural and we're blaming people and animals for it when it's just something that could be happening anyhow. (What did you like least about this exhibition?) I didn't see anything I didn't like about it, it's just different from the way I look at it because of where I live . . . my nearest neighbor is three-and-one-half miles from me. [male, 38]

## SPECIFIC EXHIBITS/SECTIONS

Interviewees were asked to describe their responses to the extinction section and to several exhibits—the Carbon in Our Lives, Tag Board, and Polar Ice: Critical Zone —to examine the degree to which these exhibits engaged visitors and conveyed the exhibition's core messages.

### CARBON IN OUR LIVES

The majority of interviewees used the Carbon in Our Lives, and they often described it as engaging, interactive, and memorable. In fact, many cited specific examples from the exhibit (see the quotation below). Some interviewees, however, experienced difficulty using the Carbon in Our Lives. Several perceived that the exhibit could only be used by one person at a time, and therefore found it challenging when multiple visitors were gathered around it. A few others described the exhibit as "confusing" and were unsure of how to use it.

> (Did you visit the Carbon in Our Lives?) I was doing it and unfortunately my carbon footprint is . . . it's kind of an eye-opener. I thought, 'I don't drive much' but I'm driving a car that is not fuel efficient . . . not a hybrid. I do ride my bike which I'm happy to say . . . maybe I should start riding my bike even more. That was kind of a wake-up [call for me]. [male, 49]

Most interviewees expressed a clear understanding of the Carbon in Our Lives. Many referred to the exhibit as the "carbon footprint exhibit," and another interviewee said that the exhibit gets people thinking about "their personal impact on the planet." The few interviewees who referred to a "carbon footprint" had a moderate understanding of the concept; they understood the core idea that individuals can lessen their carbon output by taking public transportation or fewer flights, or by biking. Several interviewees who encountered problems using the exhibit did not fully understand its message, and tended to focus on a singular aspect of the exhibit, such as "how much [$CO_2$] you put out as a household." They did not understand the overarching idea that individuals can change their lifestyle and habits to reduce their carbon footprint.

### TAG BOARD

Some but not many interviewees used the Tag Board exhibit. Overall, interviewees who had posted handwritten comments on the message board found the activity interesting and moderately informative. The fact that the notes were handwritten seemed to be a high point for these interviewees; some commented on the personal or unique quality of the exhibit. One interviewee described the exhibit as having "personal, inspiring messages."

Just as interviewees had an average experience with the exhibit, their understanding of its core message was moderate; interviewees tended to describe the message using general terms. One interviewee, for example, said that the exhibit was intended to provide visitors with "a personal say, [to show that] their ideas could matter," while another stressed that visitors can "come up with their own ideas so that they can be productive and better the environment." In both cases, the interviewees did not specifically mention climate change.

### POLAR ICE: CRITICAL ZONE

The majority of interviewees used the Polar Ice: Critical Zone interactive. Interviewees who experienced the Polar Ice: Critical Zone interactive expressed mild to moderate confusion about how to operate the exhibit and about its overall message. The exhibit proved problematic both when interviewees encountered the exhibit alone or in groups. As such, most interviewees who used the Polar Ice: Critical Zone interactive did not grasp the exhibit's main message; usually their understanding was surmised rather than stated (see the quotation below). A few interviewees, on the other hand, partially identified the exhibit's overall message of the exhibit; one described that the user needs to "get the ice formations together so the baby can reach its mother." The interviewee did not thoroughly understand, however, the overall message.

> I couldn't figure out exactly how that worked. I tried to do it for a minute and I didn't understand it. . . . I wasn't sure how to sort of make it do what it was supposed to do. (What do you think the exhibit is trying to convey to visitors?) I wasn't sure . . . I assume it's that the ice caps are melting and that's dangerous for the polar bears . . . that would be my guess. [male, 26]

### EXTINCTION SECTION

About one-half of interviewees said they understood that the extinction section of *Altered State* was intended to convey the idea that many species are threatened by climate change and may become extinct as a result of this threat (see the quotation below). The other one-half of interviewees did not perceive a relationship between the extinction section and climate change. This response type ranged from interviewees who did not notice this section of the exhibition to those who responded, "I don't see a connection."

> Certain species will eventually become extinct because of our effect on the climate, and we may not be able to ever see these animals in the wild again because of our effect on the planet. [male, 57]

## EXHIBITION LAYOUT

Most interviewees were moderately pleased with the exhibition's layout—some described it as fine or unproblematic, and a few described it as fluid. A few interviewees emphasized that the exhibition allowed visitors to move through the space without experiencing bottlenecks (e.g., "no congestion"). However, many said the layout was not conducive to comprehending "the big picture." These interviewees suggested improving visitor orientation by adding a designated pathway through the

exhibition, creating a clear entrance point, or clarifying the exhibition's organizational structure (see the quotation, next page).

> I like if it's a little more linear, but that's just my preference. It's harder for me to process . . . I like something that begins at one point and then ends at another point. [female, 25]

## UNDERSTANDING OF OVERALL MESSAGES

### PERCEPTION OF THE ACADEMY'S INTENT

Interviewees were asked to reflect on their perceptions of why the Academy created an exhibition about climate change. Most interviewees discussed the Academy's intent to raise awareness about climate change and to promote ideas and solutions to help slow or prevent climate change. Responses ranged in their level of sophistication and reflection. Some simply replied that the Academy wants to "raise awareness," some others spoke more specifically; for example, a few interviewees emphasized the exhibition's focus on slowing climate change, including the use of solar power, wind power, and public transportation. A few others discussed the exhibition's theme of individual behavioral changes (see the quotation below). One interviewee said the exhibition communicates that climate change "is a real phenomenon" and we need to consider how we can make productive changes.

> (What are some of the ideas or messages you took away from it?) Touching back on what you were asking about writing the tags and putting them up, I feel like there was definitely a push to put the issue and the solution back into people's hands . . . asking people to think of ideas to help solve these problems of emissions or problem of climate change . . . getting people to think about what they can do specifically and put their mind into finding some sort of solution. [female, 30]

### CLIMATE CHANGE IN CALIFORNIA

The exhibition's focus on climate change in California was not as readily understood. Almost no interviewees perceived the exhibition to be about climate change in California specifically; rather they expressed that the exhibition was about climate change at large, the human impact on climate change, and possible shifts in human behavior. In contrast, one interviewee identified the exhibition's focus on California, but her perception of the climate change message was limited (see the quotation below).

> I learned about the wildlife . . . from habitat to habitat and then [wildlife] in California . . . and the carbon emission. [female, 19]

## LEARNING ABOUT CLIMATE CHANGE

After discussing the exhibition's overall messages, interviewees were asked whether they had learned anything new about climate change and whether they recalled any examples from the exhibition of how scientists know that climate change is happening.

### NEW INFORMATION ABOUT CLIMATE CHANGE

Most interviewees said they had learned something new about climate change in the *Altered State* exhibition. Several expressed surprise at the rapid pace of climate change, sometimes providing specific examples; one mentioned spring's early arrival, another discussed climate change's link to fires, and a third mentioned the warming of the oceans (see the quotation, next page).

> (What, if anything, did you find out about climate change?) I didn't know that warming of the oceans has such a high percent[age]. I kind of knew, but [I did not realize] it was 80 percent. [female, 30]

Several interviewees, however, said they had not learned anything new about climate change, often noting that the exhibition had reinforced information they already knew, for example "that human activity affects climate change." A few other interviewees said they had not learned anything new and reiterated that they would have preferred to see more scientific data—as evidence of climate change—presented in the exhibition (see the quotation below).

> (What, if anything, did you find out about climate change?) I don't think I even saw anything new that I didn't know coming in. I would like to see more with the temperatures of the ocean—information about how the data was collected, how we need to measure it, where we measured it, the specific depth which is constant depth, how far from the sea, [and] was it on shipping lines? There's lots of different information that if you don't have it, you can't really see it for what it is. [male, 24]

### EXAMPLES OF CLIMATE CHANGE

Most interviewees were able to provide an example of evidence of climate change; the majority cited examples included in *Altered State*. Many identified general processes that indicate climate change, such as melting ice and rising water. Many others provided specific examples such as drought, floods, rising temperatures, rising seas, migration of species, and the effect of $CO_2$ on ocean life. In contrast, several interviewees were unable to cite evidence for climate change. They either responded, "I don't know," or indicated that they could not remember any examples.

## SOLUTIONS TO CLIMATE CHANGE

Most interviewees successfully identified solutions to climate change. Some provided generic and non-exhibit-specific responses—such as recycling—but many provided examples that were clearly specific to the *Altered State* exhibition. For example, several interviewees were interested in the idea of limiting the use of wrapping paper (see the quotation below).

> (This exhibition also features some solutions for climate change. What kinds of solutions, if any, do you recall seeing in the exhibition?) Reusable water bottles . . . just fill it up from the tap . . . or get a water filter and just fill from the tap. *The gift-wrapping . . . I thought that was really interesting. I didn't know how much gift wrapping paper gets tossed away every year, and Mom and I have to say that every birthday party we go to, we buy new bows. [The exhibition] says you can use maps and newspapers and homemade . . . **Cloth, even cloth. [female, 11; female, 41; male, 41].

In contrast, a few interviewees could not identify solutions to climate change and did not expand on their responses when further questioned.

### OPINIONS OF RANGE OF SOLUTIONS

When asked their opinions of the range of suggestions provided in the exhibition, the most interviewees were pleased with the variety of potential solutions and said they were happy to discover "helpful" methods for living sustainably. Several interviewees, however, suggested adding additional ideas for behavioral changes. For example, one requested more ideas about personal behavior changes (see the

quotation below). This interviewee had not visited the Carbon in Our Lives, Carbon Café, or Tag Board.

> I'm probably not as attentive as most, but I didn't see a lot on personal behaviors as it affects global change . . . it was more like there's a risk of extinction and showing what some countries are doing. I don't think that I've seen anything about people themselves conserving energy, driving less. . . . I'm not sure whether in the States you have sustainable energy sources available to homes, so probably more about these things . . . using fewer plastics, using fewer petroleum products. [male, 30]

### PERCEPTION OF CUTTING-EDGE SOLUTIONS

Interviewees were asked whether any of the climate change solutions presented in the exhibition were cutting-edge. Many interviewees said they did not find the solutions innovative. These interviewees were not struck by any particular solutions presented. Conversely, some were impressed with certain solutions. For example, reducing meat intake was considered innovative by one interviewee, and another mentioned using denim as insulation. One interviewee noted that it is innovative to think of the solution involving one person's behavior changes: "I never thought before about one person making a difference."

## AFFECTIVE RESPONSE TO THE EXHIBITION

Overall, interviewees spoke highly of *Altered State* when discussing their affective and intellectual responses to the exhibition. Most interviewees said the exhibition's treatment of climate change was balanced; although these interviewees said they felt the issue of climate change to be somewhat dire and daunting, they also said they felt comforted by the ideas presented about individual behavior changes and larger-scale solutions. Thus, interviewees perceived climate change as a challenge and a threat, yet they also felt empowered, since the exhibition presented changes that can be made to abate the current rate of climate change (see the two quotations below). Furthermore, visitors' affective response to the exhibition is decipherable throughout many of the interviews, not simply when they were asked to describe their intellectual or emotional response to *Altered State* (see the third quotation below).

> Making it fun and interactive I think is a nice way to do it . . . gives us the bad news with a little bit of honey. [female, 42]

> It was definitely positive . . . it doesn't really stay on the problem too much, but it talks about some loose ends, which is good. I don't really like exhibits that only talk about the problem and everything that we're doing wrong. It's good to talk about what we can do better and how we can change it, so that was cool. [female, 19]

> We practice most of it, but there are limitations depending on where you live and we happen to live in a part of the world that doesn't care. We come from Dubai. It's a relatively new country . . . less than 50 years [old]. About 90 percent of the place is desert, so they don't seem to care that much. . . . Recycling is a culture that is not yet developed so I have to make that extra effort to actually haul my newspapers out the door . . . We all know this and we all want to do it, but unfortunately the structure doesn't allow it unless you spend a lot more effort. . . . (What, if anything, did you find out about climate change?) Some of the rates . . . the rate of temperature rise and everything . . . it's rising but it's quite alarming to see the rate at which it's rising. *Yeah, I kind of worry. You really do need to do something about it. It's alright to say, 'Oh, we have

> to do something about climate change . . . we have to do something or else the world will collapse." We actually *do* need to do something here. [female, 41; female, 11]

In contrast, a few interviewees who reiterated their discontent with the exhibition's approach to climate change characterized the exhibition's treatment of the subject as "too sensational" and "stretched out of proportion."

# APPENDICES

Distribution copy: the appendices have been removed from this report for proprietary reasons.