

**Evaluation of**  
***The Bright Beneath: The Luminous Art of***  
***Shih Chieh Huang***

**A Multi-Method Study**



**Smithsonian Institution**  
**Office of Policy and Analysis**  
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## Acknowledgments

To increase visitation to the Ocean Focus Gallery – the space situated in the back of the Sant Ocean Hall – and to augment visitors' experiences with the permanent ocean life exhibition, the NMNH is showcasing a series of temporary installations with topics related to ocean life but different in ways that would provide visitors with a variety of experiences.

*The Bright Beneath: The Luminous Art of Shih Chieh Huang* was the second in the series of contemporary art installations inspired by the marvels of the deep ocean. The *Bright Beneath* exhibition aimed to stimulate the senses, spark curiosity, and to leave its visitors in awe and wonder. The exhibition team requested this study to inform future decisions about how to use the Ocean Focus Gallery and determine what kinds of experiences to provide to enhance visitors' overall satisfaction with the space as well as in the Ocean Hall permanent exhibition.

This study not only looked at how visitors responded to the exhibition, but also at how the exhibition may have impacted their experiences with the Ocean Hall as a whole. The study found that visitors' positive attitudes and experiences with the *Bright Beneath* exhibition were associated with longer stays and richer experiences in the Ocean Hall overall.

The study of the *Bright Beneath* exhibition is the result of dedication and hard work of many of Office of Policy and Analysis (OP&A) staff and Laura Brown, an intern with the National Museum of Natural History (NMNH) who helped with the multi-method data collection and data preparation as well as the analysis and writing of the qualitative report.

Minjun Kim, a talented (OP&A) intern helped design the study; she also collected, edited, scanned and cleaned the survey and observations data and helped prepare and analyze data in SPSS. I am grateful for her fine work and numerous contributions.

OP&A staff Kathleen M. Ernst, Lance Costello and Claire Eckert helped with the study design, data collection, transcriptions and editing of the report, and I thank them for their professionalism. I would like to express my appreciation to the project manager Ioana Munteanu whose valuable contributions are reflected on all of the pages of this report through her commitment to the project and attention to detail. On all projects she goes out of her way to create valid and engaging studies.

Three NMNH staff and volunteers provided assistance with data collection for the observation study: Charles Chen, Exhibition Assistant and two volunteers David Bernstein and Desa Elwell. Maria Ravielle and Whitney Watriss, senior OP&A staff also assisted with the data collection.

Finally, I wish to thank Kara Blond, Chief of Exhibits Development; Junko Chinen, Management Support Specialist; and Charles Chen, Exhibition Assistant for requesting this

study and recognizing the importance of science and technology inspiring art inspiring science and technology.

Carole Neves, PhD  
Director  
Office of Policy and Analysis

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## Introduction

*The Bright Beneath: The Luminous Art of Shih Chieh Huang (Bright Beneath)*, an exhibition at the National Museum of Natural History (NMNH), was on view in the Sant Ocean Hall's Ocean Focus Gallery from September 3, 2011 through January 8, 2012. The exhibition showcased the contemporary artwork of world-renowned installation artist Shih Chieh Huang. As a Smithsonian Artist Research Fellow in 2007, Huang closely studied specimens in the Natural History Museum's Department of Vertebrate Zoology. In particular, he was fascinated by the mysterious creatures of the deep ocean that produce light as a survival mechanism – a process called bioluminescence.

Huang's art installation in the Gallery included pulsing, glowing, whirring creations set against navy blue walls, with their lights, computer parts, recycled materials, and plastic-tube appendages that were inspired by and reminiscent of the bioluminescent marine organisms he studied, though they were not intended to be exact representations.

As a contemporary art installation within the context of a natural history museum, the exhibition aimed to offer visitors a different type of experience—to stimulate the senses and spark visitors' curiosity about the deep ocean.

## Purpose of Evaluation

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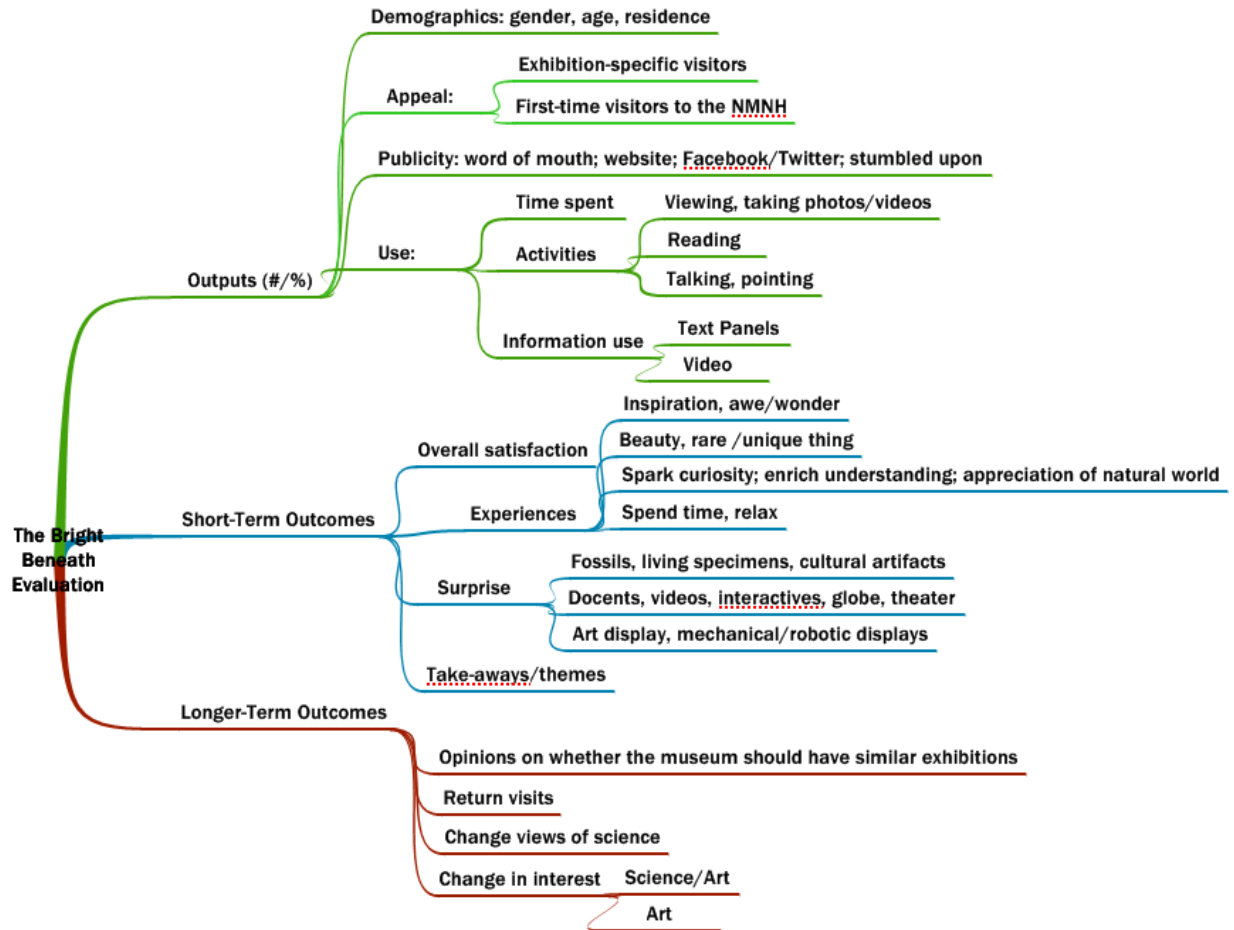
The National Museum of Natural History was interested in assessing:

- ✓ The *Bright Beneath* exhibition's outputs and short- and longer term outcomes<sup>1</sup> on visitors (see Exhibit 1).
- ✓ Demographics and responses of visitors to *Bright Beneath* compared to those of visitors to the Ocean Hall and to the *Hyperbolic Crochet Coral Reef* (HCCR) exhibition on display from October 16, 2010 through April 24, 2011 in the same space, the Ocean Focus Gallery.
- ✓ The impact, if any, that visiting *Bright Beneath* had on visitors' behaviors and responses to the Ocean Hall. (For example: Did they rate their experiences in the Ocean Hall higher? Did they spend more time in the Ocean Hall? Did they report having a higher number of satisfying experiences in the Ocean Hall?)

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<sup>1</sup>In this report, short- and longer term outcomes represent visitors' immediate response to the exhibition and respectively changes in visitors' interests and views of science, their interest in future art exhibitions at NMNH as well as percentage of repeat visitors.

## Exhibit 1: Evaluation Study Elements



## Methodology

To answer the output and outcome questions provided by the *Bright Beneath* exhibition team, the Office of Policy and Analysis (OP&A) study team<sup>2</sup> employed multiple methods over the months of December 2011 and January 2012: observation, quantitative surveys and qualitative interviews. Appendix B contains a full description of the methodology, the survey instruments, the observation form, and the qualitative interview guide developed in consultation with the NMNH exhibition development team and education staff.

### Visitor Tracking and Observation

The study team observed 323 visitors throughout their visit to the Ocean Hall. Slightly more than half of these visitors entered the *Bright Beneath* exhibition. The study used a

<sup>2</sup> Besides OP&A staff, the study team was augmented by a NMNH graduate intern and two NMNH volunteers.

variable interval sampling method. Visitors were selected at three entrances: approximately half at the Main entrance off the rotunda and about one-fourth each at the back/side entrance from the *Human Origins* exhibition and the back/side entrance from the *African Voices* exhibition.

### Quantitative Surveys

The study team administered three different surveys to four different groups of visitors. The 323 visitors selected for observation received one of two survey forms: Bright Beneath Exit (administered to 82 visitors exiting *Bright Beneath*) and Ocean Hall Exit (administered to 163 visitors who *did not* see *Bright Beneath* and 78 who *did* see *Bright Beneath*). The third survey, Ocean Hall Entrance, was administered to 431 visitors entering the Ocean Hall (see Exhibit 2 for response rates to the four surveys).

### Qualitative Study

The OP&A study team conducted a total of 44 semi-structured interviews with visitors within and exiting *Bright Beneath* on various dates between November 7, 2011 and January 6, 2012. Interviews were conducted with a total of 67 people. Interviewees included both residents of the Washington, D.C. metropolitan area and visitors to the region from around the country and the world.

**Exhibit 2: Response Rate By Survey Type**

		Entrance		Exit					
		Ocean Hall (OH)		Bright Beneath (BB)		Ocean Hall Visitors who <u>saw</u> Bright Beneath		Ocean Hall Visitors who <u>did not see</u> Bright Beneath	
		#	%	#	%	#	%	#	%
Survey Status	Complete	337	78%	68	83%	70	90%	133	82%
	Refusal	95	22%	14	17%	8	10%	30	18%
Total		432	100%	82	100%	78	100%	163	100%
Tracked through OH and BB				82	100%	78	100%	163	100%
Tracked through BB				N=160; 52% of observed visitors					

## Findings

### *Bright Beneath: Outputs*

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#### *Demographics*

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The demographic characteristics of visitors to *Bright Beneath* were mostly comparable in terms of gender, age, residence, and group composition to those of visitors to another exhibition—*The Hyperbolic Crochet Coral Reef*—that was displayed in the same gallery space, to the Sant Ocean Hall in general, and to the Natural History Museum as a whole<sup>3</sup>. (See Appendix D: Demographic Characteristics of Visitors to *Bright Beneath*, *Hyperbolic Crochet Coral Reef*, Ocean Hall, and the Museum).

- ✓ Gender: Slightly more than half of visitors to *Bright Beneath* were female (57%)
- ✓ Age: The average age of visitors was 33 years old
- ✓ Residence: Most visitors (76%) lived in the United States; one-sixth (17%) lived in the Washington, D.C. area
- ✓ Visit group: Most visitors (80%) were accompanied by family and/or friends; 17% came alone; and 3% came with an organized group.

#### *Appeal*

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- ✓ First-time visitors: 59% of visitors to *Bright Beneath* were first-time NMNH visitors
- ✓ Exhibition-specific visitors: 9% of *Bright Beneath* visitors came to NMNH specifically to see the exhibition; 11% of visitors who completed the Ocean Hall entrance survey said they came specifically to see the Ocean Hall
- ✓ The proportion of first-time visitors to the Museum and to the Ocean Hall specifically was similar in both the entrance and exit surveys (See Appendix C).

#### *Exhibition's Publicity*

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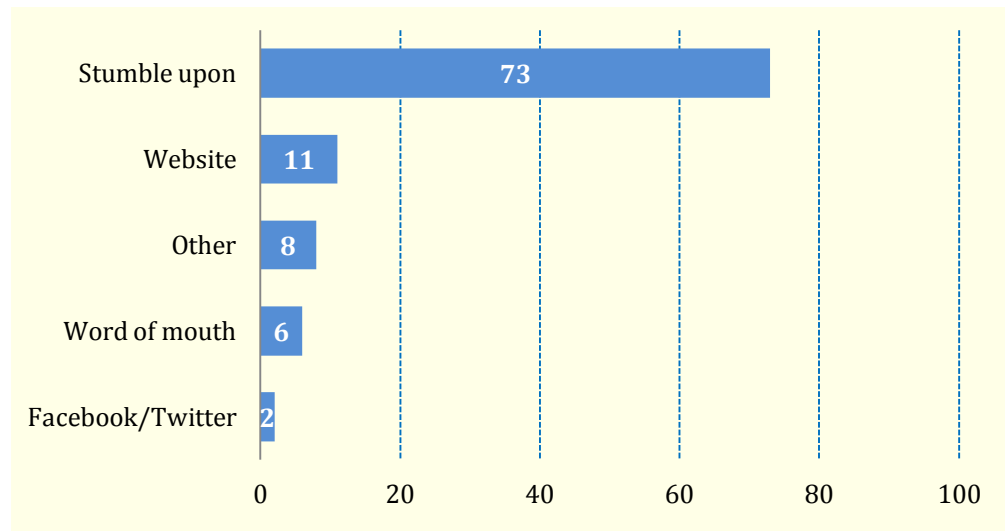
- ✓ Three-quarters of visitors to *Bright Beneath* learned about the exhibition by stumbling upon it (73%) (see Exhibit 3).

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<sup>3</sup> It is worth noting that visitors to HCCR were more likely to be female (69% vs. 57%) and local (41% vs. 17%).



**Exhibit 3: How Did You Hear About The Bright Beneath Exhibition? (In percent)  
(n=68)**



*Use*

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Time & Stops

- ✓ Half of the visitors to the Ocean Hall visited *Bright Beneath* (52%) (see exhibit 2). Similarly, half of the visitors to the Ocean Hall visited the LoOP space leading to the Ocean Focus Gallery where HCCR was exhibited (October 2010—April 2011).
- ✓ A large majority of visitors who were observed during their visit in *Bright Beneath* made at least one stop (95%). On average, visitors made 2.49 stops.
  - 84% of visitors stopped at one or more exhibition display elements
  - 54% of visitors talked with someone in their group
  - 25% took photos of themselves and/or the exhibit
  - 20% sat on benches
  - 2% took videos
  - Females were slightly more likely to make more stops when compared to male visitors in *Bright Beneath* (1.44 stops vs. 1.03 stops)
- ✓ On average, visitors spent 2:47 minutes in *Bright Beneath* (see Appendix C)
  - Of all the *Bright Beneath* display elements, the center artwork held visitors' attention the longest (33 seconds)
  - The 20% of visitors who sat on benches spent the longest amount of time, on average, on the bench situated inside the exhibition (see Appendix C)
  - Visitors residing in the US spent longer in *Bright Beneath* compared to those residing in another country (on average, 3 minutes vs. 1 minute)
- ✓ Visitors who saw *Bright Beneath* spent an average of 12 minutes in the Ocean Hall, inclusive of the time spent in *Bright Beneath*.

- ✓ Visitors who saw *Bright Beneath* spent two minutes longer in the rest of the Ocean Hall (average=9 minutes) than visitors who saw only the Ocean Hall (average=7 minutes).
- ✓ There was a positive correlation between the number of stops visitors made in *Bright Beneath* and the amount of time visitors spent in both the exhibition and the Ocean Hall.

**Exhibit 4: Average amount of time visitors spent in the *Bright Beneath* exhibition (BB), *Hyperbolic Crochet Coral Reef* exhibition (HCCR) and Ocean Hall (OH)**

Average visit time of visitors to the Ocean Hall Exhibition (Mean)			
	Visitors to OH only (2011-2012)	Visitors to BB and OH (2011-2012)	HCCR and OH 2011
Ocean Focus Gallery and the LoOP Space (BB/HCCR space)		2:47	5:51
Ocean Hall excluding Ocean Focus Gallery and the LoOP Space	7:06	9:34	
Entire Ocean Hall Exhibition Space	7:06	12:19	9:30

Information

*I watched the video about how it was created. I was just so amazed. I was like, 'Whoa.'*

*I think a little more might be good...I'm a big reader though, so...I think a little more about the science...about what it's trying to represent...*

*It's kind of nice to just come in here and get away from everything. [To] take a break, and just look at things visually and not have to worry about reading things to know what it's all about. You can kind of just take it in, and enjoy it for what it is.*

A limited amount of background and interpretative information was included in *Bright Beneath*. There was one introductory text panel, two explanatory panels, and a video depicting how the exhibition was made. At various times, a mobile cart activity augmented these sources of information.<sup>4</sup>

- ✓ Close to four in five visitors thought that the amount of information in *Bright Beneath* was “about right” (78%), and the remaining fifth said there was “too little” information (22%). No visitors marked the third option—“too much.”

<sup>4</sup> The cart was not available during the majority of time that visitor observations were conducted. Too few visitors tracked by the study team stopped at the cart for analysis purposes (12%).

- Those who said there was “too little” information also spent more time in the Ocean Hall (12 minutes vs. 8 minutes) and made more stops in *Bright Beneath*.
- ✓ Less than one in ten visitors stopped at least once in front of a text panel (7%); on average these visitors spent 34 seconds reading the three text panels.
- ✓ Thirteen percent of visitors stopped in front of the video; these stops lasted, on average, 20 seconds.

## ***Bright Beneath: Short-Term Outcomes***<sup>5</sup>

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### ***Satisfaction***

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*We came back this way just looking at various things, and then we saw it and it was all lit-up and beautiful and moving! It's really, really eye-catching.*

*I was standing next to this girl who was about 15 and she said, “Oh, it's all plastic bottles!” And I said “It was?” I didn't even pick up on that. So, people can kind of talk... it's more interactive, yet still meditative.*

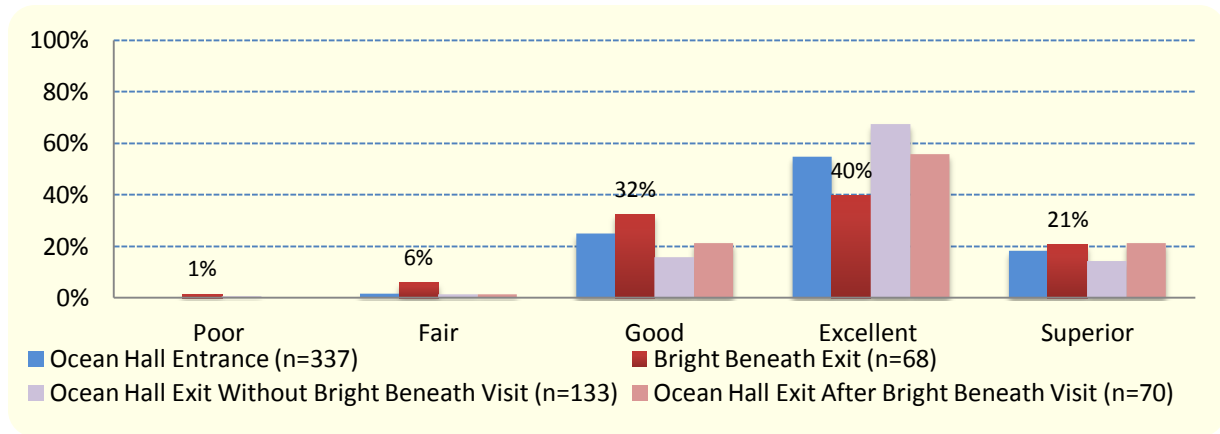
On the entrance survey, visitors were asked how they expected to rate their overall experience in the Ocean Hall when they left; and on the *Bright Beneath* and Ocean Hall exit surveys, visitors were asked to rate their actual overall experience in the respective exhibitions. For each survey, respondents were offered a five-point rating scale of Poor, Fair, Good, Excellent and Superior that OP&A has used in exhibition and museum studies across the Smithsonian, and which allows comparisons with previous results.

- ✓ Visitors rated their overall experience with *Bright Beneath* as follows: 21% superior, 40% excellent, 32% good, 6% fair and 1% poor.
  - Those who marked their overall experience as superior also spent more time in the entire Ocean Hall space (16 minutes vs. 12 minutes - for excellent vs. 10 minutes for good, fair or poor)
- ✓ Visitors' ratings of their overall experience in *Bright Beneath* were on par with their expectations for Ocean Hall. (The study team did not find a statistically significant difference between visitors' expected ratings and their actual ratings).
- ✓ Visitors rated their overall experience in *Bright Beneath* and Ocean Hall similarly (see exhibit 5).

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<sup>5</sup> In this report, short-term outcomes represent the visitors' immediate responses to the exhibition.

**Exhibit 5: How do you expect to rate...?/Please rate your overall experience in (the Ocean Hall/*The Bright Beneath*) today.**



- ✓ Visitors to *Bright Beneath* rated their overall experience in the mid-range when compared to overall experience ratings at other NMNH exhibitions and to the Smithsonian average (see Appendix E).

**Experiences**

*For viewers to have an experience of what it might be like to be at the bottom of the ocean... at a place you can't go... and kind of be in these things, instead of just watching them on a video or in a jar...*

*It's like a dance, choreography... I think that's pretty cool.*

*You can come back in this artistic space and just float with it...*

The study team asked visitors to choose from a list of ten experiences the ones they were especially looking forward to (entrance survey) or found especially satisfying (exit survey) (see Exhibit 6). The list was generated based on interviews with visitors to *Bright Beneath* who were asked to comment on a list of experiences that the NMNH exhibition team hoped would result from the visit, and those used in previous studies of visitor experiences at NMNH and SI.

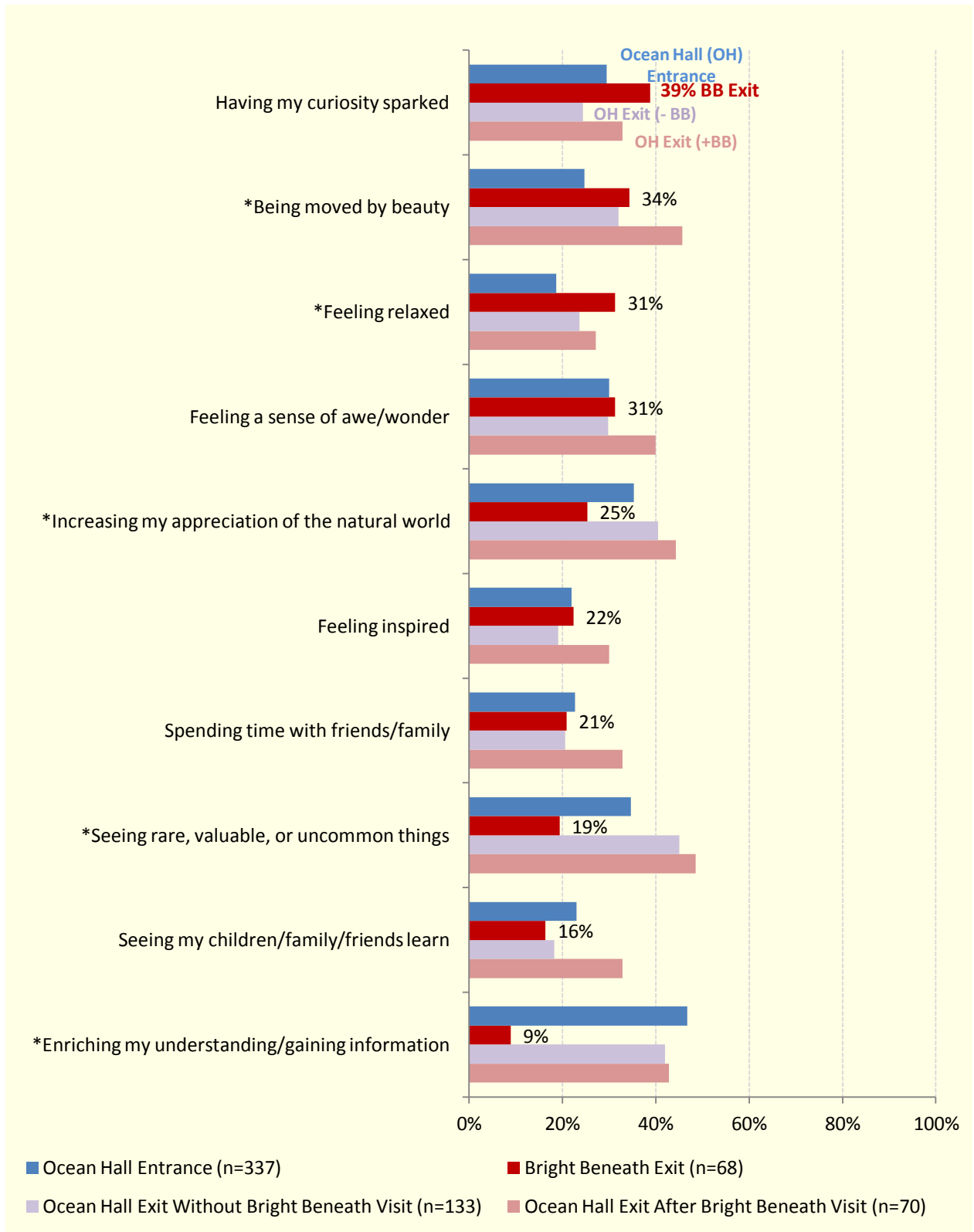
- ✓ The most frequently selected satisfying experiences were: “having my curiosity sparked” (39%), “being moved by beauty” (34%), “feeling relaxed” (31%) and “feeling a sense of awe and wonder” (31%).
  - Those who marked “being moved by beauty” were also more likely to stop more frequently in *Bright Beneath* than those who did not (3 stops vs. 2 stops)
  - Visitors who marked “having a sense of awe and wonder” were more likely to spend more time in the Ocean Hall (13 minutes vs. 8 minutes)

- ✓ The least frequently selected satisfying experience was “enriching my understanding/gaining information” (9%).
- ✓ Visitors exiting the Ocean Hall who also saw *Bright Beneath*, were more likely to report “being moved by beauty” and “feeling relaxed” than they had expected.
- ✓ When compared to visitors’ expected experiences as indicated on entrance, the exiting visitors from *Bright Beneath* were less likely to report “enriching my understanding/gaining information” (9% vs. 47%) and “seeing rare, valuable or uncommon things” (19% vs. 35%).
- ✓ Experiences with *Bright Beneath* that were different from those found in Ocean Hall:
  - *Bright Beneath* visitors were less likely to mark “seeing rare, valuable, or uncommon things” than were Ocean Hall visitors (19% vs. 46%)
  - Visitors exiting *Bright Beneath* were less likely to mark “increasing my appreciation of the natural world” when compared to those exiting the Ocean Hall (25% vs. 42%)
- ✓ Those who marked “increasing my appreciation of the natural world” were more likely to spend more time in the Ocean Hall (12 min. vs. 8 min).
- ✓ On average, visitors exiting the Ocean Hall who saw *Bright Beneath* marked a higher number of experiences than visitors exiting the Ocean Hall who did not see *Bright Beneath* (4 experiences vs. 3 experiences).
- ✓ Visitors who reported a higher number of experiences were more likely to rate the exhibition superior. This was true for all visitors regardless of the survey they completed. In other words, the more experiences they had the higher their satisfaction with the exhibition.<sup>6</sup>

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<sup>6</sup> Other OP&A studies have indicated a possible correlation between number of experiences and satisfaction. See, for example, *An Analysis of Existing Data on Visitors to the Freer and Sackler Galleries*, p. 19. <http://www.si.edu/content/opanda/docs/Rpts2007/FSG.metadata.071114.final.pdf>

**Exhibit 6: Which of these experiences are you especially looking forward to/did you find especially satisfying in (the Ocean Hall/*The Bright Beneath*) today?**



\*Differences are statistically significant.

## Surprises

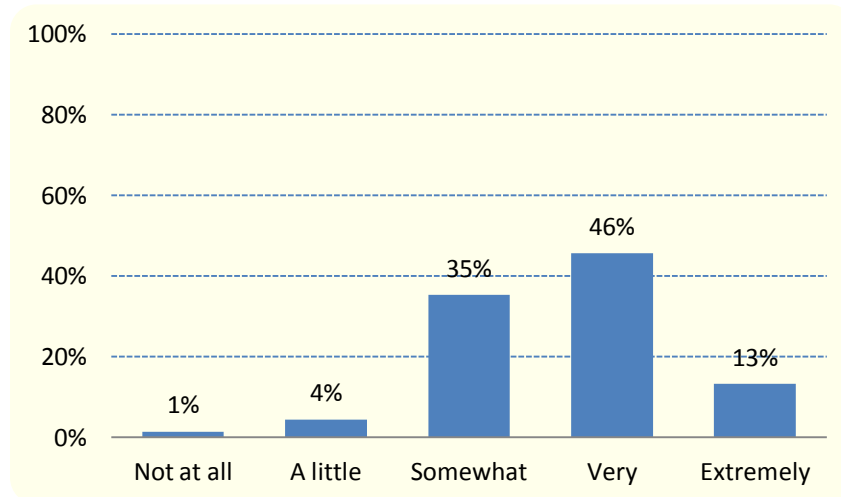
*I didn't expect it—it's like art. I like it a lot.*

*I hadn't realized that [the Museum] was interested in having artists come, and that they were interested in seeing how [artists] integrate their perception of the world with what scientists are doing...*

*I've been in a few natural history museums and a lot of them have some sort of art associated with it. So, I wasn't surprised but it was pleasant to see.*

Exiting visitors were asked to rate how surprised they were by *Bright Beneath* on a five-point scale of Not at all, A little, Somewhat, Very, and Extremely. Over half of visitors said they were either Very surprised or Extremely surprised (59%).

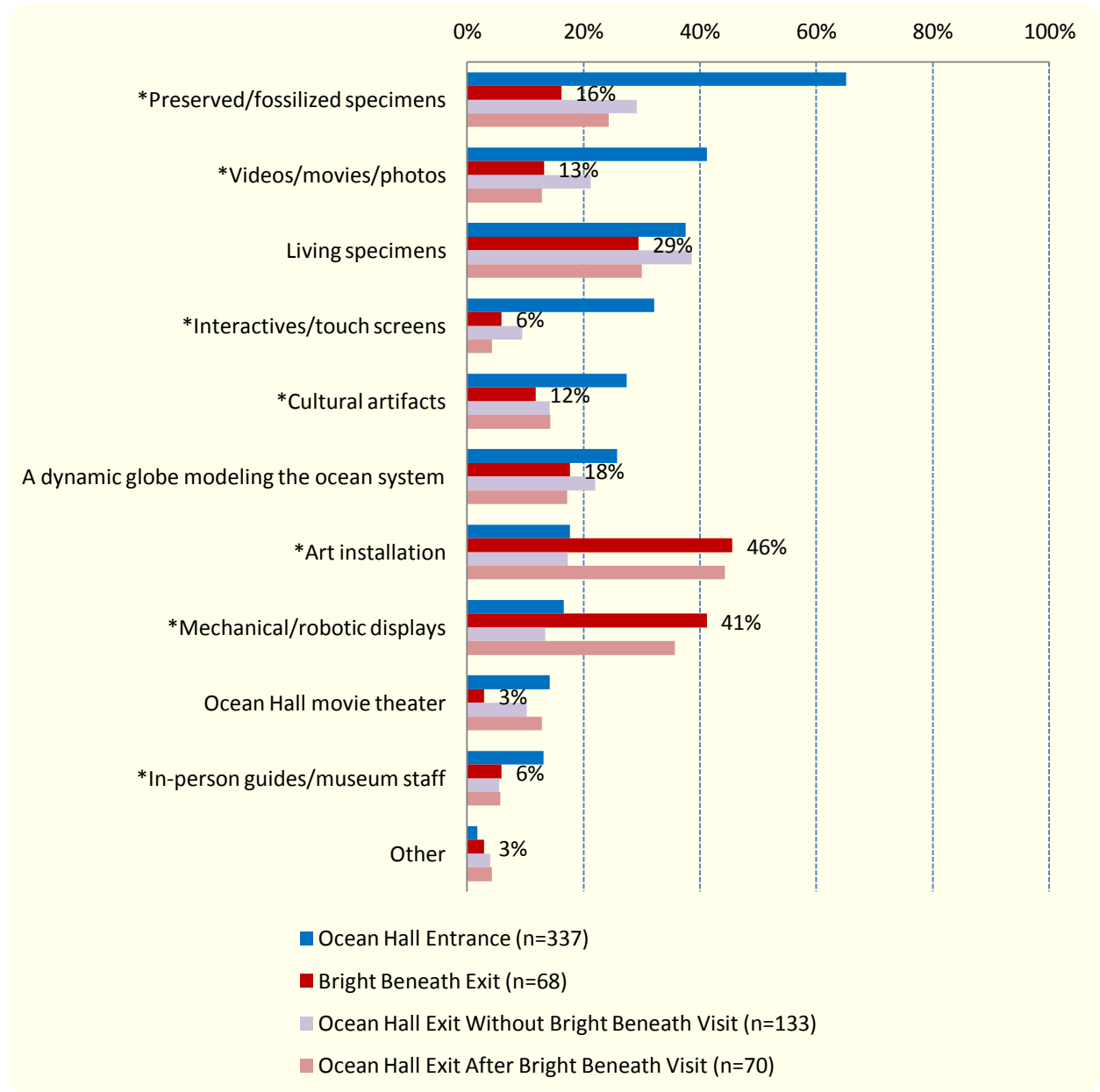
### Exhibit 7: Please rate how surprised you are by this exhibition (n=68)



Upon entering the Ocean Hall, visitors were asked what they *expected to see*; upon exiting they were asked what they were *surprised by/did not expect to see* during their visit. The questionnaire included 10 options and “other” (see exhibit 8).

- ✓ The top two elements surprising visitors exiting *Bright Beneath* were “art installation” (46%) and “mechanical/robotic displays” (41%).
- ✓ Similarly, “art installation” and “mechanical/robotic displays” were the top two surprising elements selected by the visitors who saw *Bright Beneath* and were intercepted when exiting Ocean Hall. Visitors to Ocean Hall who did not see *Bright Beneath* were more likely to say that they were surprised by “living specimens”.
- ✓ When compared to what visitors expected to see, those who saw *Bright Beneath* were more likely than on entrance to be surprised by “art installation” and “mechanical/robotic displays.”
  - Those who said they were surprised by “mechanical/robotic displays” spent more time in the Ocean Hall (12 minutes vs. 8 minutes)

**Exhibit 8: Which of the following do you expect to see/were you surprised by/did not expect to see during your visit today?**



***Take-aways/themes***

*I'm not an engineer or anything but it made me think about how the devices were working, and also how that relates to the randomness of the jellyfish in the ocean.*



*The fact that [the exhibit] is dark in that room—that most of the light is coming from the creatures themselves [shows] how no sunlight comes down to their environment. So it [illustrates] how [the sea creatures] create their own light. So yeah, I guess I kind of learned that from this exhibit—not that I didn’t already know that, but the way it’s presented makes it more real.*

*Well, he used a lot of recyclable things, so I think recycling and the environment and how important it is...*

The goals of *Bright Beneath*, as well as what visitors reported getting from the exhibit in pre-survey interviews, were used to generate a list of five possible take-aways from *Bright Beneath*. Visitors chose them in the following order:

- ✓ (68%) I enjoyed the soothing environment (sound/color/movement)
  - ✓ (47%) I was impressed by the mechanics of the objects
  - ✓ (26%) I better understand the concept of bioluminescence
  - ✓ (7%) It changed my feelings/views of natural science
  - ✓ (3%) Other<sup>7</sup>
- 
- ✓ 19% of *Bright Beneath* exit survey participants responded to the open-ended question, “What did you learn about in *The Bright Beneath* exhibit?” About a quarter of these respondents reported learning something about light and/or bioluminescence, while several cited learning about the combination between art and science.
  - ✓ 34% of *Bright Beneath* exit survey participants responded to the open-ended question, “What do you think are the themes/ideas of this exhibition?” The most commonly cited themes were deep sea life, light and bioluminescence, beauty in the natural world, and discovery.

### ***Bright Beneath: Longer-Term Outcomes***

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The exhibition team was interested in measuring three indicators of longer-term outcomes from *Bright Beneath*: whether visitors would like to see art exhibitions at NMNH in the future; the number of people who made a return visit to the exhibition; and the number who said it changed their views on science and interest in science and/or art.

### ***Future art exhibits at NMNH***

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*...this [exhibition] was a very interesting, eye-catching sort of thing, and I think it’s something that people will remember when they go away from the museum. So, I don’t know if they have other art-science fellows, but I think it could be a really neat avenue to explore—I would come back to see other [exhibitions] like this.*

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<sup>7</sup> Eight visitors wrote in an “other” response. Their comments were: *value of art in a natural history museum; nothing; about ocean species; movement and color; there’s beautiful life besides humans; light effects; good and innovative; and excellent engineering.*

- ✓ Three-quarters of visitors to *Bright Beneath* said the Museum should display art exhibitions (76%); one-fifth had no opinion (19%); and 4% said the Museum should not display art exhibitions.
- ✓ 34% of *Bright Beneath* exit survey participants responded to the “why or why not” portion of the question, “Should the museum display art exhibitions like this?” Nearly all of these comments were in support of art exhibits at NMNH. Most respondents commented on art’s ability to connect with and inspire visitors as to why there should be more art exhibits.

### *Return visits*

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- ✓ 10% of all visitors were making a repeat visit to *Bright Beneath*.

### *Change in interest*

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*It’s a new way to look at things and to remind people to make connections... the exhibit kind of adds another view of these deep sea creatures... in more of an abstract form.*

*..It makes [science] an attractive and beautiful thing, not just something that’s just sort of dead on the paper.*

*Well it certainly opens the door. Like I said, I’m an artist who is interested in science...and when you go into the science world having been an artist, there’s not a whole lot of open doors there and there aren’t a whole lot of people who understand the connection...so I feel at home, I guess.*

The exhibition team was interested in finding out if visitors to *Bright Beneath* reported an increased interest in science and/or art after visiting the exhibition.

- ✓ Across the three surveys, visitors entering or exiting the Ocean Hall or *Bright Beneath* reported the same levels of interest.
- ✓ *Bright Beneath* visitors’ self-reported levels of interest were:
  - Art : 40% very interested, 55% somewhat interested, and 4% not interested
  - Science: 49% very interested, 49% somewhat interested, and 2% not interested

### *Changes in visitors’ views on science*

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- ✓ 7% said visiting the exhibition changed their feelings/views of natural science.

## Observations

Most visitors to *Bright Beneath* had positive experiences—many were moved aesthetically, emotionally, philosophically, and intellectually. Some were affected by seeing the juxtaposition and linkages between art and science and a few said their views of science had been changed. Visitors' responses to *Bright Beneath* indicate that it was successful by several measures:

- ✓ It was rated “superior” similar to other exhibitions at NMNH, including Ocean Hall.
- ✓ It surprised its visitors.
- ✓ It provided intended satisfying experiences to many of its visitors—“having my curiosity sparked,” “being moved by beauty,” “feeling relaxed,” and “feeling a sense of awe and wonder.”
- ✓ It provided most visitors with sufficient information
- ✓ For a few, it changed their views/feelings about science
- ✓ Its visitors spent longer amounts of time in the Ocean Hall
- ✓ It made respondents' overall visits to the Ocean Hall richer, i.e., they had a higher number of satisfying experiences.

It was less successful in meeting other indicators:

- ✓ It did not draw a large, exhibition-specific audience, i.e., a low percentage of visitors came specifically to see *Bright Beneath*. (The sample was too small to assess whether the exhibition brought in different audiences. In fairness, the majority of NMNH visitors are tourists coming from outside the DC Metropolitan area. Also, the study team was unaware of any special advertising/promotion for the exhibition.)
- ✓ Visitors' reported levels of interest in science and/or art was similar -on average, exiting visitors had the same levels of interest as entering visitors.

### **Satisfaction with the exhibition**

Most visitors to *Bright Beneath* were satisfied with their overall experience in the exhibition. Visitors' ratings for the exhibition were similar to their ratings for the Ocean Hall and for other exhibitions at NMNH.

### **Visitors satisfying experiences**

The exhibition was successful in providing its visitors with intended satisfying experiences. It exceeded visitors' expectations with respect to “being moved by beauty” and “feeling relaxed,” and met their expectations of “having my curiosity sparked” and “feeling a sense of awe and wonder.” This study further shows that *Bright Beneath* was especially successful with those who found “being moved by beauty” and “feeling a sense of awe and wonder” to be satisfying experiences as those experiences correlate with making more frequent stops and longer time spent in the exhibition.

Furthermore, visitors who saw *Bright Beneath* had richer experiences in the Ocean Hall. They reported a higher number of satisfying experiences and spent more time in the Hall. It is possible that presenting a broader variety of opportunities, as was accomplished by adding an art exhibit, might help generate longer stays and favorable ratings. Many

interviewees—even those who ultimately decided that they didn’t care for the exhibition—described how the exhibition stimulated the senses, and for some, triggered an emotional reaction and had the capacity to engage, affect, and transform.

Interviewees’ opinions regarding the exhibition layout and presentation expressed how they saw *Bright Beneath* as “different” from the rest of the museum, yet still related to the Ocean Hall. Comments regarding why the museum chose to display *Bright Beneath* further support the idea that interviewees both identified the exhibition as different, and understood how and why it was different.

### **Surprise**

Almost half of visitors to *Bright Beneath* said they were surprised to see an “art installation” or “mechanical/robotic displays.” Moreover, most interviewees expressed their surprise as positive and those reporting being surprised by “mechanical/robotic display” also spent more time in the Ocean Hall.

### **Time spent in the exhibition**

It is difficult to assess whether the amount of time visitors spent in the exhibition was low, high or about right. Compared to the *HCCR* exhibition, visitors to *Bright Beneath* spent less time in the same space. However, the study team questions whether the two are necessarily comparable since *HCCR* had different aims and different types of displays. It is worth noting that visitors spent more time in the Ocean Hall while *Bright Beneath* was on display than they did when *HCCR* was in the Ocean Focus Gallery.

Perhaps more important is the fact that visitors who saw *Bright Beneath* spent more time in the non-*Bright Beneath* portion of the Ocean Hall than those who did not see *Bright Beneath*. These findings suggest that visiting *Bright Beneath* sparked people’s curiosity about the ocean; or relaxed visitors and, thus, provided a pause that fostered further exploration. It is also possible that the current sample of visitors had more time to spend in the exhibitions.

### **Amount of Information**

As a contemporary art installation, NMNH presented *Bright Beneath* with less interpretation than is standard for Museum exhibitions. For the majority of survey respondents, the amount of information provided was sufficient, and none said it had too much information. Although some interviewees stressed that additional interpretation would have taken away from their experience, others expressed how more interpretation, either in the form of more text or images, would have had a positive effect on their experience. Additionally, some visitors suggested either clarifying the existing labels, or adding additional easier-to-read labels for increased accessibility. While un-obstructive text could have added information about the artist and the intent of the exhibition for those eager to read more, only less than one-tenth of visitors had stopped in front of the information panels that were available.

### **Exhibition Themes**

Most visitors took something away from visiting the exhibition. Some had experiences such as enjoying the environment and relaxing; for others, the exhibition was a cognitive experience that deepened their understanding of the concept of bioluminescence or changed their view of science. While some visitors expressed that they would have benefited from more information in understanding the exhibition's themes, the study team is not convinced that more information would have been accessed by the visitors or that it would not have hindered other satisfying experiences, such as sparking curiosity, being moved by beauty, or feeling a sense of awe and wonder.

## Appendix A: Qualitative Study of *The Bright Beneath: The Luminous Art of Shih Chieh Huang*

### Qualitative Interviews

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For the qualitative part of the study, OP&A staff conducted a total of 44 semi-structured interviews with visitors within and exiting *The Bright Beneath: The Luminous Art of Shih Chieh Huang (Bright Beneath)* on various dates between November 7, 2011 and January 6, 2012. Interviews were conducted with a total of 67 people. Interviewees included both residents of the Washington, D.C. metropolitan area and visitors to the region from around the country and the world. Interviews lasted from a few minutes to nearly half an hour.

In conducting interviews, OP&A staff used an interview guide developed in consultation with the NMNH exhibition development team and education staff (see Appendix B). While this guide served as an initial basis for interview questions, visitors were encouraged to talk freely about any topic relevant to the exhibition.

Interviewees in the qualitative study do not constitute a representative sample; thus no information is generalizable to the visitor population and percentage figures are not used when reporting the interview findings.

### Findings

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#### Layout and Presentation

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#### Thematic Unity

Many interviewees described *Bright Beneath* as different but still related to the rest of the Ocean Hall. A number of interviewees cited the unique look-and-feel of the exhibition as the reason why they identified it as different; several reported feeling drawn to the space because, as characterized by one visitor, the space had a “different vibe”.

*We came back this way just looking at various things, and then we saw it and it was all lit-up and beautiful and moving! It's really, really, eye-catching.*

\*\*\*\*\*

*It belongs in the Ocean Hall, because it was very obviously inspired by the deep ocean...*

\*\*\*\*\*

*You know, we love this stuff, but people who are not as natural history oriented might find the exhibits a bit more static... but this kind of brings a nice creative, artistic, more modern aspect to it. And it's a nice amount too because the museum still gets to stay true to its core of being a natural history museum, but at the same time in can kind of show a little bit of flare... a different flavor that complements the rest of the museum.*

## Presentation

Interviewee comments about the presentation of *Bright Beneath* were for the most part positive, particularly with respect to the modern and artistic look-and-feel of the exhibition.

*The space is cleaner—not to say that the rest of the space is not laid out well—but I mean, this is just sort of an interesting, simple space that really kind of draws your eye back into the actual exhibit.*

\*\*\*\*\*

*This hall is kind of new so it goes along with the fresh, new vibe. It's very modern... It kind of seems as something that could be just as well placed in a modern gallery of an art museum, but I guess it makes sense that it's here because we're in the Ocean Hall.*

However, one visitor—a mechanical engineer—found the presentation to be a bit sloppy:

*The wiring is a little sloppy. It has a lot of exposed wires that could have been tucked up a bit cleaner.*

## Video

Of the interviewees who reported watching the video, several reported that the video positively affected their experience.

*I watched the video about how it was created. I was just so amazed. I was like, 'Whoa.'*

\*\*\*\*\*

*Just watching the assembly of it was very interesting...to see how they did it.*

## Labels

Reactions to the labels were mixed. A number of interviewees commented that they would have liked more information, either in the form of more text or images:

*I'm really into art, and I'd love to know more about the artist himself, but I like the connection he makes between the specimens he looked at and the creation process...I don't know, I would always like to hear more I guess.*

\*\*\*\*\*

*I think a little more might be good...I'm a big reader though, so...I think a little more about the science...about what it's trying to represent...*

\*\*\*\*\*

*I think I would have an image of a jellyfish in the background just because not everyone may know what these things represent...*

\*\*\*\*\*

*OP&A: So you would like to see [images] of the organisms that inspire this work?*

*FEMALE 1: Yeah.*

*FEMALE 2: Yeah, definitely.*

Others suggested making the information more accessible:

*Larger font, clearer text, bolded type—things that I could quickly identify. Maybe signs that say what these things are...the kids are asking me what these things are and I don't know.*

\*\*\*\*\*

*I would suggest that you include some more dialogue that describes this in a more friendly way to kids. It takes a while to read through the poster boards. Most of the kids aren't going to do that. Maybe you could include interactive screens or something that kids could touch. That is an investment that I think would give this exhibition more value than just a 'wow' factor.*

However, some felt that additional information would have taken away from the experience:

*It's kind of nice to just come in here and get away from everything. [To] take a break, and just look at things visually and not have to worry about reading things to know what it's all about. You can kind of just take it in, and enjoy it for what it is.*

\*\*\*\*\*

*I think I like the visual without words. I like the feeling of an experience that carries the theme of the hall.*

One male visitor actually stopped reading the label for fear of ruining the element of surprise:

*I didn't want to get too far into it; I didn't want to spoil the fun of it.*

### Visitors' Interpretations of Bright Beneath

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Because of the ambiguous nature of the exhibition, the NMNH exhibition team was especially interested in visitors' interpretations of both the exhibition space and the objects within the space.

### Exhibition as a Whole

A number of interviewees categorized the exhibition as art, often describing it as an artistic representation of what can be found in the ocean:

*[The exhibition is] an artistic representation of the bioluminescent creatures of the deep ocean. I think it's really neat; it's a really creative way of doing it.*

\*\*\*\*\*

*I would say that it's art. Art is just somebody's image of the world. This is obviously the artist's perception of what's underneath the ocean.*

\*\*\*\*\*

For others, art wasn't the first thing to come to mind when discussing the exhibition:

*OP&A: Let me see, I've been talking to you for almost fifteen minutes, and you didn't use the word art. This is supposed to be an exhibition about how to use art to make visitors think*



*differently about science, and you didn't use the word art. And I'm wondering now why. Can you elaborate?*

*MALE VISITOR: Well, you know, I'm first and foremost a left-brain kind of guy (laughs). So art to me is sort of one of those abstract concepts that I enjoy doing but I'm much more of a technical person. But yeah, I wouldn't consider this not art. I mean, these are mobiles, and you know mobiles are a form of sculpture. It's very cool. I enjoy it.*

And yet, a few interviewees weren't entirely comfortable with labeling the exhibition as art:

*OP&A: You didn't call it art at all...*

*FEMALE VISITOR: Yeah, I didn't.*

*OP&A: You don't see it as art?*

*FEMALE VISITOR: I don't know...it's true that it stimulates all your senses...I mean, there is the visual...and also your ears are stimulated...but I don't know if I can call it art—well, yeah maybe it is, because art is something that is innovative and something that impresses you...so maybe it is art.*

Additionally, a few interviewees were unsure of what to call it:

*OP&A: How would you describe it to your friends?*

*MALE VISITOR: I don't know.*

*OP&A: So if you [were to tell them], "Hey, I've been to the natural history museum and I saw..."*

*MALE VISITOR: I honestly can't tell you. I don't know.*

## Objects

Interviewees used a variety of terms to describe the objects in the exhibition, including "sculptures", "machines", "mobiles", "contraptions", "robots", and "recycled art pieces". A number of interviewees interpreted the objects in the exhibition as representations of jellyfish or sea creatures. Others offered more imaginative interpretations of the objects:

*FEMALE VISITOR: I like the ones on the floor—they're kind of like petals. I think it's pretty cool.*

*OP&A: Like flowers?*

*FEMALE VISITOR: Yeah. Because yeah, they kind of look like hanging flowers and stuff like that...*

\*\*\*\*\*

*OP&A: What do you think it is supposed to be?*

*BOY 1: A robot.*

*BOY 2: Spiders.*

\*\*\*\*\*

*For some reason it reminded me of aliens from outer space.*

## Themes and Messages

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When asked to identify the exhibition's theme/messages, interviewees described at least one theme/message.

## Bioluminescence

Several interviewees picked up on the theme of bioluminescence. A number of these interviewees also reported reading the text and/or watching the video. However, these responses were mixed: some interviewees reported that they immediately recognized the bioluminescence theme, even before reading and/or watching the video, while others made it clear that without the text and/or video they would not have picked up on this theme.

*It made me think of [bio]luminescence automatically, so I think that it was a really good exhibit because it made me automatically think of what it's supposed to represent.*

\*\*\*\*\*

*Before [I read the panel] I thought it was probably an artist representing himself in some way in this deep water exhibit.*

\*\*\*\*\*

*I read about it after we went in and actually looked at it and studied the lights and the sequence of lights and the events...and initially I understood that it was sea-oriented, but I probably didn't get the bioluminescence aspect as quickly as I should have...*

Additionally, several of the interviewees who identified this theme also reported having previous knowledge of the topic. Often, these individuals said that the exhibition confirmed and/or added to their understanding of bioluminescence.

*The fact that [the exhibit] is dark in that room—that most of the light is coming from the creatures themselves [shows] how no sunlight comes down to their environment. So it [illustrates] how [the sea creatures] create their own light. So yeah, I guess I kind of learned that from this exhibit—not that I didn't already know that, but the way it's presented makes it more real.*

## Connection Between Art and Science

The connection between art and science was mentioned by several interviewees, often to express their excitement for the recognition of the topic, and as we'll discuss later, as a source of surprise.

*I like to see the juxtaposition of art and science...it's a really great, great thing.*

\*\*\*\*\*

*Well, I think the exhibit is a really neat combination of the creative because you do have that art side of [the objects]—they have the lights and the movement and the different plastic bags and what not. [It] also has the scientific aspect of it because it is representing a life form and it is here in the museum of natural history.*

A number of the interviewees who identified the connection between art and science as a theme also reported reading at least some of the text, many even referred directly back to information from the text panels in their responses.

*FEMALE VISITOR: It's cool—I didn't know that they had artist fellows, I just assumed that they were all research fellows and scientists, but I like that it's an artist.*

OP&A: *So you think that the guy was an artist fellow?*

FEMALE VISITOR: *Yeah.*

OP&A: *So, you said awesome to describe it, and you said cool...please elaborate...what do you mean? Why cool, why awesome?*

FEMALE VISITOR: *Well, I think it's neat to see art that's so concretely inspired by an aspect of nature that people don't come across very much.*

On the other hand, a few of the interviewees who identified the connection between art and science as a theme did not read the text. However, these visitors reported either having previous knowledge of *The Bright Beneath*, or of similar exhibitions that explore the connection between art and science. The first interviewee—an art teacher who had read about the exhibition extensively on the museum's website—brought her class to NMNH specifically to see *The Bright Beneath* exhibition. She explained why:

*I believe the arts are branching out... art all by itself doesn't have as much power as it does when you combine it or collaborate with the sciences or the humanities or language arts or literature or news... and that's really when it has a lot of power. That's what I try to do in my classes, is to support students who may not necessarily be artists....*

Two other interviewees—an elderly couple visiting from out of town—immediately associated *Bright Beneath* with an art exhibition they saw at an aquarium:

FEMALE VISITOR: *We've been to an exhibit—in an aquarium somewhere—that had this incredible exhibit on jellyfish. And this made me think of that.*

OP&A: *Ok. So, it was an exhibit of live jellyfish?*

MALE VISITOR: *Live. Yes.*

FEMALE VISITOR: *And there were frames around the jellyfish as if they were works of art.*

MALE VISITOR: *...To me, it achieves what it set out to achieve.*

OP&A: *Which is what to you?*

MALE VISITOR: *To me it's [to illustrate] the connection between art and nature.*

### [Environment/Ocean Conservation/Recycling](#)

Some interviewees identified the exhibition's environmental messages, using terms such as “pollution”, “recycling” and “ocean conservation”. Although specific interpretations of the exhibition's environmental messages varied, all of the interviewees mentioned the materials used in the exhibition (e.g. plastic bags, coke bottles) when talking about the exhibition's environmental themes/messages. Some interviewees interpreted the materials as a comment on the importance of recycling:

*Well, he used a lot of recyclable things, so I think recycling and the environment and how important it is...*

While others viewed the materials as a comment on the hazardous effects pollution has on the ocean:

*You can think about it from an environmental perspective... [these materials] are things that litter the ocean...*

It is important to note that two interviewees only mentioned the environmental message after probing from OP&A staff, as seen in the example below:

*OP&A: Do you think there is a message in that [the water bottles]?*

*FEMALE VISITOR: Well, I imagine that there probably is...I think that, you know, there is always the environmental message...*

*OP&A: Before I asked you, were you thinking of that?*

*FEMALE VISITOR: Not particularly—I mean I noticed that they were water bottles, but when I walked in and looked at the exhibit I was not thinking that this was environmental...*

### Deep Sea

Some interviewees identified the deep sea/creatures of the deep sea as an exhibition theme, often citing the look-and-feel of the exhibition as well as the exhibition's location in the Ocean Hall in their responses.

*Because of the way it's colored...I'm assuming we're talking deep water and adaptation...*

\*\*\*\*\*

*A couple of movies were going through my mind, The Abyss and things like that.*

\*\*\*\*\*

*For me, it's sort of an interesting take on the ocean, and the life that's in it below...in specific levels of the ocean.*

\*\*\*\*\*

*It's a new way to look at things and to remind people to make connections... the exhibit kind of adds another view of these deep sea creatures... in more of an abstract form.*

### Unintended Messages

A few interviewees also derived unintended messages/themes from the exhibition. Many of these abstract interpretations were highly contemplative. For example, one male visitor—a neurologist visiting from New York—viewed the exhibition (at least in part) as a philosophical commentary on science:

*Well, the thing about biology is [that it allows us to] be able to see creatures different from ourselves, but at the same time [it gives] us a sense that there are pieces of life forms that we know of [that are] so far beyond our imagination.*

\*\*\*\*\*

*... [This exhibition] represents looking into what our place is in the universe in a way that is close to us...*

Some interviewees reported that they did not pick up on any exhibition themes/messages. One male visitor said he didn't know he was supposed to pick up on any themes or messages, while another simply responded that he was unsure. However, others explained that they hadn't been in the exhibition long enough, and therefore were unable to make any conclusions about its meaning.

## Visitor Reactions

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### Sensory Reactions

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A number of interviewees reacted positively to the exhibition; often citing the way the exhibition stimulated the senses as the source of its appeal. One visitor even described the exhibition as “a smorgasbord for the senses.” Words such as “beautiful”, “colorful”, “bright”, and “visually stimulating” were commonly used when describing the exhibition’s appeal, suggesting that for many, their time in *Bright Beneath* was a positive aesthetic experience. Some interviewees also identified the sounds coming from the exhibition as part of its appeal, as these two different female visitors did:

*You know, you hear the fans and you hear these little clicking noises. So it’s a really pleasant auditory experience.*

\*\*\*\*\*

*And then the sounds of the various switches clicking, and trying to make it sort of rhythmic, and again, a sort of organic type of communication...*

Besides sight and sound, a number of visitors said the kinetic nature of *Bright Beneath*, for example, “fans inflating the tentacles” and “the movement of the appendages” was what drew them in.

*I also think it’s cool that it’s mobile—it’s almost like performance art, but with machines.*

\*\*\*\*\*

*It’s like a dance, choreography... I think that’s pretty cool.*

A number of interviewees also described how the sensory-rich exhibition made them feel relaxed, using terms like “mesmerizing”, “meditative”, and “calming” to describe the experience.

*You can come back in this artistic space and just float with it...*

\*\*\*\*\*

*It’s actually very soothing if you sit here and look at it.*

Others reported feeling happy and/or excited. Still others described their experiences as immersive or thought-provoking:

*I’m happy. It’s just kind of a fun, exciting little thing that I enjoyed seeing. So, it was very enjoyable.*

\*\*\*\*\*

*OP&A: ..and either how you feel about the exhibit or how you would describe it in just three quick words...*

*FEMALE VISITOR: Happy, whimsical and beautiful.*

\*\*\*\*\*

*For viewers to have an experience of what it might be like to be at the bottom of the ocean... at a place you can't go... and kind of be in these things, instead of just watching them on a video or in a jar...*

\*\*\*\*\*

*I'm not an engineer or anything but it made me think about how the devices were working, and also how that relates to the randomness of the jellyfish in the ocean.*

Conversely, a few interviewees responded negatively to the sensory aspects of the exhibition, often reporting that they didn't like the exhibition because it "creeped" or "weirded" them out. For two college-aged girls, it was the sounds and movement of the hanging sculptures that evoked a negative response:

*FEMALE VISITOR 1: I think it's cool, but it's kind of weird. The sounds kind of creeps me out. It sounded like you were walking into a—I don't know how to describe it. We were interested at first, [so] we walked in and were like, "Oh this is cool", but then it started making the sounds that were kind of creepy—like if you were to go to a circus.*

*FEMALE VISITOR 2: Yeah. I like the ones on the ground, but the ones hanging...*

*FEMALE VISITOR 1: It was the one that went like this [movement of object's arms] that kind of weirded me out.*

For another, it was eyes on one of the objects that proved to be unsettling:

*OP&A: ...But somehow you didn't really like [the exhibition]...*

*FEMALE VISITOR: No. It's just odd. Especially the one with the eyes...that [one] creeps me out.*

However, a few interviewees who described feeling "creeped" out by the exhibition also categorized the feeling as positive.

*TEN YEAR-OLD FEMALE VISITOR: I felt like it was going to grab at my head.*

*OP&A: How did that make you feel?*

*TEN YEAR-OLD FEMALE VISITOR: Creepy.*

*OP&A: Did you like it or not?*

*TEN YEAR-OLD FEMALE VISITOR: I liked it.*

*I'm kind of creeped out by it, but in a good way...I mean, I wouldn't want it in my room, but I like that it exists, and I like to look at it. Like that (points to object) is super creepy—they look like eyes. I don't know what that would be based on, I assume some sort of part of an organism, but...It's really cool—it's just kind of creepy.*

\*\*\*\*\*

*FEMALE VISITOR: And that one looks like it has eyes...and they're staring at you.*

*OP&A: So you find it a little bit creepy...*

*FEMALE VISITOR: Yeah, but in a good way—I'm like positively creeped out.*

## Surprise

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Another research interest for this study was visitors' reactions to *The Bright Beneath* as a contemporary art installation within the context of a natural history museum.

## Good Surprise

Several interviewees were surprised by the exhibition, often categorizing the surprise as a “good surprise” when probed by OP&A staff. Of the interviewees who categorized the surprise as a good surprise, several responded positively to having art in a natural history museum.

*FEMALE VISITOR: I didn't expect it—it's like art. I like it a lot.*

*OP&A: When you say you didn't expect it—what about it...was it the art that you didn't expect?*

*FEMALE VISITOR: I guess so, yeah. I like how it's kind of merging...well I wasn't sure what it was trying to be...I guess it was trying to be ocean organisms or something...I don't know, but yeah—it just looked cool...it's like an art museum.*

\*\*\*\*\*

*I hadn't realized that [the museum] was interested in having artists come, and that they were interested in seeing how [artists] integrate their perception of the world with what scientists are doing... And I think that artists are always trying to help people perceive their world in a youthful and creative way; they're [trying to create] something that touches the part of the mind that pure facts don't.*

Further, several of the interviewees who categorized *Bright Beneath* as a good surprise also supported the idea of bringing more exhibitions like *The Bright Beneath* to the NMNH.

*I would say yes, because this [exhibition] was a very interesting, eye-catching sort of thing, and I think it's something that people will remember when they go away from the museum. So, I don't know if they have other art-science fellows, but I think it could be a really neat avenue to explore—I would come back to see other [exhibitions] like this.*

\*\*\*\*\*

*I would encourage it. Certainly not to lose the mission of investigation, education and display, but to draw all these pieces together is a good idea; it is a good balance, too. You are only using a very small portion of the floor space and the stimulation you have here...is more than okay.*

On the other hand, a few of the interviewees who considered *The Bright Beneath* to be a good surprise expressed some degree of hesitation about bringing in similar exhibitions to NMNH.

*OP&A: So would you have expected to see this exhibition in a natural history museum?*

*FEMALE VISITOR: I probably wouldn't have thought that this would be here.*

*OP&A: Do you mind--?*

*FEMALE VISITOR: No, no.*

*OP&A: Do you think there should be more of these?*

*FEMALE VISITOR: I'm not sure that you should fill a whole museum full of something like this, but it's nice to have one section that is dedicated to something like this.*

### [Bad Surprise](#)



Conversely, some interviewees categorized the exhibition as a “bad surprise” when probed by OP&A staff, often reporting that the contemporary art exhibition was out of place in a natural history museum.

*OP&A: Did it surprise you that this was here in the museum?*

*FEMALE VISITOR: Yes.*

*OP&A: Why?*

*FEMALE VISITOR: It doesn't seem like it fits in with everything else, because it is more modern, whereas everything else is... from the animals and different parts of history. I didn't know where this fits in at this part of the museum.*

*OP&A: Is that a negative or a positive for you?*

*FEMALE VISITOR: I guess it would be a negative.*

\*\*\*\*\*

*OP&A: Were you surprised?*

*FEMALE VISITOR: Yes.*

*OP&A: Do you like that there is an art exhibit here or do you think it doesn't belong in a natural history museum?*

*FEMALE VISITOR: Well I kind of think it doesn't really belong.*

*OP&A: Why is that?*

*FEMALE VISITOR: I don't know; it's just not natural history.*

Others felt that *The Bright Beneath* was too either technical or mechanical for a natural history museum:

*OP&A: Is this something that you expected to see in a natural history museum?*

*FEMALE VISITOR: No.*

*MALE VISITOR: Probably not; it would more likely be in a science museum.*

*OP&A: Why is that?*

*MALE VISITOR: Just because it is like robotic.*

*OP&A: Do you think it has a place here?*

*MALE VISITOR: Probably not.*

*OP&A: Why do you say that?*

*MALE VISITOR: I don't see [how it's related to] history; it's not [about] the past—it's more [about] the future, isn't it? [It's more about] art in general, and like I said, it's more robotic. There are more interesting things that I'd rather be looking at.*

### Neutral Surprise

For one interviewee, the surprise was neither good nor bad:

*OP&A: Were you surprised to see an exhibit like this in a natural history museum?*

*MALE VISITOR: Yes.*

*OP&A: Why—why were you surprised?*

*MALE VISITOR: Well, the Smithsonian typically has the kinds of things that are historical and extremely significant, and they're supposed to be the most predominant of--of what is discovered. I didn't know how this fit into that general idea...*

*OP&A: Ok.*



*MALE VISITOR: It's not that I have a problem with it, it's not a criticism...I was just surprised.*  
*OP&A: So, would you consider it a good surprise or a bad surprise?*  
*MALE VISITOR: It's neutral.*

### No Surprise

Additionally, a few interviewees commented that they weren't surprised by the exhibition, either because of previous exposure to art in natural history museums, or because of their perception of the Smithsonian.

*OP&A: Were you surprised?*

*MALE VISITOR: No, not really. I've been in a few natural history museums and a lot of them have some sort of art associated with it. So, I wasn't surprised but it was pleasant to see.*

\*\*\*\*\*

*Nothing surprises me at the Smithsonian.*

### Changes in Visitors' Perceptions of Art; Science

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Some interviewees reported experiencing a change in their perception of art and/or science. For some, the exhibition sparked an interest in science by making it more attractive and inviting.

*..It makes [science] an attractive and beautiful thing, not just something that's just sort of dead on the paper.*

\*\*\*\*\*

*Well it certainly opens the door. Like I said, I'm an artist who is interested in science...and when you go into the science world having been an artist, there's not a whole lot of open doors there and there aren't a whole lot of people who understand the connection...so I feel at home, I guess.*

\*\*\*\*\*

*[It made me think] how amazing it is... that there are many different branches of science. And I know the kids I am with are looking at it and saying, 'Wow! One person did this? What kind of math and science did he need to do that?'*

For others, the exhibition expanded their ideas about art:

*I guess there's a lot of art that's modeled on—a landscape is a classic example—there's a lot of art modeled on nature, which is science, but this is a new way of doing that... I don't know, this is just really different...it's a new way of using nature as a model...*

### Museum's Intent Behind The Exhibition

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Visitors were encouraged to speculate about why the Museum decided to install a contemporary art exhibition. Many of their answers reflected their goodwill about the Smithsonian and the Museum trying to act in their interest.

*Well, they're always trying to expand and have new ideas – broaden people's perspectives and horizons... that probably has something to do with it.*

\*\*\*\*\*

*I think the Smithsonian's job is to bring different ideas to the public, and so when you have an art exhibit about something scientific... it could get people to think differently about what they're learning about in the Museum.*

\*\*\*\*\*

*I think mostly for the kids. It is something new and different for the kids.*

\*\*\*\*\*

*The deep recesses of the ocean are relatively unexplored so to have this kind of exhibit will probably get people to talk more about it.*

\*\*\*\*\*

*To teach you a little bit that there is art involved in natural history as well. It's kind of neat to put the two together.*

\*\*\*\*\*

OP&A: Why do you think it is here?

FEMALE VISITOR: *To show that museums aren't just all stuffy things*

FEMALE VISITOR: *They are diverse.*

### *Visitors' Reactions to Other Visitors in The Bright Beneath*

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A number of interviewees shared their observations of and interactions with the other visitors in the exhibition.

*I was standing next to this girl who was about 15 and she said, "Oh, it's all plastic bottles!" And I said "It was?" I didn't even pick up on that. So, people can kind of talk... it's more interactive, yet still meditative.*

In particular, several interviewees mentioned the kids' reactions, often to express their amusement.

*We were enjoying the way the kids were reacting to it, too. We were commenting to each other that all the kids were mesmerized.*

\*\*\*\*\*

*The little boy in front of me was like, 'it's an octopus'.*

\*\*\*\*\*

*As we were leaving we noticed that the little girl over there—in the white skirt—had this open-mouthed, expression of awe on her face.*

For others, observing children's reactions in the exhibition brought up issues of accessibility and education.

MALE VISITOR: *I think of [how it is accessible] to kids. It has this science-fiction [feel]. It also has a lot of LED lights so it's very bright. It's just more inviting. And once [visitors] come and look at it, then they can say, "Mom (or Dad), are these things real?"*

OP&A: *So it sparks curiosity and questioning?*

MALE VISITOR: *Yeah. And then it evokes an interaction between them and their parents that's [beyond the normal] passive interactions [that occurs between kids and parents]. You know,*

*the passive interactions [that occur] when kids are [occupied] with the TV or IPAD, and how it's the kid and the parents and the IPAD and not just the kid and the parents...*

## Appendix B: Methodology

### Methodology

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To answer the output and outcome questions provided by the *Bright Beneath* exhibition team, the Office of Policy and Analysis (OP&A) study team<sup>8</sup> employed multiple methods over the months of December 2010 and January 2011: visitor tracking and observation, quantitative surveys and qualitative interviews. The following is a full description of the three methodologies, limitations of the study, analyses conducted, the qualitative interview guide developed in consultation with the NMNH exhibition development team, the tracking forms, and the survey instruments.

### Visitor Tracking and Observation

The study team observed 323 visitors throughout their visit to the Ocean Hall. Roughly half of these visitors entered the *Bright Beneath* exhibition. The study used a variable interval sampling method. Visitors were intercepted at three entrances: roughly half at the Main entrance off the rotunda and about one-fourth each at the back/side entrance from the *Human Origins* exhibition and the back/side entrance from the *African Voices* exhibition.

### Quantitative Surveys

The study team administered three different surveys to four different groups of visitors. The visitors selected for observation received one of two survey forms: *Bright Beneath* Exit (for visitors exiting BB) or Ocean Hall Exit (administered to groups of visitors who *did not* see BB and who *did* see BB). The third survey, Ocean Hall Entrance, was administered to 336 visitors entering the Ocean Hall.

### Qualitative Study

The OP&A study team conducted a total of 44 semi-structured interviews with visitors within and exiting *Bright Beneath* on various dates between November 7, 2011 and January 6, 2011. Interviews were conducted with a total of 67 people. Interviewees included both residents of the Washington, D.C. metropolitan area and visitors to the region from around the country and the world.

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<sup>8</sup> Besides OP&A staff, the study team was augmented by an NMNH graduate intern and two NMNH volunteers.

## Response rate by survey type

		Entrance				Exit			
		Ocean Hall		Bright Beneath		Ocean Hall		Ocean Hall	
						Visitors who saw Bright Beneath		Visitors who did not see Bright Beneath	
		#	%	#	%	#	%	#	%
Survey Status	Complete	337	78%	68	83%	70	90%	133	82%
	Refusal	95	22%	14	17%	8	10%	30	18%
Total		432	100%	82	100%	78	100%	163	100%
Tracked through OH and BB				82	100%	78	100%	163	100%
Tracked through BB				N=160; 52% of observed visitors					

### Limitations

There are several threats to the internal and external validity of the multi-method *Bright Beneath* study results:

- ✓ The approximate sampling error for 300 visitors is plus or minus 6% and for 100 visitors is plus or minus 10% at 95% confidence interval. For example, if 55% of the entering visitors to the Ocean Hall were female, we can be certain that repeated surveys of 300 visitors would show that the percentage of females is between 49% and 61%.
- ✓ The study team conducted several rounds of pretesting to assure that visitors would interpret the questions the way they were meant to be interpreted. However the study team cannot guarantee that no visitors misread the questions.
- ✓ Error associated with observers' measurements: Observations were conducted by trained staff as well as trained volunteers and intern. While all observers were trained and practiced the observation, it is possible that some errors in measurement occurred.

### Bias analysis

A bias analysis was conducted for variables such as gender, group composition, residence, and age. Foreign visitors were slightly underrepresented as they were more likely to refuse to answer the survey for language reasons. Since this is a frequent result, no adjustments were made. Older visitors were also slightly more likely to be underrepresented as those who refused were more likely to be over 60 years old. Again, no adjustment was made for this result, mainly because this difference did not show on the average age. The data was weighted to account for ineligible for the entrance survey; no weight adjustments were made for the exit surveys because visitors were selected observed as they entered the exhibition and then intercepted to complete the survey; lack of resources impeded the team to get an accurate account of the percentage of visitors who were ineligible.

## *Core analysis*

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Several types of analyses and tests were performed to generate the results for this report:

- ✓ Chi square tests
- ✓ Independent sample t-tests
- ✓ Analyses of variance and covariance
- ✓ Binary regression analyses

## *Additional analysis*

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### Factor Analysis Results

The study team ran a factor analysis to look for patterns in experiences. Based on these results visitors' experiences tend to fall into three main patterns:

- ✓ Pattern 1 was correlated with “enriching my understanding/gaining information,” “having my curiosity sparked,” and “increasing my appreciation of the natural world.”
- ✓ Pattern 2 was correlated with those who found especially satisfying “spending time with friends and family,” “seeing my children/friends/family learn,” and “feeling relaxed.”
- ✓ Pattern 3 was correlated with those who marked “feeling inspired,” “having a sense of awe/wonder,” “being moved by beauty,” and “Seeing rare, valuable, or uncommon things.”

The study team looked at associations between visitors having these satisfying experience patterns and their levels of satisfaction and surprise. Visitors who were more associated with pattern 2 and 3 were more likely to rate the exhibition higher. No association was found with their level of surprise.

**Hello, I would like to talk to you about your experience in this space, *The Bright Beneath* [Did you know about this exhibition before? Why did you decide to stop or not to stop?]**

**Did you think it was part of the Ocean Hall or a separate exhibit?**

**Probe:** What made you decide to stop here?

**What is your reaction to this exhibition? What do you think?**

**Probe:** did you like it or not? Why?

Did you pick up any themes or messages in the exhibit?

Did you read the text panels? Watch the video? Notice the sound?

Do you think that there is enough information? Too little?

Did this exhibit raise any questions in your mind?

**How did you feel in the exhibit?**

**Probe:** did you feel an emotional connection?

Did you feel it was an aesthetic experience?

Did you feel a sense of awe or wonder?

**Were you surprised to see an exhibit like this in a Natural History Museum?**

Probe: (If not surprised) Why? Do you think it is different or unique?

Probe (If surprised) Were you surprised in a good way or a bad way?

Do you think this kind of art exhibit has a place in a Natural History Museum? Why or why not?

**Is there anything about the exhibit that you didn't like? That you would change or improve?**

**How would you describe this exhibition to your friends/family? What words would you use to describe this exhibition?**

**Does this exhibit make you think any differently about science? Does this exhibit make you think any differently about contemporary art?**

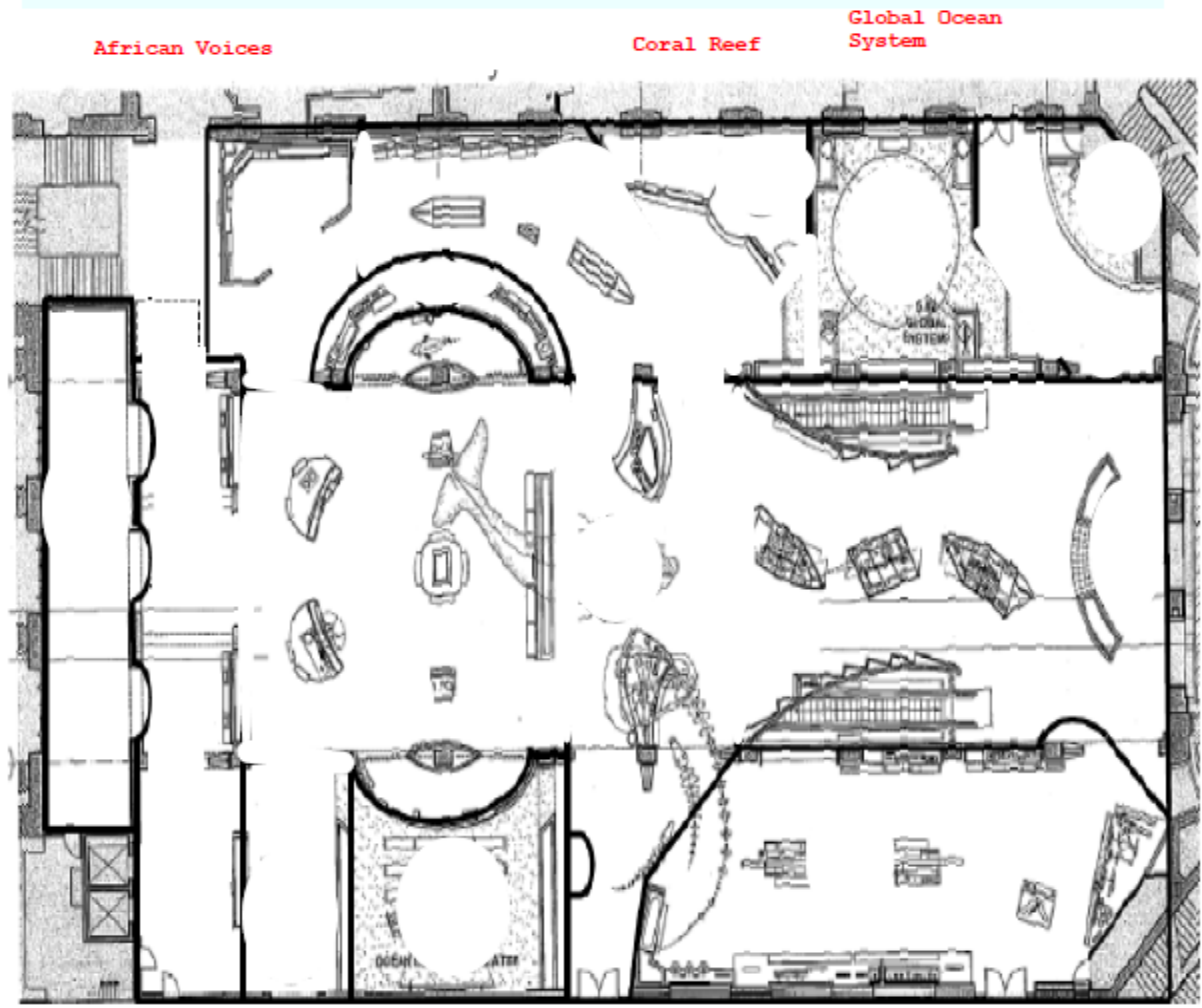
**Why do you think the Museum put this exhibition here?**

*Ocean Hall Observation Form*

0406560685

OH Time In      OH Time Out

Date



Age  0-11  12-20  21-30  31-40  41-50  51-60  61-70  71+

Gender  Female  Male

Group  Alone  With others  With group

# of children 0 to 11        # of youth 12 to 17        # of adults 18 +

Initial FID      Session

Loc  Main  HO  AF

TStatus  In  T  BB  SBB  SOH

SStatus  I  R1  Ro  C





Ocean Hall Entrance Survey

**Ocean Hall Entrance**

7603406972

Is this your first time visiting this museum, the National Museum of Natural History?  Yes  No      If "No," have you been to this Ocean Hall exhibit before?  Yes  No

Did you visit the museum today specifically to see the Ocean Hall?  Yes  No

How do you **expect to rate** your overall experience in the Ocean Hall when you leave?  Poor  Fair  Good  Excellent  Superior

Which of these experiences are you **especially** looking forward to in the Ocean Hall today? [Mark one or more]

- Feeling inspired
- Being moved by beauty
- Enriching my understanding/gaining information
- Seeing my children/family/friends learn
- Having my curiosity sparked
- Feeling a sense of awe/wonder
- Seeing rare, valuable, or uncommon things
- Spending time with friends/family
- Feeling relaxed
- Increasing my appreciation of the natural world

Did you come to learn something specific in this exhibition today? Please explain.

Which of the following do you **expect to see** in the Ocean Hall today? [Mark one or more]

- Preserved/fossilized specimens
- Living specimens
- Art installation
- In-person guides/museum staff
- Videos/movies/photos
- Mechanical/robotic displays
- A dynamic globe modeling the ocean system
- Interactives/touch screens
- Cultural artifacts
- Ocean Hall movie theater
- Other: \_\_\_\_\_

How interested are you in art?  Not interested  Somewhat interested  Very interested

How interested are you in natural science?  Not interested  Somewhat interested  Very interested

\*With whom are you visiting this museum today? [Mark only ONE]

- I am with a school group/organized group
- I am alone
- I am with others

\*If with others, how many people other than yourself are with you? [Write NUMBER of people]

# of adults 18 and over        # of children 0 to 11

# of youth 12 to 17

\*Where do you live?  United States. ZIP Code:

Other country. Please specify: \_\_\_\_\_

\*What is your age?

\*What is your sex?  Female  Male

**Thank you for your time and assistance!**

Initials	Session	Segment	Status					ID
<input type="text" value=""/> <input type="text" value=""/>	<input type="text" value=""/> <input type="text" value=""/>	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3	<input type="radio"/> C <input type="radio"/> R <input type="radio"/> L <input type="radio"/> I					<input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/>

Bright Beneath Exit Survey

1643085164	<b>The Bright Beneath Exit</b>	
Is this your first time visiting this museum, the National Museum of Natural History?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If "No," have you been to this <i>Bright Beneath</i> exhibit before? <input type="checkbox"/> Yes <input type="checkbox"/> No
Did you visit the museum today specifically to see <i>The Bright Beneath</i> exhibition?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Please rate your overall experience in <i>The Bright Beneath</i> exhibition today.	<input type="checkbox"/> Poor <input type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Excellent <input type="checkbox"/> Superior	
Which of these experiences did you find <b>especially satisfying</b> in <i>The Bright Beneath</i> today? [Mark one or more]	<input type="checkbox"/> Feeling inspired <input type="checkbox"/> Being moved by beauty <input type="checkbox"/> Enriching my understanding/gaining information <input type="checkbox"/> Seeing my children/family/friends learn <input type="checkbox"/> Having my curiosity sparked <input type="checkbox"/> Feeling a sense of awe/wonder <input type="checkbox"/> Seeing rare, valuable, or uncommon things <input type="checkbox"/> Spending time with friends/family <input type="checkbox"/> Feeling relaxed <input type="checkbox"/> Increasing my appreciation of the natural world	
How did you hear about <i>The Bright Beneath</i> exhibition?	<input type="checkbox"/> Stumbled upon <input type="checkbox"/> Facebook/Twitter <input type="checkbox"/> Word of mouth <input type="checkbox"/> Website <input type="checkbox"/> Other: _____	
Please rate how surprised you are by this exhibition.	<input type="checkbox"/> Not at all <input type="checkbox"/> A little <input type="checkbox"/> Somewhat <input type="checkbox"/> Very <input type="checkbox"/> Extremely	
Which of the following elements were you <b>surprised by/did not expect to see</b> during your visit today? [Mark one or more]	<input type="checkbox"/> Preserved/fossilized specimens <input type="checkbox"/> Living specimens <input type="checkbox"/> Art installation <input type="checkbox"/> In-person guides/museum staff <input type="checkbox"/> Videos/movies/photos <input type="checkbox"/> Mechanical/robotic displays <input type="checkbox"/> A dynamic globe modeling the ocean system <input type="checkbox"/> Interactives/touch screens <input type="checkbox"/> Cultural artifacts <input type="checkbox"/> Ocean Hall movie theater <input type="checkbox"/> Other: _____	
Should the museum display art exhibitions like this?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No opinion	
Why or why not?	_____	
For you personally, what do you think about the amount of information in <i>The Bright Beneath</i> ?	<input type="checkbox"/> Too little <input type="checkbox"/> About right <input type="checkbox"/> Too much	
What do you think are the themes/ideas of this exhibiton?	_____	
What did you get out of visiting this exhibition?	<input type="checkbox"/> I enjoyed the soothing environment (sound/color/movement) <input type="checkbox"/> I better understand the concept of bioluminescence <input type="checkbox"/> I was impressed by the mechanics of the objects <input type="checkbox"/> It changed my feelings/views of natural science <input type="checkbox"/> Other: _____	
What did you learn about in <i>The Bright Beneath</i> exhibit? Please explain:	_____	
How interested are you in art?	<input type="checkbox"/> Not interested <input type="checkbox"/> Somewhat interested <input type="checkbox"/> Very interested	
How interested are you in natural science?	<input type="checkbox"/> Not interested <input type="checkbox"/> Somewhat interested <input type="checkbox"/> Very interested	
With whom are you visiting this museum today?	<input type="checkbox"/> Alone <input type="checkbox"/> With others <input type="checkbox"/> With school/organized group	
Where do you live?	<input type="checkbox"/> United States. ZIP Code: [ ][ ][ ][ ][ ][ ] <input type="checkbox"/> Other country (specify): _____	
If with others, how many people other than yourself are with you? [Write NUMBER of people]	What is your age? [ ][ ]	
<input type="checkbox"/> # of children 0 to 11 <input type="checkbox"/> # of youth 12 to 17 <input type="checkbox"/> # of adults 18 +	What is your sex? <input type="checkbox"/> Female <input type="checkbox"/> Male	
IN [ ][ ] S [ ][ ] FID [ ][ ] C [ ] R [ ] L [ ] I [ ][ ][ ][ ]		

*Ocean Hall Exit Survey*

8818161272	<b>Ocean Hall Exit</b>	
Is this your first time visiting this museum, the National Museum of Natural History?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If "No," have you been to this Ocean Hall exhibit before? <input type="checkbox"/> Yes <input type="checkbox"/> No
Did you visit the museum today specifically to see the Ocean Hall?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Please rate your overall experience in the Ocean Hall today.	<input type="checkbox"/> Poor <input type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Excellent <input type="checkbox"/> Superior	
Which of these experiences did you find <b>especially satisfying</b> in the Ocean Hall today? [Mark one or more]	<input type="checkbox"/> Feeling Inspired <input type="checkbox"/> Being moved by beauty <input type="checkbox"/> Enriching my understanding/gaining information <input type="checkbox"/> Seeing my children/family/friends learn <input type="checkbox"/> Having my curiosity sparked <input type="checkbox"/> Feeling a sense of awe/wonder <input type="checkbox"/> Seeing rare, valuable, or uncommon things <input type="checkbox"/> Spending time with friends/family <input type="checkbox"/> Feeling relaxed <input type="checkbox"/> Increasing my appreciation of the natural world	
What did you learn about in the Ocean Hall today? Please explain.		
Which of the following elements were you <b>surprised by/did not expect</b> to see in the Ocean Hall today? [Mark one or more]	<input type="checkbox"/> Preserved/fossilized specimens <input type="checkbox"/> Living specimens <input type="checkbox"/> Art installation <input type="checkbox"/> In-person guides/museum staff <input type="checkbox"/> Videos/movies/photos <input type="checkbox"/> Mechanical/robotic displays <input type="checkbox"/> A dynamic globe modeling the ocean system <input type="checkbox"/> Interactives/touch screens <input type="checkbox"/> Cultural artifacts <input type="checkbox"/> Ocean Hall movie theater <input type="checkbox"/> Other: _____	
How interested are you in art?	<input type="checkbox"/> Not interested <input type="checkbox"/> Somewhat interested <input type="checkbox"/> Very interested	
How interested are you in natural science?	<input type="checkbox"/> Not Interested <input type="checkbox"/> Somewhat Interested <input type="checkbox"/> Very Interested	
With whom are you visiting this museum today? [Mark only ONE]	<input type="checkbox"/> I am with a school group/organized group <input type="checkbox"/> I am alone <input type="checkbox"/> I am with others	
If with others, how many people other than yourself are with you? [Write NUMBER of people]	<input type="text"/> <input type="text"/> # of adults 18 and over	<input type="text"/> <input type="text"/> # of children 0 to 11
	<input type="text"/> <input type="text"/> # of youth 12 to 17	
Where do you live?	<input type="checkbox"/> United States. ZIP Code: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
	<input type="checkbox"/> Other country. Please specify: _____	
What is your age?	<input type="text"/> <input type="text"/>	
What is your sex?	<input type="checkbox"/> Female <input type="checkbox"/> Male	

***Thank you for your time and assistance!***

Initials	Session	Field ID	Status			ID
<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="radio"/> C <input type="radio"/> R <input type="radio"/> L <input type="radio"/> I	<input type="radio"/>	<input type="radio"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>

### Appendix C: Frequency Distributions

	Entrance (n=337)	Exit (n=271)	Entrance (n=337)	BB Exit (n=68)	OH Exit (n=203)	OH Entrance (n=337)	BB Exit (n=68)	OH OH Exit (n=133)	BB OH Exit (n=70)
Is this your first time visiting this museum the National Museum of Natural History?									
No	46%	41%	46%	41%	41%	46%	41%	35%	53%
Yes	54%	59%	54%	59%	59%	54%	59%	65%	47%
If "No," have you been to this Ocean Hall/Bright Beneath exhibit before?									
No	44%	59%	44%	90%	49%	44%	90%	40%	59%
Yes	56%	41%	56%	10%	51%	56%	10%	60%	41%
Did you visit the museum today specifically to see the Ocean Hall/Bright Beneath exhibition?									
No	89%	90%	89%	91%	90%	89%	91%	91%	89%
Yes	11%	10%	11%	9%	10%	11%	9%	9%	11%
Please rate your overall experience in Ocean Hall/Bright Beneath exhibition today									
Poor	0%	1%	0%	1%	0%	0%	1%	1%	0%
Fair	2%	3%	2%	6%	1%	2%	6%	2%	1%
Good	25%	21%	25%	32%	18%	25%	32%	16%	21%
Excellent	55%	57%	55%	40%	63%	55%	40%	67%	56%
Superior	18%	18%	18%	21%	17%	18%	21%	14%	21%
Which of these experiences are you especially looking forward to in the Ocean Hall today? [Mark one or more] [Entrance]									
Which of these experiences are you especially satisfying in the Ocean Hall today? [Mark one or more] [Exit]									
Feeling inspired	22%	23%	22%	22%	23%	22%	22%	19%	30%
Being moved by beauty	25%	36%	25%	34%	37%	25%	34%	32%	46%
Enriching my understanding/gaining	47%	34%	47%	9%	42%	47%	9%	42%	43%

	Entrance (n=337)	Exit (n=271)	Entrance (n=337)	BB Exit (n=68)	OH Exit (n=203)	OH Entr- ance (n=337)	BB Exit (n=68)	OH OH Exit (n=133)	BB OH Exit (n=70)
information									
Seeing my children/family/friends learn	23%	22%	23%	16%	23%	23%	16%	18%	33%
Having my curiosity sparked	30%	30%	30%	39%	27%	30%	39%	24%	33%
Feeling a sense of awe/wonder	30%	33%	30%	31%	33%	30%	31%	30%	40%
Seeing rare, valuable, or uncommon things	35%	40%	35%	19%	46%	35%	19%	45%	49%
Spending time with friends/family	23%	24%	23%	21%	25%	23%	21%	21%	33%
Feeling relaxed	19%	26%	19%	31%	25%	19%	31%	24%	27%
Increasing my appreciation of the natural world	35%	38%	35%	25%	42%	35%	25%	40%	44%
Average experiences	3	3	3	2	3	3	3	3	4
How did you hear about The Bright Beneath Exhibition? [BB Exit]									
Stumbled upon	0%	73%	0%	73%	0%	0%	73%	0%	0%
Website	0%	11%	0%	11%	0%	0%	11%	0%	0%
Facebook/Twitter	0%	2%	0%	2%	0%	0%	2%	0%	0%
Word of mouth	0%	6%	0%	6%	0%	0%	6%	0%	0%
Other	0%	8%	0%	8%	0%	0%	8%	0%	0%
Please rate how surprised you are by this exhibition [BB Exit]									
Not at all	0%	1%	0%	1%	0%	0%	1%	0%	0%
A little	0%	4%	0%	4%	0%	0%	4%	0%	0%
Somewhat	0%	35%	0%	35%	0%	0%	35%	0%	0%

	Entrance (n=337)	Exit (n=271)	Entrance (n=337)	BB Exit (n=68)	OH Exit (n=203)	OH Entrance (n=337)	BB Exit (n=68)	OH OH Exit (n=133)	BB OH Exit (n=70)
Very	0%	46%	0%	46%	0%	0%	46%	0%	0%
Extremely	0%	13%	0%	13%	0%	0%	13%	0%	0%
Which of the following do you expect to see in the Ocean Hall today? [Mark one or more] [OH Entrance]									
Which of the following elements were you surprised by/ did not expect to see in the Ocean Hall today? [Mark one or more] [Exit]									
Preserved/fossilized specimens	65%	25%	65%	16%	27%	65%	16%	29%	24%
Living specimens	38%	34%	38%	29%	36%	38%	29%	39%	30%
Art installation	18%	32%	18%	46%	27%	18%	46%	17%	44%
In-person guides/museum staff	13%	6%	13%	6%	6%	13%	6%	6%	6%
Videos/movies/photos	41%	17%	41%	13%	18%	41%	13%	21%	13%
Mechanical/robotic displays	17%	26%	17%	41%	21%	17%	41%	13%	36%
A dynamic globe modeling the ocean system	26%	20%	26%	18%	20%	26%	18%	22%	17%
Interactives/touch screens	32%	7%	32%	6%	8%	32%	6%	9%	4%
Cultural artifacts	27%	14%	27%	12%	14%	27%	12%	14%	14%
Ocean Hall movie theater	14%	9%	14%	3%	11%	14%	3%	10%	13%
Other	2%	4%	2%	3%	4%	2%	3%	4%	4%
Should the museum display art exhibitions like this? [BB Exit]									
No	0%	4%	0%	4%	0%	0%	4%	0%	0%
Yes	0%	76%	0%	76%	0%	0%	76%	0%	0%
No opinion	0%	19%	0%	19%	0%	0%	19%	0%	0%

	Entrance (n=337)	Exit (n=271)	Entrance (n=337)	BB Exit (n=68)	OH Exit (n=203)	OH Entr- ance (n=337)	BB Exit (n=68)	OH OH Exit (n=133)	BB OH Exit (n=70)
For you personally, what do you think about the amount of information in The Bright Beneath? [BB Exit]									
Too Little	0%	22%	0%	22%	0%	0%	22%	0%	0%
About Right	0%	78%	0%	78%	0%	0%	78%	0%	0%
Too much	0%	0%	0%	0%	0%	0%	0%	0%	0%
What did you get out of visiting this exhibition? [BB Exit]									
I enjoyed the soothing environment (sound/color/movement)	0%	68%	0%	68%	0%	0%	68%	0%	0%
I better understand the concept of bioluminescence	0%	26%	0%	26%	0%	0%	26%	0%	0%
I was impressed by the mechanics of the objects	0%	47%	0%	47%	0%	0%	47%	0%	0%
It changed my feelings/views of natural science	0%	7%	0%	7%	0%	0%	7%	0%	0%
Other	0%	3%	0%	3%	0%	0%	3%	0%	0%
How interested are you in art?									
Not Interested	8%	7%	8%	4%	7%	8%	4%	6%	10%
Somewhat Interested	50%	51%	50%	55%	49%	50%	55%	53%	41%
Very Interested	42%	43%	42%	40%	43%	42%	40%	40%	49%
How interested are you in natural science?									
Not Interested	1%	1%	1%	2%	1%	1%	2%	1%	1%
Somewhat Interested	34%	40%	34%	49%	37%	34%	49%	38%	34%
Very Interested	65%	59%	65%	49%	62%	65%	49%	61%	64%
With whom are you visiting this museum today?									



	Entrance (n=337)	Exit (n=271)	Entrance (n=337)	BB Exit (n=68)	OH Exit (n=203)	OH Entrance (n=337)	BB Exit (n=68)	OH OH Exit (n=133)	BB OH Exit (n=70)
I am with a school group/organized group	5%	2%	5%	3%	2%	5%	3%	2%	3%
I am alone	22%	18%	22%	17%	19%	22%	17%	23%	11%
I am with others	73%	80%	73%	80%	79%	73%	80%	76%	86%
Where do you live?									
Other country	19%	25%	19%	24%	25%	19%	24%	29%	16%
United States	81%	75%	81%	76%	75%	81%	76%	71%	84%
Washington DC metropolitan area									
No	88%	86%	88%	83%	87%	88%	83%	89%	84%
Yes	12%	14%	12%	17%	13%	12%	17%	11%	16%
What is your sex?									
Male	45%	50%	45%	43%	52%	45%	43%	54%	49%
Female	55%	50%	55%	57%	48%	55%	57%	46%	51%
Age grouped by generations									
GI (Born before 1925)	0%	0%	0%	0%	0%	0%	0%	0%	0%
Silent (Born 1925-1945)	3%	1%	3%	0%	1%	3%	0%	2%	1%
Leading Boom (Born 1946-1955)	5%	3%	5%	6%	1%	5%	6%	2%	0%
Trailing Boom (Born 1956-1964)	8%	10%	8%	9%	10%	8%	9%	9%	13%
Generation X (Born 1965-1981)	39%	42%	39%	42%	42%	39%	42%	41%	44%
Generation Y (Born 1982-1995)	41%	41%	41%	39%	42%	41%	39%	44%	39%
Generation Z (Digital)	4%	3%	4%	4%	2%	4%	4%	2%	3%

	<b>Entrance (n=337)</b>	<b>Exit (n=271)</b>	<b>Entrance (n=337)</b>	<b>BB Exit (n=68)</b>	<b>OH Exit (n=203)</b>	<b>OH Entr- ance (n=337)</b>	<b>BB Exit (n=68)</b>	<b>OH OH Exit (n=133)</b>	<b>BB OH Exit (n=70)</b>
Natives) (Born after 1995)									
Age by 10 year group									
1 thru 11	0%	0%	0%	0%	0%	0%	0%	0%	0%
12 thru 20	15%	14%	15%	19%	12%	15%	19%	12%	13%
21 thru 30	34%	33%	34%	27%	35%	34%	27%	37%	33%
31 thru 40	26%	26%	26%	19%	28%	26%	19%	26%	31%
41 thru 50	13%	19%	13%	27%	16%	13%	27%	16%	17%
50 thru 59	6%	6%	6%	3%	7%	6%	3%	8%	4%
60 thru 100	6%	2%	6%	4%	1%	6%	4%	2%	1%
Visit to Bright Beneath									
No	0%	49%	0%	0%	65%	0%	0%	98%	1%
Yes	0%	51%	0%	100 %	35%	0%	100 %	2%	99%

## *Analysis of the Open-Ended Responses*

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48% of the Ocean Hall Exit survey participants answered the question, “What did you learn about in the Ocean Hall today?” More than half of respondents referenced some aspect of ocean life in their responses (e.g. ocean animals, deep sea life, etc.); the giant squid was specifically mentioned in about 15% of the responses. Conservation, evolution, ecosystem, robotics used in ocean exploration, that science and art can mix beautifully, and volcanic eruptions that occur underwater were also cited.

37% of the Ocean Hall Entrance survey participants responded to the question, “Did you come to learn something specific in this exhibition today? The majority of respondents reported that they did not come to the exhibition to learn anything specific. For those who did report coming to the Ocean Hall to learn something specific, several referenced some aspect of ocean life (e.g. whales, prehistoric fish, fish) in their responses.

Ocean Hall Exit: Which of the following elements were you surprised by/did not expect to see in the Ocean Hall today? Other \_\_\_\_\_

*Responses (5): Squid, expert presence, species that are unknown to us, 3-D globe, giant squid*

19% of *Bright Beneath* exit survey participants responded to the open-ended question, “What did you learn about in *The Bright Beneath* exhibit?” About a quarter of these respondents reported learning something about light and/or bioluminescence, while about 15% cited learning about the combination between art and science.

*Bright Beneath* Exit: How did you hear about *The Bright Beneath* exhibition? Other \_\_\_\_\_

*Responses (4): N/A (Installer of BB exhibit, but not SI employee), no, museum volunteer, family*

*Bright Beneath* Exit: Which of the following elements were you surprised by/did not expect to see during your visit today? Other \_\_\_\_\_

*Response (1): Squid*

**Bright Beneath Exhibition (Average time and Percent)**

Tracked Visitors (n=323)

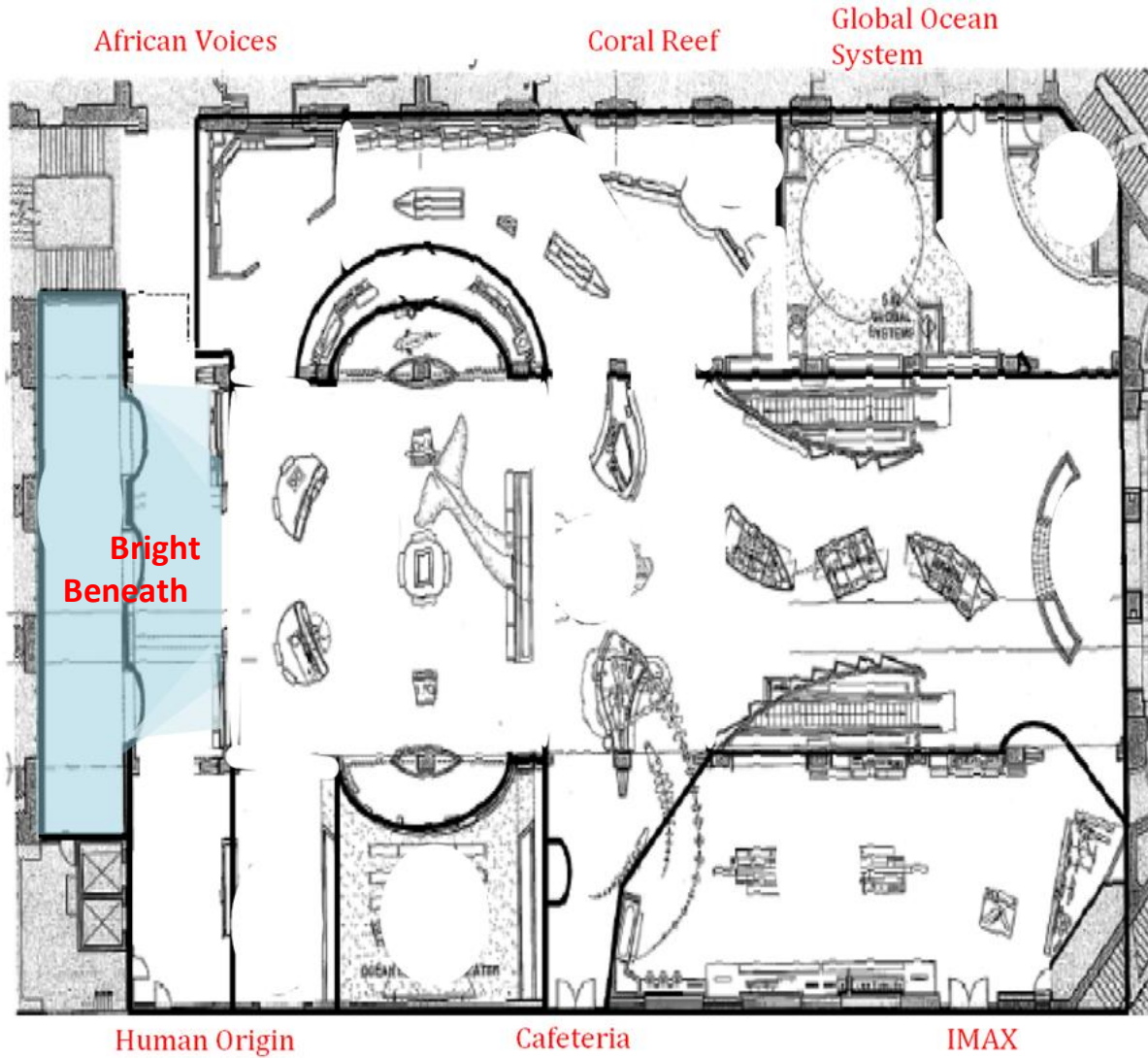
52% Visit to BB

48% Visit only OH

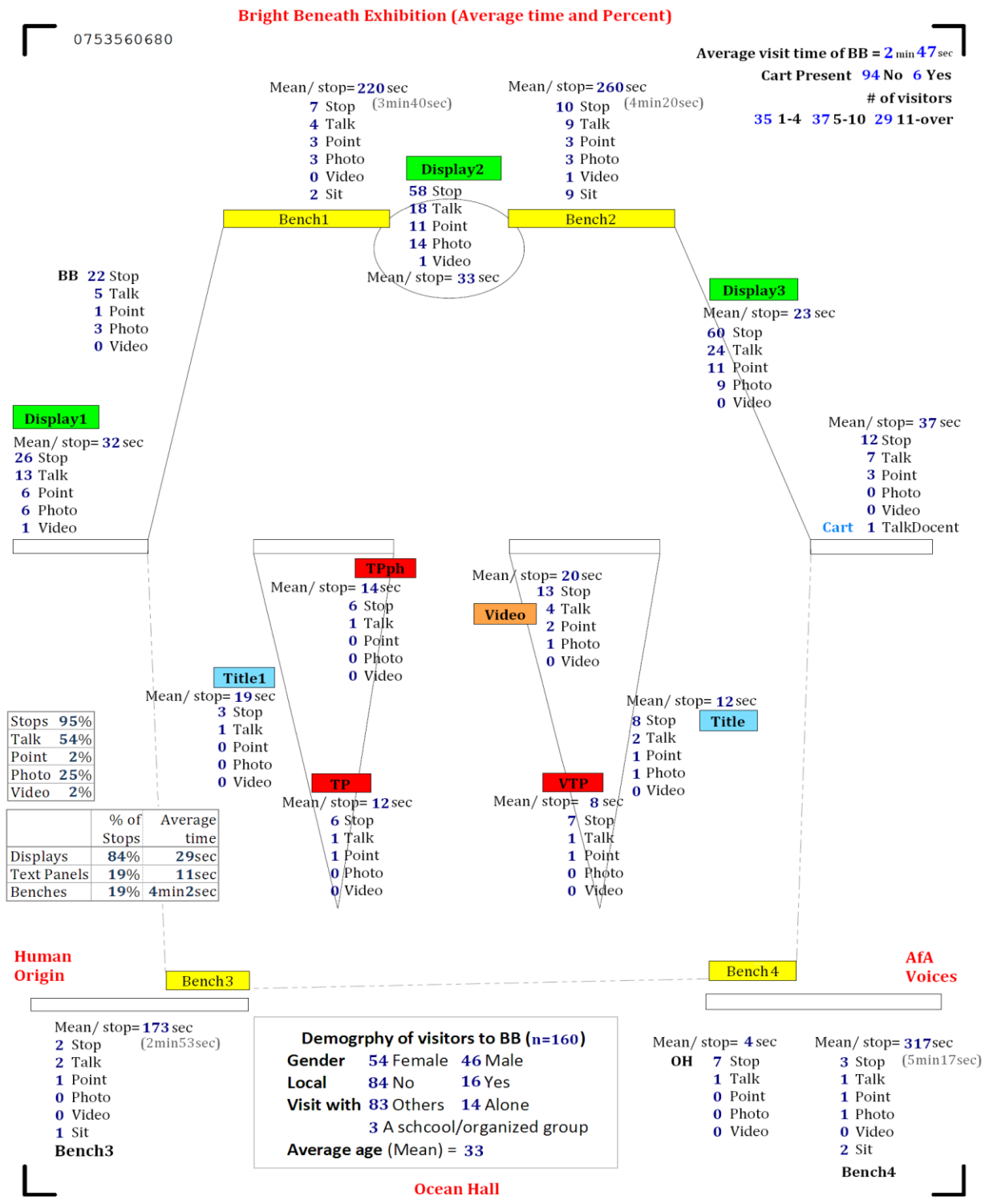
Average visit time of tracked Visitors

who saw BB and OH : 12min 19sec

Only OH : 7min 7sec



Bright Beneath Observations Frequencies



## Appendix D: Demographics of Visitors to *Bright Beneath, Hyperbolic Crochet Coral Reef, Ocean Hall, and NMNH*

		2011-2012 Bright Beneath Study (winter)				2010 NMNH General (winter Jan-Feb, 2010)		2011 NMNH Ocean Conservation Message		2011 NMNH Hyperbolic Crochet Coral Reef		
		OH Entrance	BB Exit	OH OH Exit	BB OH Exit	NMNH Entrance	NMNH Exit	OH Entrance	OH Exit	Exhibit Attendee	Exhibit Non Attendee	Exhibit Pre Attendee
<b>Is this your first time visiting this museum the National Museum of Natural History?</b>	No	46%	41%	35%	53%	53%	57%	39%	30%	57%	46%	57%
	Yes	54%	59%	65%	47%	47%	43%	61%	70%	43%	54%	43%
<b>With whom are you visiting this museum today?</b>	I am with a school group/organized group	5%	3%	2%	3%	8%	10%	5%	5%	4%	8%	9%
	I am alone	22%	17%	23%	11%	18%	20%	8%	14%	18%	24%	21%
	I am with others	73%	80%	76%	86%	74%	70%	88%	81%	78%	68%	71%
<b>Where do you live?</b>	Other country	19%	24%	29%	16%	16%	14%	16%	20%	18%	21%	14%
	United States	81%	76%	71%	84%	84%	86%	84%	80%	82%	79%	86%
<b>Local</b>	No	88%	83%	89%	84%	78%	73%	91%	94%	59%	76%	71%
	Yes	12%	17%	11%	16%	22%	27%	9%	6%	41%	24%	29%
<b>What is your sex?</b>	Male	45%	43%	54%	49%	47%	53%	45%	52%	31%	63%	52%
	Female	55%	57%	46%	51%	53%	47%	55%	48%	69%	37%	48%
<b>Age by 10 year</b>	1 thru 11	0%	0%	0%	0%	0%	1%	1%	1%	0%	0%	0%

<b>group</b>	12 thru 20	15%	19%	12%	13%	13%	10%	23%	23%	17%	17%	19%
	21 thru 30	34%	27%	37%	33%	26%	29%	17%	23%	37%	51%	35%
	31 thru 40	26%	19%	26%	31%	25%	24%	18%	18%			
	41 thru 50	13%	27%	16%	17%	13%	16%	25%	20%	33%	20%	37%
	50 thru 59	6%	3%	8%	4%	13%	11%	9%	9%			
	60 thru 100	6%	4%	2%	1%	8%	9%	7%	7%	13%	12%	9%
<b>Age grouped by generations</b>	GI (Born before 1925)	0%	0%	0%	0%	0%	0%	0%	0%			
	Silent (Born 1925-1945)	3%	0%	2%	1%	6%	6%	2%	3%			
	Leading Boom (Born 1946-1955)	5%	6%	2%	0%	9%	11%	7%	8%			
	Trailing Boom (Born 1956-1964)	8%	9%	9%	13%	12%	12%	14%	13%			
	Generation X (Born 1965-1981)	39%	42%	41%	44%	42%	43%	41%	38%			
	Generation Y (Born 1982-1995)	41%	39%	44%	39%	27%	26%	26%	28%			
	Generation Z (Digital Natives) (Born after 1995)	4%	4%	2%	3%	3%	3%	10%	10%			

## Appendix E: *Bright Beneath* Ratings as compared to NMNH's Exhibition Ratings and the Smithsonian Average\*

Overall Experience Ratings for National Museum of Natural History Exhibitions (in percentage values)						
Museum	Exhibition Name	Poor	Fair	Good	Excellent	Superior
NMNH	<i>Ocean Hall (2011)</i>	0	3	21	53	24
NMNH	<i>Ocean Hall (After Bright Beneath Visit) (2011-2012) (Saw BB and did OH Exit survey)</i>	0	1	21	56	21
NMNH	<i>The Bright Beneath: The Luminous Art of Shih Chieh Huang (2011-2012) (BB Exit Survey)</i>	1	6	32	40	21
NMNH	<i>Orchid Express (2005)</i>	0	2	23	56	19
NMNH	<i>Geology, Gems &amp; Minerals (2006)</i>	0	1	34	47	18
NMNH	<i>Dinosaurs (2007)</i>	1	2	24	58	16
NMNH	<i>Ocean Hall (Without Bright Beneath Visit) (2011-2012) (didn't see BB but did OH Exit survey)</i>	1	2	16	67	14
<b>Average of all ratings</b>		<b>0</b>	<b>2</b>	<b>24</b>	<b>54</b>	<b>19</b>
		<b>Poor</b>	<b>Fair</b>	<b>Good</b>	<b>Excellent</b>	<b>Superior</b>
<i>Average of all SI exhibition ratings (2004-2011) exclude BB exhibition rating and OH rating</i>		<b>1</b>	<b>4</b>	<b>28</b>	<b>48</b>	<b>20</b>

\*Excludes HCCR which used a different scale (poor-excellent)