INSTITUTE FOR LEARNING INNOVATION

Smithsonian Institution
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The Sant Ocean Hall Visitor Study
Final Report

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EXECUTIVE SUMMARY

The purpose of this evaluation was to find out how visitors are behaving in, reacting to and learning from the newly reopened Sant Ocean Hall. To do this, three methods were employed: a) timing and tracking, b) exit interviews and c) focused studies for specific exhibits and experiences. A total of 553 unique visitors were included in the study[1], with data collection occurring in December 2008 and January 2009.

Main Findings:

1. **Where do visitors go and where do they spend their time while in the Sant Ocean Hall? Are there areas that are more utilized than others?**

   The overall time spent in the Hall was just under twenty minutes. The most frequently visited areas in the Hall were Biodiversity, Open Ocean, Whales and Coral Reefs (greater than three-quarters of all visitors entered these areas). When looking at just those who entered the areas, visitors spent the most time in the Ocean Explorer Theater, Open Ocean and Journey through Time. Areas that were underutilized (at least in comparison to the other areas in the Hall) include Ocean Systems/Ocean News, Living on an Ocean Planet and Deep Ocean Exploration.

2. **What are visitors' reactions to the Sant Ocean Hall ? Which areas do they like and where do they see room for improvement?**

   There were five exhibit components visitors mentioned when asked what they enjoyed most: the coral reef aquarium, the giant squid, the specimens displayed in jars, Science on the Sphere and the Ocean Explorer Theater. When asked what would improve their experience, more than one third either said "it was fine the way it is" or couldn't come up with a suggestion, indicating that people were generally pleased with the experience. Those who made specific suggestions wanted more content, more activities geared specifically for children or more live animals. In describing the Hall, the most frequently mentioned words were informative, interesting, educational, colorful and cool.

3. **Are visitors exposed to the main messages of the Sant Ocean Hall? Are they noticing the ocean stewardship messages?**

   Visitors interviewed were learning new facts related to the main messages, especially about the size of the ocean and its diversity. They were also reminded about their personal responsibility and personal connection to the ocean, reinforcing concepts from before the visit. When asked about specific messages, they were most likely to say they saw or heard information about the diversity of the ocean, how it operates as one big system, how the ocean's life forms have changed over time and/or how the ocean affects life on the planet. Ocean stewardship messages were seen or heard by close to half of all visitors; these messages were recalled most frequently in the Shores to Shallows, Open Ocean and Coral Reef areas.

4. **How are Navigators and the Family Guide working? What do they add to the visitor experience?**

   When interacting with Navigators or other staff, visitors interviewed typically looked for the following: exhibit-specific, child-focused and/or basic museum information. Those who interacted with Navigators generally felt their questions were answered adequately, and that talking to Navigators enhanced their visit to the Hall. The majority of these visitors initiated the

[1] Of the 553 unique visitors, 88 participated in the timing and tracking + interview study, 39 participated in exit interviews only, and 426 in focused studies. The majority of visitors included in focused studies were for the Tree of Life graphic panel (325 visitors).

interaction with the Navigator, and the conversations were typically object-related: providing identification, confirming authenticity of objects or sharing or explaining information.

Visitors in this study thought that the Family Guide was primarily a navigation and informational tool, and liked its size, look and feel. They thought the Guide would help enhance family visits by more effectively meeting children's needs and by making navigation easier. Some suggested that it could be more child-friendly, as it seemed more designed for parents.

5. How are the following exhibit components working: Ocean Today, LOOP Interactives, Tree of Life and Collections?

Ocean Today – This was one of the more underutilized areas of the Hall, with many visitors passing through it rather than stopping – this may have to do with its location on the periphery of the Hall and that the space is often used as a path to the bathrooms. The most popular videos were Shipwrecks and Otters and Sounds. What visitors remembered or were struck by was driven by which videos they watched. They did learn new information, but had a harder time connecting the theme of the exhibit to the rest of the Hall; many had not yet been through the Hall or were just passing through the space. Additionally, a few visitors mentioned that the audio was difficult to hear.

LOOP Interactives – In the two exhibits in this space, *Ocean as Laboratory* (OL) and *Who Cares for the Ocean* (WCO), cued visitors spent about 3 or 4 minutes. For *OL*, groups typically viewed one video, liked the videos and found out how various scientists are studying the ocean. For *WCO*, groups typically used one of the two interactives, usually *Confronting Climate Change,* and liked the interactive nature of the experience. However, people sometimes had trouble with the audio on *OL*, thought both exhibits were geared more towards adults than children, and thought making the exhibits more three dimensional would make them more attractive to visitors and increase their use.

Tree of Life – In terms of the placement of the graphic panel, either in its original location by the Whales or near the main entry at the rotunda, location did affect visitor behavior. There was a slightly more positive response to the panel, in terms of more people glancing at it, in the new location by the rotunda. In terms of comprehension, adults had an easier time saying what the Tree of Life represented, although children were sometimes more familiar with that type of diagram since they may have studied such diagrams in school. However, children sometimes incorrectly related it to a food chain. The connection to the other Diversity Displays was clear to most, but the graphic representation about the connection between the three groups of life was not understood by most visitors.

Collections – Visitors used the area pretty thoroughly, with more than half of the visitors attending to 5 of the 7 main areas. Visitors reported learning new information, including how flounders develop, how specimens are preserved and about animals like the coelacanth. Visitors perceived the collections as at least mostly collected by Smithsonian scientists, and available to other scientists and the general public.

6. What differences are there in the experience between those visiting with children 12 and younger and those visiting with no children 12 and younger?

While those visiting *without* children under 12 visited a significantly greater number of areas, there were not any significant differences in the total amount of time or which specific areas they visited, compared with those visiting *with* children 12 and under. Those visiting *with* younger children (12 and younger) recalled fewer specific messages than those with older children; this is likely a result of spending a decent amount of time focused on mediating the experience for the children. However, on an individual basis both groups were about equally likely to recognize the main messages of the exhibition.

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INTRODUCTION

PROJECT BACKGROUND

The need for ocean literacy is both pressing and great. As the results of The Ocean Project's report entitled *"Communicating about Oceans: Results of a National Survey"*[2] show, Americans are not generally aware of the condition of the oceans nor do they perceive the oceans' health as being an urgent issue. This national survey also showed that the American public has only a superficial awareness of the importance and relevance of the oceans to their daily lives, let alone its importance to all life on the planet.

The Smithsonian Institute showcased the current understanding of the ocean and its many connections to humans with the opening of the **Sant Ocean Hall** at the National Museum of Natural History. The Sant Ocean Hall is the largest renovation in the museum since it opened in 1910. The Hall's combination of 674 marine specimens and models, high-definition video experiences, exhibits and the newest technology allows visitors to explore the ocean's past, present and future as never before.

EXHIBITION GOALS

At some 23,000 square feet and the largest exhibition hall within the National Museum of Natural History, the Sant Ocean Hall's exhibition goals include:

- To inspire awe for how vast, diverse and unexplored the ocean is, and for how fundamentally different it is from land.
- To provide a unique and engaging experience that demonstrates how the ocean works and how it is interconnected with other global systems.
- To demonstrate how life evolved in the ocean over billions of years and changed dramatically over time.
- To instill in visitors an awareness of the great diversity of ocean habitats and ocean life, and of how much is still being discovered.
- To inform visitors about the exciting technologies and other approaches used by scientists and ocean explorers to uncover the ocean's mysteries.
- To inspire and empower visitors to make the connection between the ocean and their daily lives, and to encourage them to continue exploring the ocean and help to conserve it.
- To provide exhibit-related informal and formal learning opportunities for visitors, students, and educators through publications, programming and Web-based offerings.

The Hall is dramatic in scale and scope and is designed to engage visitors of all ages and interests with a wide variety of content and media. Displays include fossils and specimens, HD and standard video, computer interactives, visualizations of data ("Science On a Sphere") as well as text and

[2] Belden, Russonello, & Stewart and American Viewpoint. *Communicating about Oceans: Results of a National Survey*. Washington, DC: The Ocean Project, 1999.

graphics. Throughout the Hall, researchers and their science, in particular Smithsonian scientists, are highlighted in an effort to help visitors understand "how we know what we know" when it comes to ocean science.

EVALUATION FOCUS

The Institute for Learning Innovation (ILI), a non-profit educational research and evaluation organization based in Edgewater, MD, was contracted by the National Museum of Natural History to conduct a visitor study for the Sant Ocean Hall to examine initial visitor perceptions and understanding, as well as to gain insight on how all the components of the exhibition work in concert with each other. This understanding will build a foundation for the development of further educational tools and resources at the Museum, as well as provide key insights into how the Hall is functioning from a visitor perspective.

This visitor study incorporated a variety of methods and was designed to answer the following evaluation questions:

1. Where do visitors go and where do they spend their time while in the Sant Ocean Hall? Are there areas that are more utilized than others?
2. What are visitors' reactions to the Sant Ocean Hall? Which areas do they like and where do they see room for improvement?
3. Are visitors exposed to the main messages of the Sant Ocean Hall? Are they noticing the ocean stewardship messages?
4. How are Navigators and the Family Guide working? What do they add to the visitor experience?
5. How are the following exhibit components working: Ocean Today, LOOP Interactives, Tree of Life and Collections?
6. What differences are there in the experience between those visiting with children 12 and younger and those visiting with no children 12 and younger?

The following report is organized into three sections representing the key methods of the study: 1) **Timing & Tracking Observations**, 2) **Exit Interviews** and 3) **Focused studies**. While data collected by each method were analyzed and presented independently in this report, they were combined to provide an assessment of the effectiveness of the overall Hall and its exhibit experiences in their ability to achieve the main exhibition goals.

OVERVIEW: METHODS & SAMPLE

All data for this study were collected between December 4, 2008 and January 31, 2009. Instruments and procedures utilized for these evaluation studies were developed by ILI in consultation with staff from the National Museum of Natural History. Data for each study were collected by ILI staff (or affiliate contractor) on-site at the museum, and were coded and/or entered into statistical analysis software (SPSS, Version 15) or analyzed using qualitative methods.

The following table (Table 1) summarizes the methods and samples from each method of the visitor study and identifies whether visitors were notified, or cued, prior to their participation in the evaluation. A total of 553 unique visitors were included in the overall study.

Table 1: Summary of study methods and samples

Method	TOTAL Sample Size (n = # of Visitors)	Cued	Uncued
Timing & Tracking	88	88	
Exit Interviews	127		
Focused Studies			
A. Ocean Today	21	17	4
B. LOOP	20	20	
C. Tree of Life			
▪ Observations	300 [3]		300
▪ Interviews	25		25
D. Collections	19	8	11
E. Navigators	20	20	
F. Family Guide	21	21	

While more detailed descriptions of methods and samples are available in each individual section of this report, the following provides a brief description of each method used. Across the methods a stratified sampling approach was used, where groups *with* children 12 and under were purposefully over sampled, to provide enough data on this key audience segment.

1. TIMING & TRACKING OBSERVATIONS

Timing and tracking was used in Sant Ocean Hall to assess visitor circulation and the relative use of specific areas. Specifically, this portion of the study aimed at answering the overarching question: *"What are visitors doing in the Sant Ocean Hall?"* This part of the evaluation focused on where visitors spent their time, how they moved through the hall, what they did in the hall, what areas they used (and did not use), and whether their experience varied depending on their group composition.

[3] The sample size was higher for the *Tree of Life* focused study so that enough data were collected for the two conditions to provide a meaningful comparison between the two.

ILI evaluators approached adult visitors as they entered the Hall and those agreeing to participate in the study were tracked as they moved through the gallery space. Evaluators noted: 1) the path taken by the visitor through the Hall, 2) the times the visitor entered and exited each of the 14 areas that divided the Hall and 3) the occurrence of selected behaviors. A total of 88 visitors were tracked; of these visitors, 11 did not complete the exit interview.

2. EXIT INTERVIEWS

Exit interviews were used to assess visitors' engagement with the exhibition, general reaction to the experience, as well as knowledge and understanding of the content presented. Interviews were conducted with those adult visitors participating in the timing and tracking observations. To increase the sample size for the exit interview portion, additional visitors were interviewed without the timing and tracking observation component.

3. FOCUSED STUDIES

Focused studies were used in this project to understand the behaviors and interactions at a particular exhibition or part of the experience within Sant Ocean Hall. ILI evaluators first observed groups by recording specific behaviors and comments made, and then interviewed one adult member of the group about their use and understanding of and reaction to the component and its content. This project incorporated six independent focused studies: 1) Ocean Today, 2) LOOP Interactives, 3) Tree of Life, 4) Collections exhibit, 5) Navigators and 6) Family Guide.

TIMING & TRACKING

PURPOSE AND DESIGN OF THE STUDY

Timing and tracking was used in the evaluation of the Sant Ocean Hall to assess traffic flow and attractiveness of exhibits relative to one another. More specifically, this portion of the evaluation aimed at answering the overarching question: *"What are visitors doing in the Sant Ocean Hall?"* and focused on the following areas:

1. Where did visitors spend their time?
2. How did visitors move through the Sant Ocean Hall?
3. How did visitors use the Sant Ocean Hall?
4. Did any areas seem underutilized?
5. Did adults visiting *with* younger children behave differently than those visiting *without* younger children?

METHOD

The Institute for Learning Innovation (ILI) developed the instruments and procedures utilized to collect data on-site at the Natural Museum of Natural History. ILI evaluators collected and entered the data into statistical analysis software (SPSS, version 15). In this study, timing and tracking consisted of following adults visiting by themselves or in groups of 2 or more people throughout

their visit in Sant Ocean Hall. Upon entering the Hall, visitors were approached by ILI evaluators and invited to participate in an interview at the end of their visit. If a visitor agreed to the interview, the evaluator would select one person in the group and track them as he or she moved through the Hall. As the evaluators followed the visitor, they recorded the following information directly on an observation sheet (Appendix 1): 1) the path taken by the visitor through the Hall, 2) the times the visitor entered and exited each of the 14 areas that divided the Hall and 3) the occurrence of selected behaviors ("stopping at an exhibit," "touching an object," "watching a video or media," "actively engaging with interactive," "pointing to an object," "conversations with someone in the group," "conversation with a Navigator/docent" and "downtime"). At the end of the visit, the evaluator would re-engage with the visitor to conduct a brief interview. (see Exit Interview section for results of this method)

SAMPLE CHARACTERISTICS

During 13 days between December 4, 2008 and January 31, 2009 a total of 88 visitors were tracked. Of these visitors, 11 did not complete the exit interview. To ensure enough data were collected from the target audience of intergenerational groups *with* younger children, a stratified sampling technique was used so that the majority of timing and trackings consisted of adults in groups *with* children 12 years of age or younger (74%). The sample was also split almost equally between weekdays (48%) and the weekend (52%) to account for potential audience differences, and their behavior, related to day of the week.

As summarized in Table 2, about half of the sample was male (49%) and half was female (51%). Given that most groups included children 12 years or younger, it is not surprising that most adults tracked were in the 35-44 age category (45%). A little over two thirds of the visitors tracked were Caucasian (68%), followed by Hispanics (14%), and African-Americans (8%). The sample tracked was highly educated, with 82% having at least a college degree (41% had a graduate degree or higher).

Fewer than one in five of tracked visitors were members of the Smithsonian Institution (14%), not surprising given the large tourist visitation at the National Museum of Natural History (NMNH). The majority was visiting the Sant Ocean Hall for their first time (92%) and for 61% it was their first visit to NMNH in the past 12 months. More than half of all visitors sampled reported visiting another natural history museum in the past 12 months (57%), and about a quarter had been to an aquarium and/or a nature or science center during that same period (22%).

Table 2: Summary of sample characteristics for individual tracked

Characteristic	Timing/Tracking (n=77)
Group Type [4]	**n=76**
Adults WITH NO Children 12 or younger	26%
Adults WITH Children 12 or younger	74%
Gender	***n=70***
Male	49%
Female	51%
Age Category	***n=73***
18 to 24	11%
25 to 34	19%
35 to 44	45%
45 to 54	12%
55 to 64	11%
65 and older	1%
Race/ Ethnicity	***n=72***
African-American	8%
Caucasian	68%
Asian/ Pacific Islander	4%
Hispanic/ Latino	14%
Native American	0
Other	6%
Highest Level of Education	***n=75***
Some high school	1%
High school degree	4%
Some college	12%
College degree	33%
Some graduate school	8%
Graduate degree or higher	41%
Membership to Smithsonian Institution	***n=74***
Yes	14%
First Time Visit in the Past 12 Months	***n=75***
Sant Ocean Hall	92%
National Museum of Natural History	61%
Prior Visits in the Past 12 Months (yes)	***n=74***
Other natural history museums	57%
Aquarium, nature or science center	22%

[4] The designation of "Adults with no Children 12 or younger" includes both adult-only groups and groups *with* children 13 to 17.

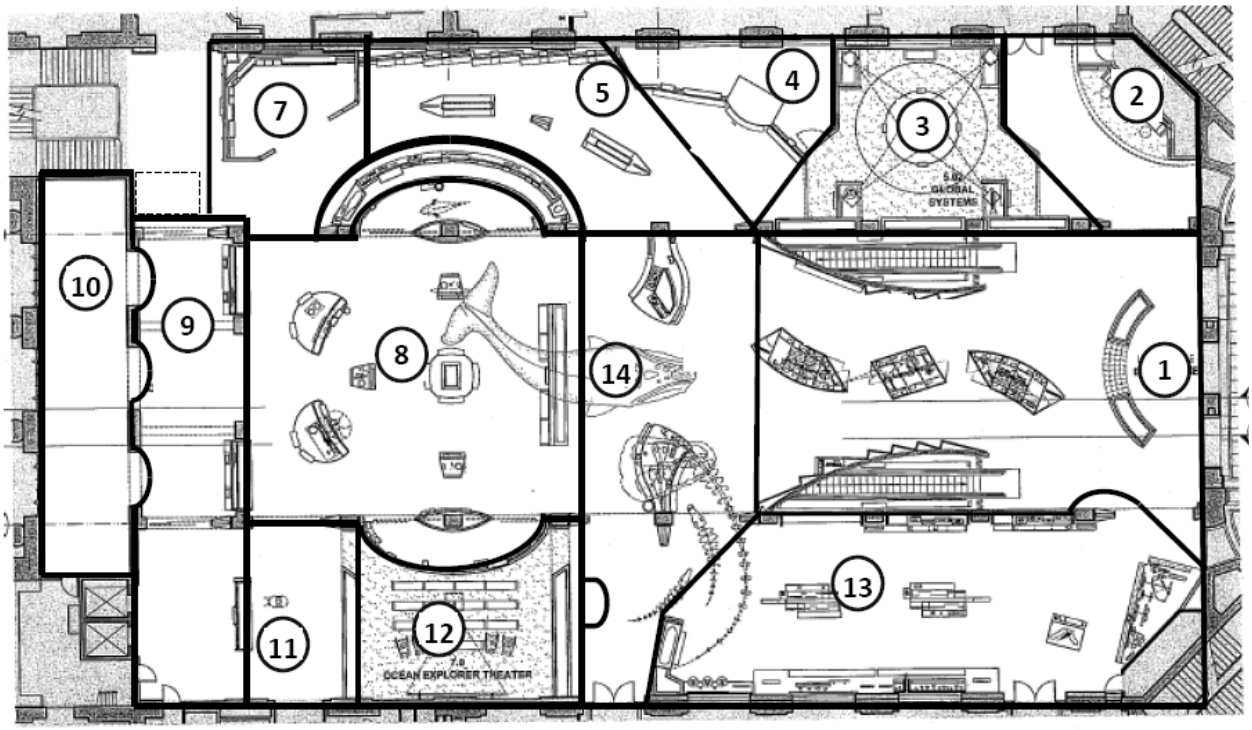
RESULTS & DISCUSSION

Findings for this evaluation study are organized by the five evaluation questions stated in the beginning of this section.

1) Where did visitors spend their time?

For the purposes of this timing and tracking study, the Sant Ocean Hall was divided into 14 distinct areas, as shown in Figure 1. Visitors moved in and out of these areas, and sometimes went back to an area they had visited before.

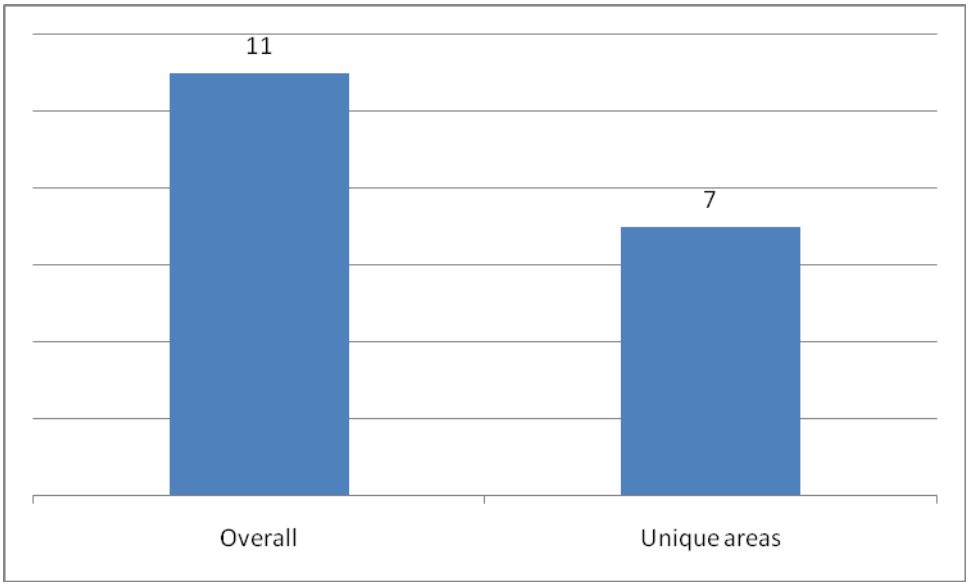
Figure 1: Floor plan of the Sant Ocean Hall with 14 timing and tracking areas



Areas		
Area 1 - Biodiversity	Area 6 - Collections Wall	Area 11 - Deep Ocean Exploration
Area 2 - Ocean Systems/ Ocean News	Area 7 - Poles	Area 12 - Ocean Explorer Theater
Area 3 - Global Systems	Area 8 - Open Ocean	Area 13 - Journey Through Time
Area 4 - Coral Reefs	Area 9 - Living on an Ocean Planet	Area 14 - Whales
Area 5 - Shores to Shallows	Area 10 - Changing Exhibit	

When looking at the overall number of areas visited (including repeated areas), the median[5] number of areas was 11. If only looking at unique areas visited, the median was 7 areas (or half of the total possible, which was 14) (Figure 2, Appendix 2).

Figure 2: Number of areas visited in Sant Ocean Hall: overall vs. unique areas



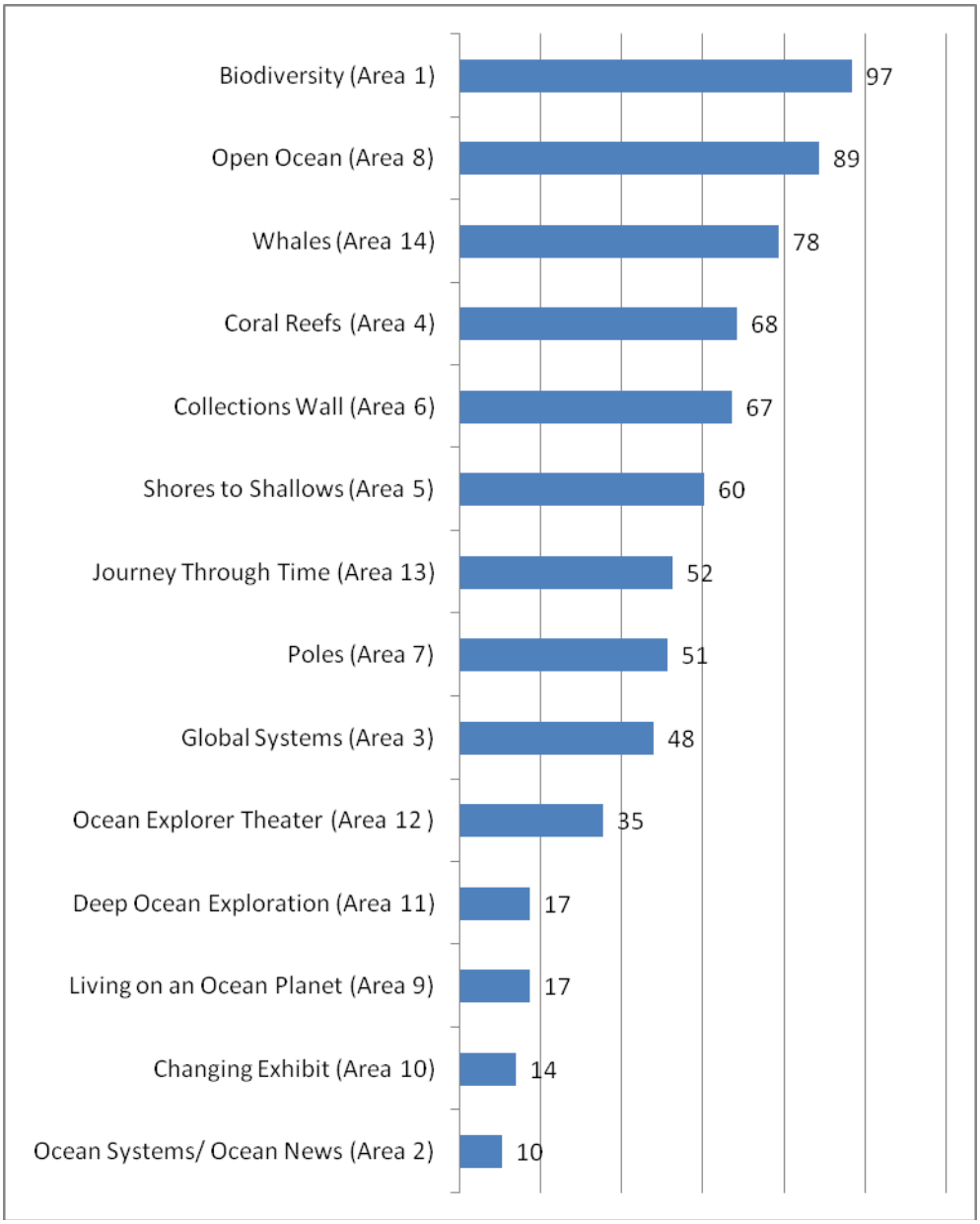
The areas with the highest proportions of visitors were Biodiversity (97% of visitors), Open Ocean (89%)[6] and Whales (78%) (Figure 3). As shown later in the report, these areas were included in the main route people started their visit with. Other areas that were visited by at least half of the visitors were Journey Through Time (52%), Shores to Shallows (60%), Collections Wall (67%) and Coral Reefs (68%).

Areas that were less frequently visited included Ocean Systems/Ocean News (10% of visitors), Changing Exhibit (14%), Living on an Ocean Planet (17%) and Deep Ocean Exploration (17%).

[5] It is important to note that throughout this analysis medians are reported, instead of means (averages). The reason for this is the presence of outliers (very extreme high and/or low values) that occurred in most of the variables, resulting in distributions that are not normal (values group more to one side of the graph, instead of in a bell-shape form). In such cases, means are not the best way to summarize the data because they include outliers that unduly influence the average in one direction or another. Medians, on the other hand, are not sensitive to outliers. That is because a median is the value that splits the distribution in half. In other words, 50% of the values (regardless of what they are) fall below the median and 50% above the median. For example, as we will see next, visitors spent in the Sant Ocean Hall an average of 28 ½ minutes. However, this average does not accurately represent the time most visitors spent, given that they spent anywhere from 2 ½ minutes to 1 ½ hours in the Hall. This wide range of time spent, due to outliers (very extreme high and low values), produced a large standard deviation (22 minutes). Because of that, in this case the median best represents the time most visitors spent in the Hall, which was around 19 ½ minutes. Complete descriptive statistics, including means and standard deviations, are found in the appendices.

[6] The Open Ocean area included the female giant squid, which likely contributed to the popularity of this area, among other things.

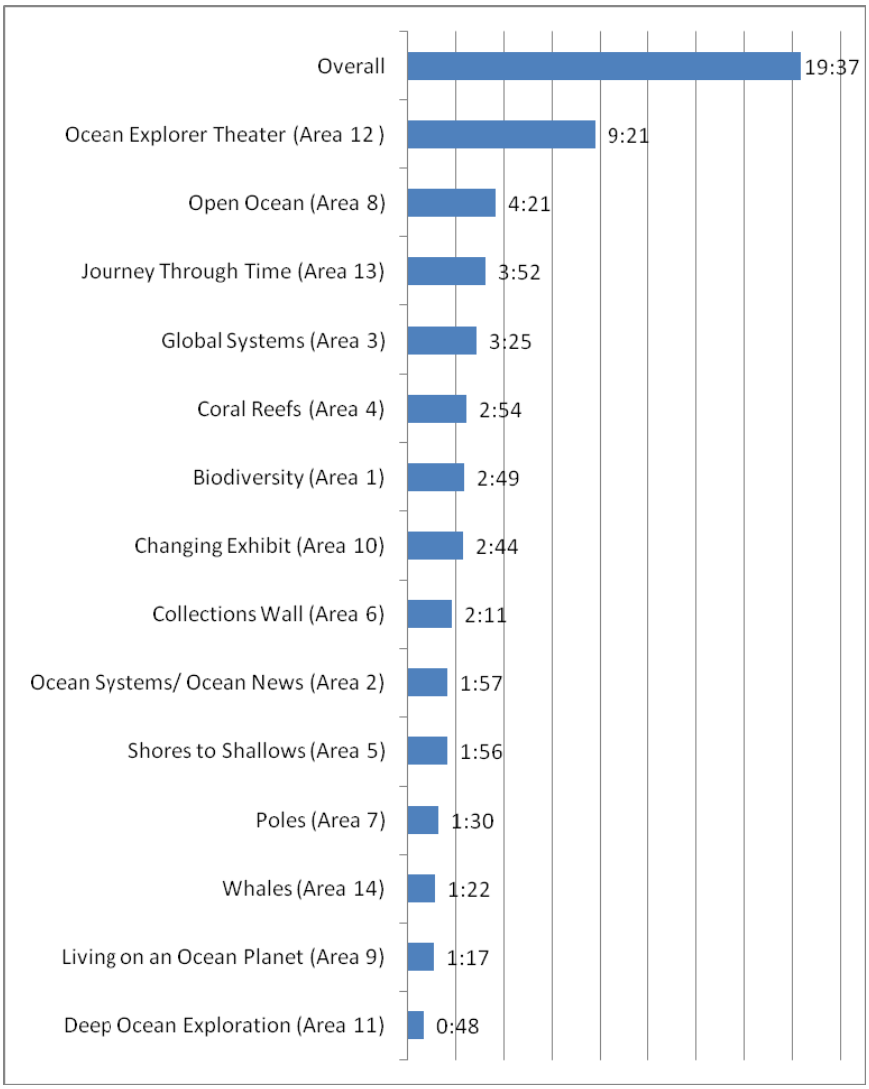
Figure 3: Percentage of visitors entering each area of the Sant Ocean Hall (n=88)



The overall median time that visitors spent in the Hall was 19:37 minutes (Figure 4). When looking at time spent in each individual area, the area where visitors spent most time was the Ocean Explorer Theater (md=9:21 minutes)[7], followed by Open Ocean (md=4:21 minutes), Journey Through Time (md=3:52 minutes) and Global Systems (md=3:25 minutes). The areas with the least time of visitation were Deep Ocean Exploration (md=0:48 minutes), Living on an Ocean Planet (md=1:17 minutes) and Whales (md=1:22 minutes). (See Appendix 3)

There was a statistically significant correlation between the number of areas visited and the time spent in the entire exhibit (Pearson r=0.727, p<.05): the more areas visited, the more time was spent in the Hall.

Figure 4: Time spent in Sant Ocean Hall: overall vs. unique areas (in minutes:seconds, median)



NOTE: Times listed for the specific area are medians and refer only to visitors who entered the area.

[7] md = median

2) **How did visitors move through the Sant Ocean Hall?**

The majority of visitors tracked entered the Sant Ocean Hall through Biodiversity (87%) (Figure 5). Visitors also entered from other access points throughout the gallery: Journey Through Time (4 visitors), Collections Wall (n=2), Poles (n=2), Open Ocean (n=1), and Living on an Ocean Planet (n=1) and Ocean Systems/ Ocean News (n=1).

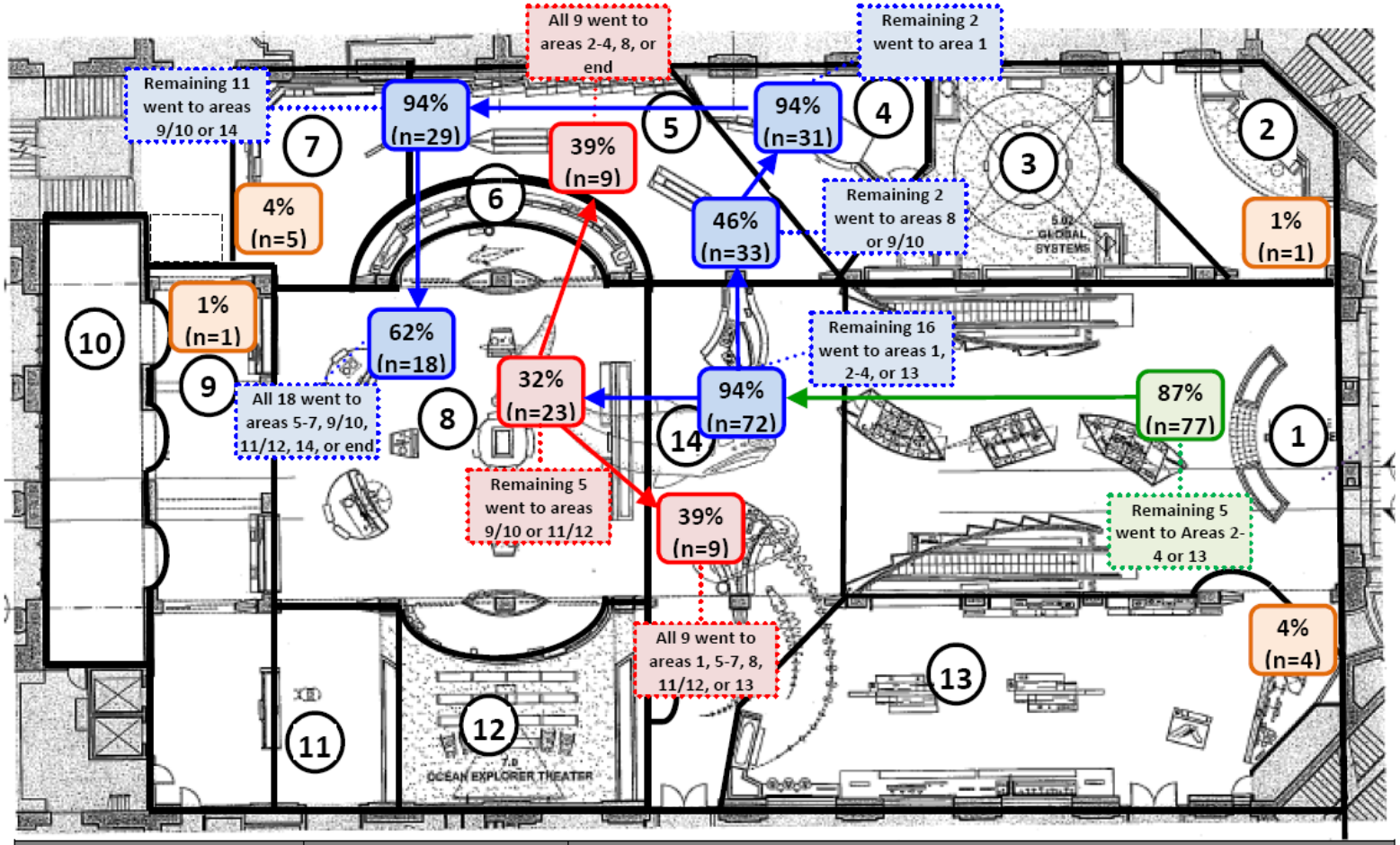
Almost all of the visitors entering from Biodiversity continued on to Whales (94%). From there, they followed two major paths: a *straight* path or a *right turn* path. Those who took the *straight* path went from Whales to Open Ocean (32%), and from there the most common routes these visitors took were to either return to Whales (39%) or to go to Collections Wall or Shore to Shallows (39%). After these areas, visitor paths dispersed in no particular patterns, so no further distinct trends could be mapped.

Those visitors who followed the *right turn* path went from Whales to Collections Wall or Shores to Shallows (46%). The majority then went to Coral Reefs, Global Systems, and/or Ocean Systems/ Ocean News (94%), only to return to Collections Wall, Shores to Shallow and/or Poles (94%). From there, most (62%) went to Open Ocean, after which the patterns became less visible.

Of all the visitors tracked in the Hall, 38% went on the *right tur*n path, 26% went *straight ahead*, and the remaining 36% followed *other* paths. There were no statistically significant differences between the overall time spent in the Ocean Hall related to path taken (Appendix 4). Also, no statistical significant differences were found in the number of unique areas visited by people who took each of the paths (Appendix 5). Visitors who took the *right turn* path visited a significantly larger number of areas than those who went *straight ahead* or took other *paths*[8].

[8] There was a statistically significant difference in the number of areas visited, based on which path was taken (Kruskal Wallis Chi Square=8.87, $p<0.05$). Those who took the *right turn* path went to statistically significantly more areas than those who took the *straight ahead* path (post hoc Mann-Whitney U=209.0, $p<.05$); they also went to more areas than those who took *other* paths (post hoc Mann-Whitney U=361.0, $p<.05$). No differences were found between those taking the *straight ahead* and *other* paths.

Figure 5: Area use based on percentage of visitation and time spent



Areas				Key	
Area 1 - Biodiversity Combined 2-4: Area 2 - Ocean Systems/ Ocean News Area 3 - Global Systems Area 4 - Coral Reefs	Combined 5-7: Area 5 - Shores to Shallows Area 6 - Collections Wall Area 7 - Poles Area 8 - Open Ocean	Combined 9/10: Area 9 - Living on an Ocean Planet Area 10 - Changing Exhibit	Combined 11/12: Area 11 - Deep Ocean Exploration Area 12 - Ocean Explorer Theater Area 13 - Journey Through Time Area 14 - Whales		Primary entry point Other entry points Right turn path Straight ahead path

3) **How did visitors use the Sant Ocean Hall?**

As visitors moved through Ocean Hall, ILI researchers recorded the occurrence and location of the following selected behaviors:

- *Stopping at an exhibit*: whenever the visitor stopped for 3 seconds or more at an exhibit; this included stops to look at an exhibit component, read text, talk to a Navigator, etc.
- *Touching an object*: whenever the visitor touched a part of the exhibit that was designed to be touched and which usually displayed a "Touch Me" sign (distinct from "Actively engaging with interactive" – see below).
- *Actively engaging with interactive*: whenever the visitor actively used the components of the interactive; this included making choices of which content to watch in certain videos (digital interactive), as well as turning knobs and opening drawers (hands-on interactive). Interactive exhibits were determined before data collection began.
- *Watching a video or media*: whenever the visitor watched a video or media.
- *Pointing to an object*: whenever the visitor pointed to a component of the exhibit, usually to show it to someone else in the group, or to call attention to a specific part.
- *Conversations with someone in the group*: whenever visitors talked with other member(s) of the group, regardless of the content of the conversation.
- *Conversation with a Navigator/docent*: whenever visitors talked with a volunteer, staff, or docent, regardless of the content of the conversation.
- *Downtime*: these were times in which visitors did not engage with an exhibit; it included, for example, talking on a cell phone or resting at a bench.

As illustrated by Figures 6 and 7, the most frequent behavior was "*stopping at an exhibit*." All of the visitors tracked stopped at an exhibit and the median number of times they stopped in the entire Hall was 20.5 times. The next most frequent behavior was having "*conversations with someone in the group*," which was exhibited by 93% of the visitors (md=7.0 times). This was followed by "*pointing to an object*," exhibited by 82% of the visitors (md=3 times) and "*watching a video or media*," exhibited by 78% of the visitors (md=2.0 times). All the other behaviors occurred less frequently: 42% of the visitors "*actively engaged with an interactive*," 38% "touched an object," 18% had a "*conversation with a navigator/docent*" and 17% included "*downtime*" during their visit. (Also see Appendix 6)

Figure 6: Number of occurrences of selected behaviors in the Sant Ocean Hall (median) (n=88)

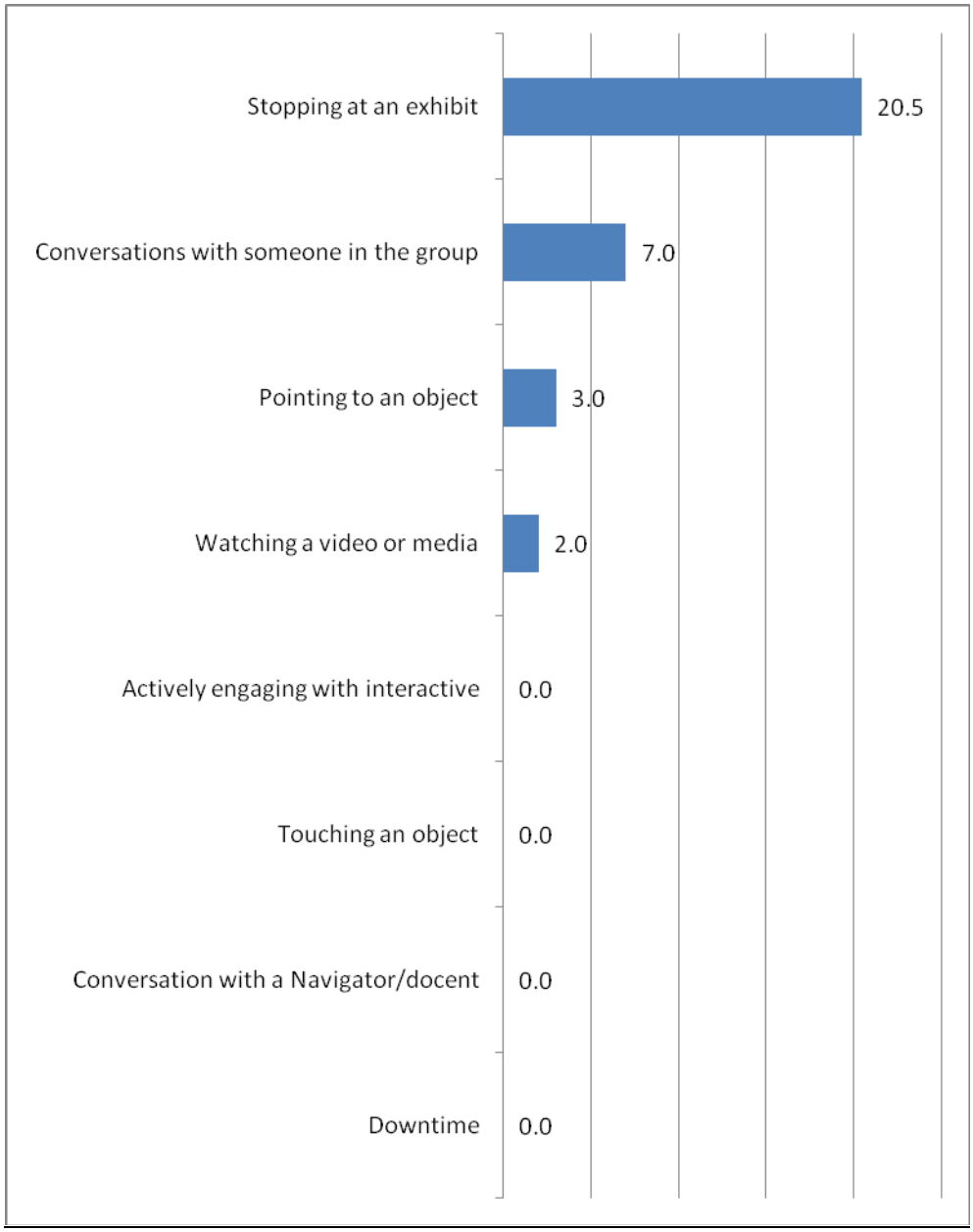
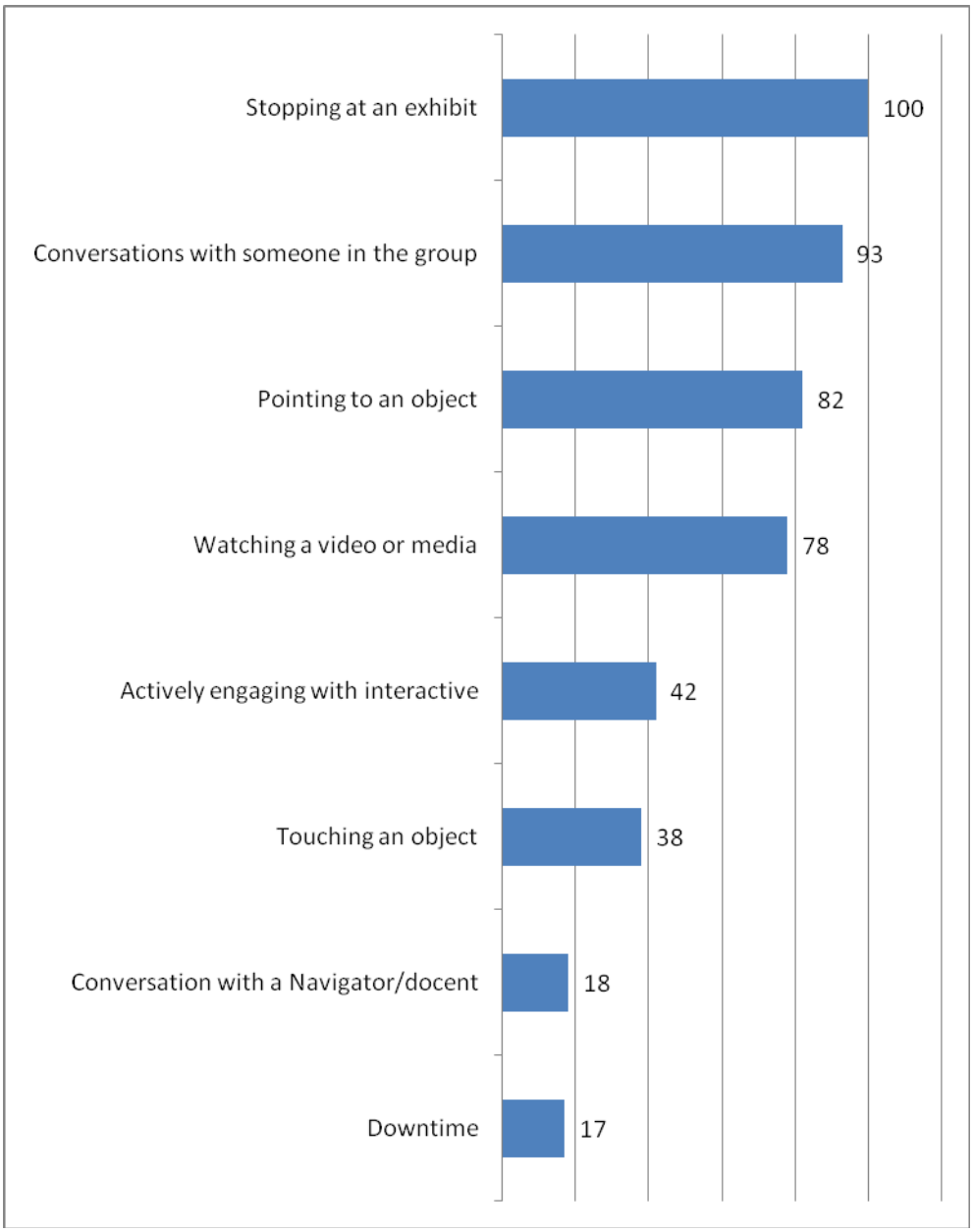


Figure 7: Percentage of visitors demonstrating selected behaviors in the Sant Ocean Hall (n=88)



Besides noting whether a selected behavior occurred, data collectors noted in which of of the 14 areas a behavior occurred. More than half of the visitors tracked had conversations with someone in their groups in Biodiversity (80%), Open Ocean (63%) and Coral Reefs (52%) (Figure 8). These three areas had high visitation[9] and also displayed some of the most attractive features of the Hall, such as the fish tank (Coral Reef) and the giant squid (Open Ocean). (See Appendix 7 for a summary of the behaviors for all 14 areas).

The areas in which conversations occurred less frequently (less than 10% of the visitors) were either areas with moderate visitation and with media (not conducive for conversations), such as Global Systems (9%) and Ocean Explorer Theater (6%), or areas with low visitation, such as Changing Exhibit (7%), Deep Ocean Exploration (5%), Living on an Ocean Planet (5%) and Ocean Systems/ Ocean News (2%).

While visitors were generally less inclined to point to an object than to have conversations with other members of their groups, these two behaviors tended to occcur more frequently in the same areas (Figure 9). Here, the areas where pointing to an object occurred more frequently were Biodiversity (64%), Open Ocean (39%) and Coral Reefs (38%); the areas where pointing occurred less frequently were Changing Exhibit (5%), Global Systems (2%), Ocean Explorer Theater (1%), Deep Ocean Exploration (1%), Living on an Ocean Planet (0%) and Ocean Systems/ Ocean News (02%).

About one third of the visitors watched a video or media in at least one of the 14 areas (Figure 10). As might be expected, the areas with the largest percentages of visitors watching video/media were Global Systems (42% of the visitors), Open Ocean (36%) and Ocean Explorer Theater (35%). With the exception of Open Ocean, the other two areas had video/media as the main experience. Although the overall percentage of visitors watching video/media was lower compared to other behaviors, it had a high "capture rate" for those visiting Ocean Explorer Theater (100% of those in the area) and for those visiting Global Systems (86%).

Notably, the areas in which watching video/media occurred least frequently—Whales, the Collections Wall and Journey Through Time—had moderate to high visitation. On the other hand, Living on an Ocean Planet and Ocean Systems/Ocean News, where video/media was the main medium employed, had very little visitation. This may explain the absence of the behavior in these areas (in fact, of those who visited these areas, a range of 40-44% watched a video).

[9] As described later in the report, the percentage of visitors in an area was categorized relative to visitation to other areas: high (above 67%), moderate (35-60%), or low (10-17%).

Figure 8: Percentage of visitors who had conversations with someone in their group

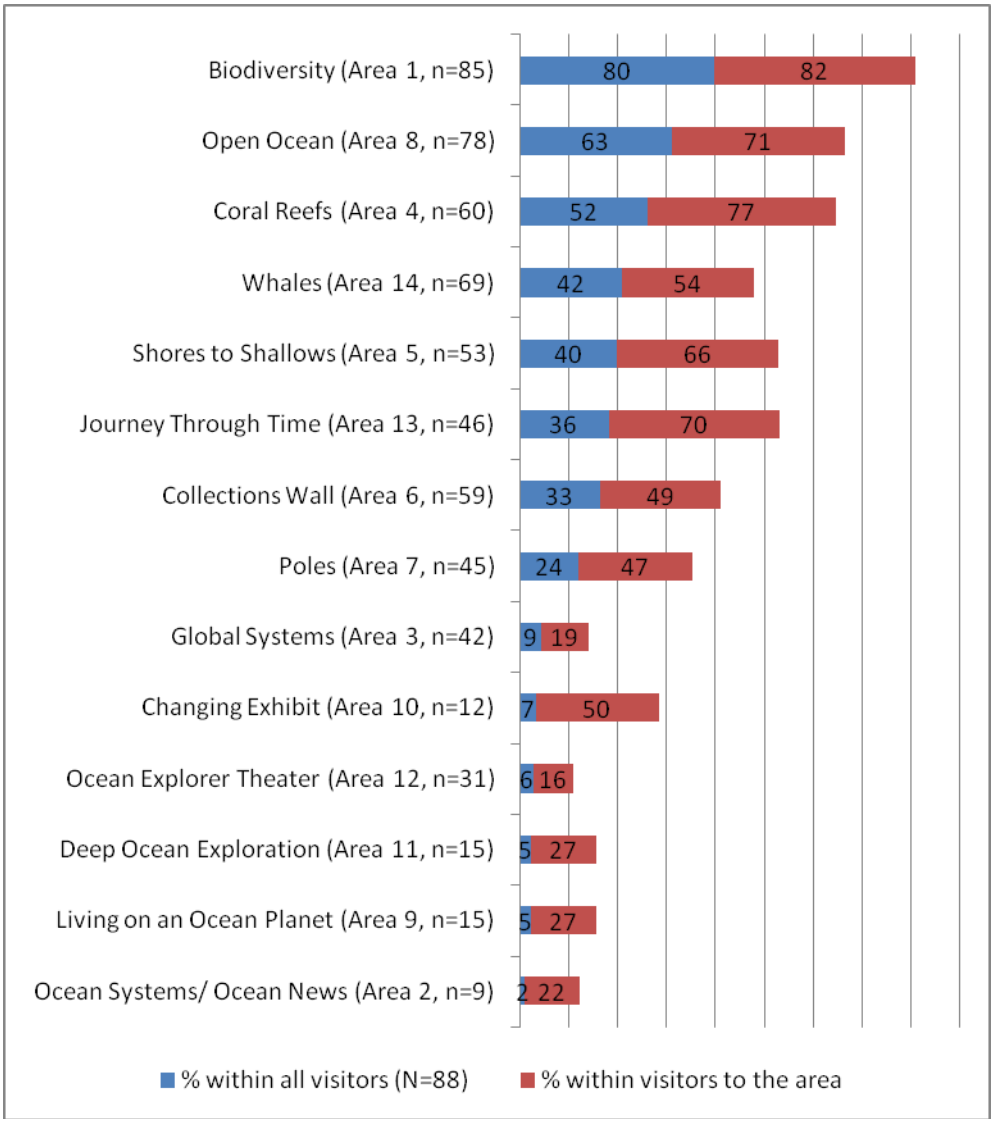


Figure 9: Percentage of visitors who pointed to an object

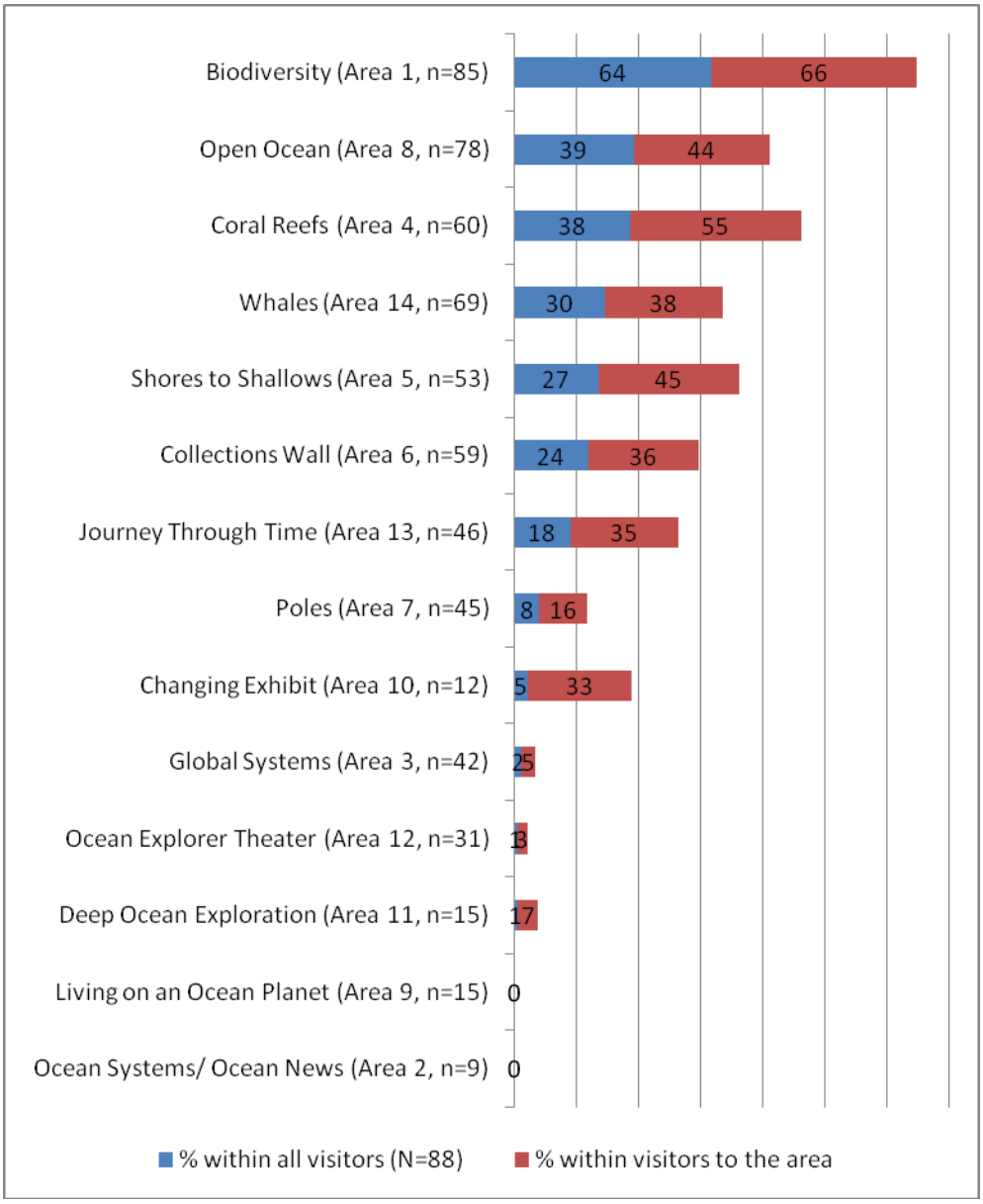
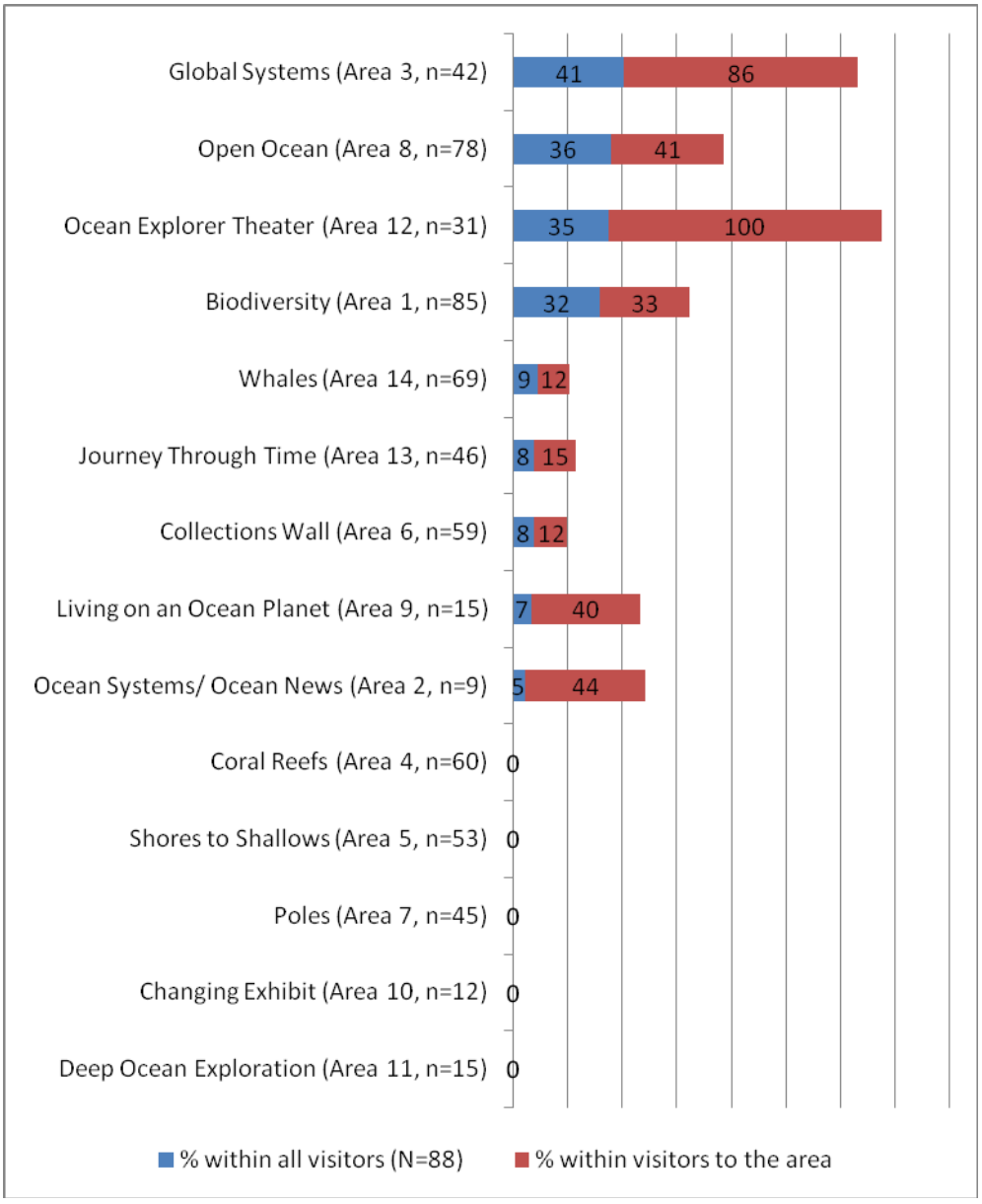


Figure 10: Percentage of visitors who watched video or media



Engagement with interactive components was not observed very frequently in the exhibition (Figure 11). This is partially because seven out of the 14 areas contain neither hands-on (manual manipulation) nor digital interactive elements. The areas where visitors most frequently engaged with interactives were Open Ocean (24%), Journey Through Time (11%), Shores to Shallows (9%) and the Collections Wall (8%). In all of these areas, the interactives were hands-on with the only exception being a media interactive in Journey Through Time.

Areas with digital interactive elements presented the smallest proportion of visitors engaging in the behavior: Ocean Systems/Ocean News with only 6% of the visitors and Living on an Ocean Planet with 2%. These areas also coincide with low visitation. However, whereas 56% of the 9 visitors to Ocean Systems/Ocean News engaged with the interactive, only 13% of the 15 visitors to Living on an Ocean Planet did similarly. This could be interpreted as somewhat surprising given that interactives are the main medium used in this area. However, the Living on an Ocean Planet interactives could only accommodate a total of 4 groups at a time and it appeared that visitors were treating this area as more of a throughway than a place to stop during the visit. Locating the interactives in a different place or making the area more attractive would likely increase the proportion of visitors interacting with these components.

Only three out of 14 areas presented opportunities to touch an object, which helps explain why visitors did not engage as frequently in this behavior (Figure 12). Of all visitors tracked, only 19% of visitors touched an object in Biodiversity, 11% in Whales and 8% in Journey Through Time.

Figure 11: Percentage of visitors who actively engaged with interactives

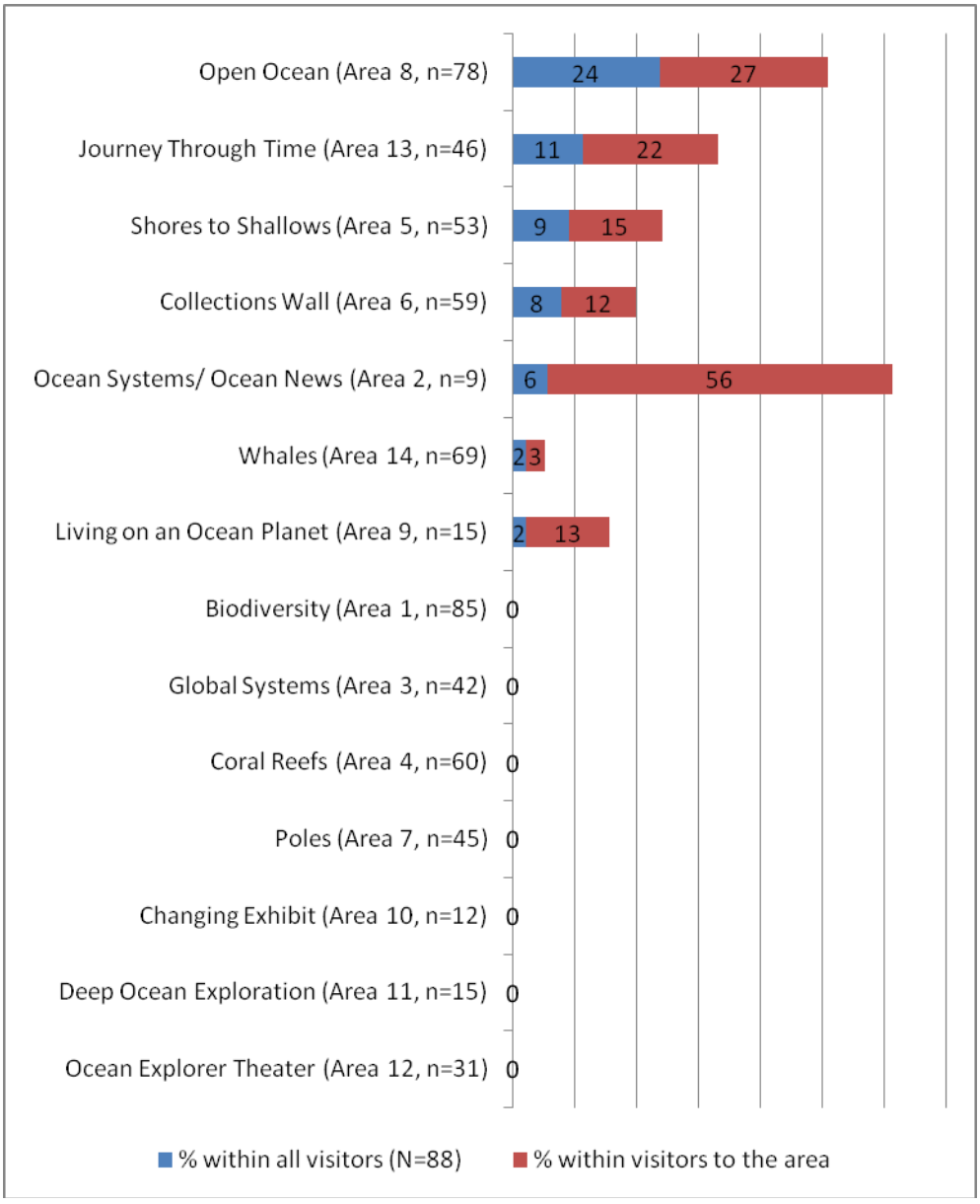
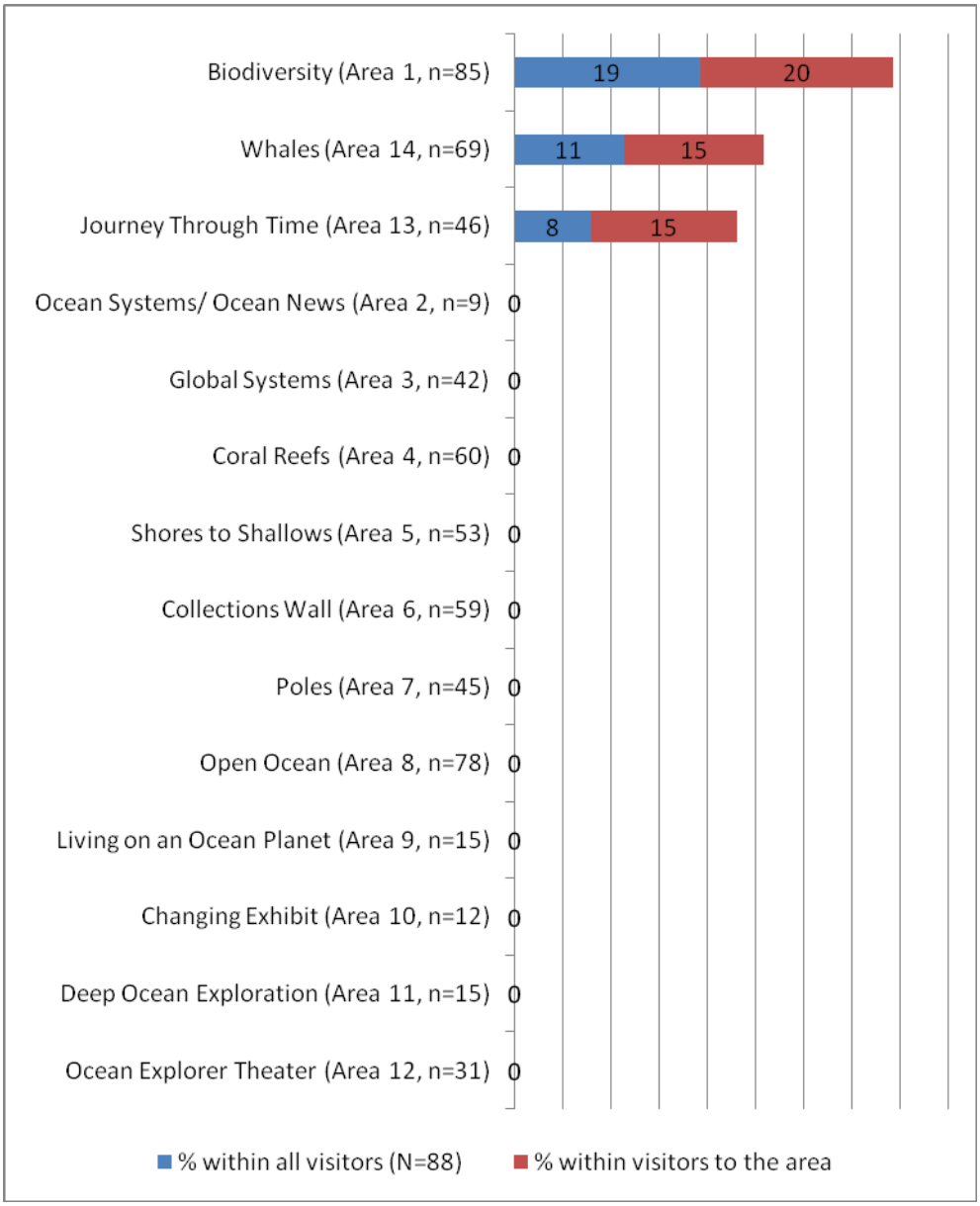
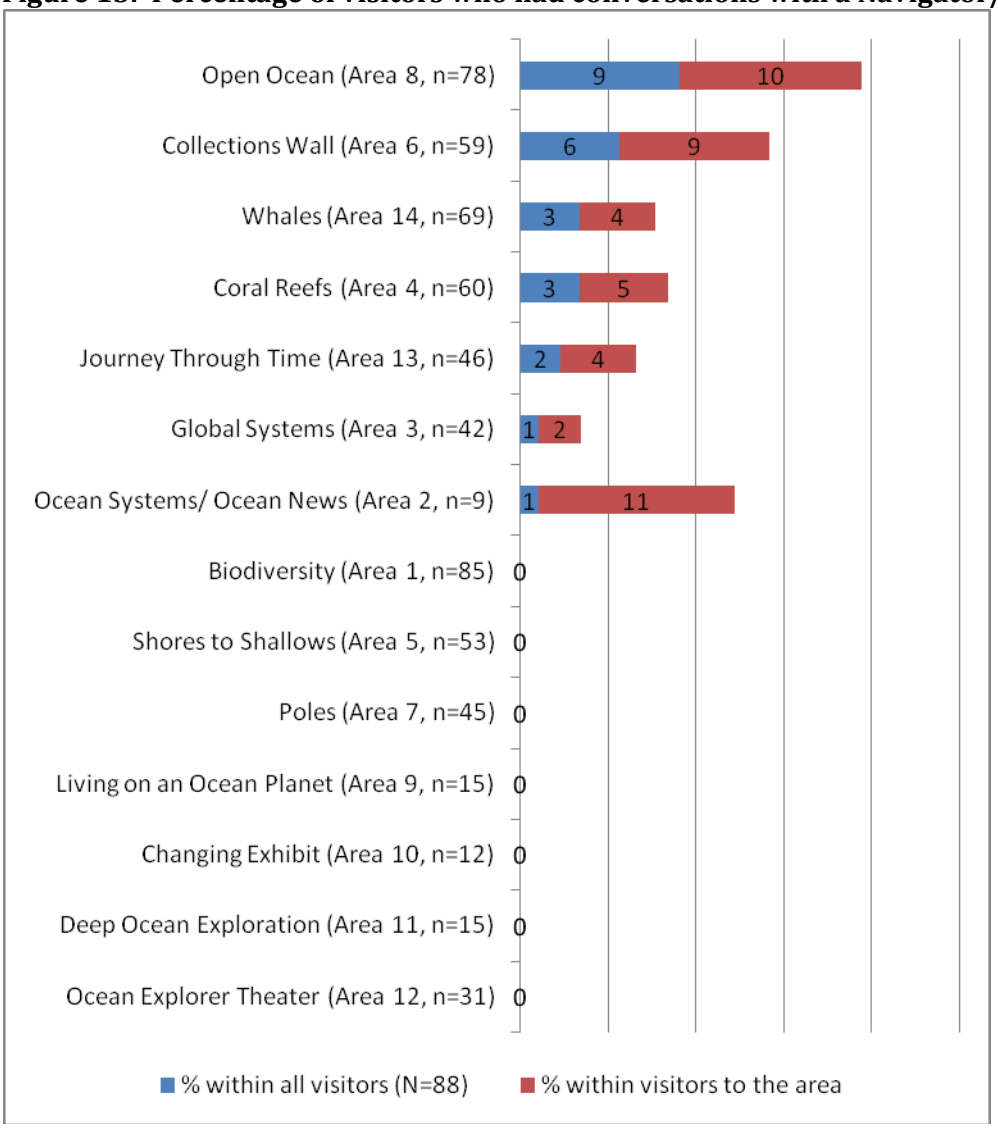


Figure 12: Percentage of visitors who touched an object



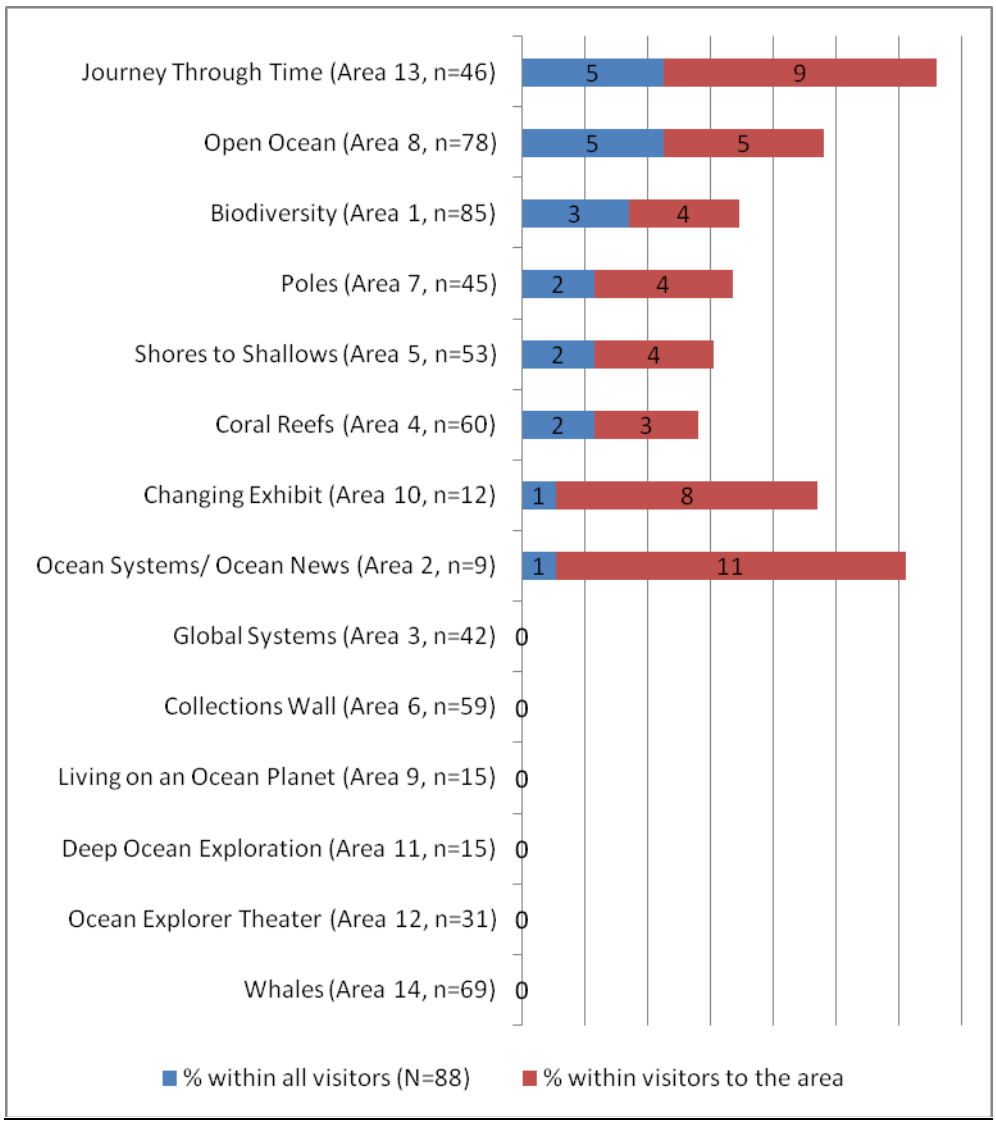
A small percentage of visitors had conversations with a Navigator/ docent (Figure 13). The areas where these conversations happened more frequently were Open Ocean (9%) and the Collections Wall (6%). Open Ocean is not surprising as the lead area where conversations occurred, since Navigators are frequently stationed at or near the female giant squid.

Figure 13: Percentage of visitors who had conversations with a Navigator/docent



Visitors to the Hall seemed very engaged, indicated by the fact that not many visitors engaged in a high degree of downtime during their visit to the Hall. This behavior occurred slightly more frequently in Journey Through Time (5%) and Open Ocean (5%) (Figure 14). Both of these areas have seating spaces, which may help explain the occurrence of downtime there. Although the Changing Exhibit area also has seating spaces, this area was not very well visited.

Figure 14: Percentage of visitors who stopped to rest (took downtime)



4) **Did any areas seem underutilized?**

To determine how well utilized an area was, two pieces of information were taken into account: the percentage of visitors who entered an area and the amount of time visitors spent there when they did enter it. This was done by first categorizing the percentage of visitors in an area as high (above 67%), moderate (35-60%) or low (10-17%); then the time spent in an area as a lot (3:25-9:21 minutes), moderate (2:11-2:54 minutes) or a little (0:48-1:57 minutes) (Appendix 8 summarizes the data used).

Combining the percentage of visitors in an area and the time spent resulted in five utilization categories for the areas: high, medium high, medium, medium low and low. For example, an area that received high visitation and visitors spent a lot of time was considered "high," and so on (see Table 3 for a summary of the utilization categories). These results were applied to the Hall floor map (Figure 15); this map also highlights where visitor behaviors occurred the most and the least frequently.

This analysis shows that only Open Ocean fell in the "**high**" category, with both a *high* visitation and visitors spending *a lot* of time in there. This is most likely due to the presence of the giant female squid exhibit and, as presented earlier in the report, high traffic in that area. This part of the Hall had one of the highest percentages of visitors engaging in several behaviors: conversation with others in the group, pointing to an object, watching a video/media, and using an interactive.

Six areas fell into the "**medium high**" category, with one "high" and one "moderate" designation. Ocean Explorer Theater, Journey Through Time and Global Systems had a *moderate* visitation, but visitors spent *a lot* of time there. In Ocean Explorer Theater and the Global Systems visitors could sit down to watch the videos being projected (both areas had the highest percentages of visitors watching video/media). Journey Through Time is a large area that has the shark jaw display, a large number of objects and several 'touchable' objects. In comparison with other areas, this area also had one of the largest use of interactives (11% of visitors) and downtime (5%).

In the other areas in the "medium high" category – Biodiversity, Coral Reefs and the Collections Wall – the opposite occurred: visitors spent a *moderate* amount of time, but these areas were *highly* visited. As presented earlier in the report, a common path taken by visitors was to enter the Hall from Biodiversity then move to the Collections Wall/Shores to Shallow/Poles and to Coral Reefs/Global Systems/Ocean Systems-Ocean News. The fact that these areas were frequently at the beginning of the visit helps explain some of the *high* visitation there. Coral Reefs and Biodiversity had the largest percentages of visitors having conversations and pointing at objects.

Whales, the only area categorized in the "**medium**" level, had *high* visitation, but visitors spent *little* time there. Again, this was often the second area visited for most of the visitors (81% of visitors went there, after entering through Biodiversity). The area's main attraction, the Right Whale hanging from the ceiling, could be seen from many different parts of the Hall. Although visitors accessed the area, they did not necessarily stay there very long.

Three areas were in the "**medium low**" category. Changing Exhibit had *low* visitation, but visitors spent a *moderate* time in there. This is an area that is in the back of the Hall, so visitors did not usually go there. Shores to Shallows and Poles were areas which had a *moderate*

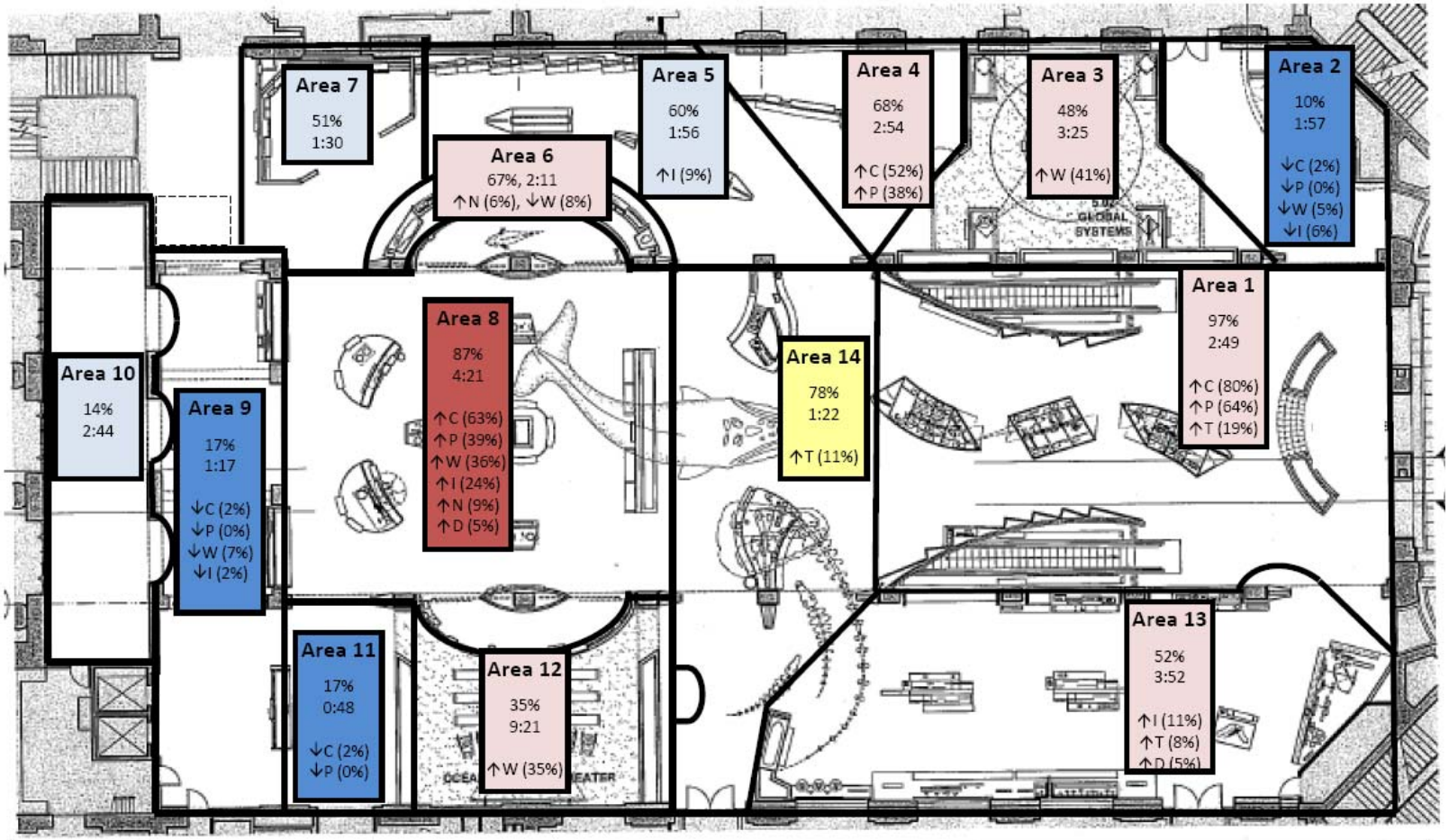
visitation, but where visitors spent *little* time. These areas were in the high traffic path, but people did not spend a lot of time in them.

Three areas fell into the "**low**" category. Deep Ocean Exploration, Ocean Systems/Ocean News, and Living on an Ocean Planet were the areas with both *low* visitation and where visitors spent *little* time. Since these areas were low in utilization they also tended to be among the ones with the lowest percentages of visitor behaviors, such as conversation with others, pointing to an object, watching a video, and using interactives. As mentioned earlier, it was surprising that even those visitors who went to Ocean Systems/ Ocean News and Living on an Ocean Planet did not engage as frequently with interactives or watch the movies, given that these exhibits focus on digital interactive. However, it may be that the areas being on the periphery of the exhibition, the longer interaction times at each component, and a limited number of groups being able to use them at the same time contributed to this low use.

Table 3: Key to utilization categories (high, medium, low)

	Median time spent in the area		
Percentage of visitors in the area	**A Lot**	**Moderate**	**A Little**
High	High	Medium High	Medium
Moderate	Medium High	Medium	Medium Low
Low	Medium	Medium Low	Low

Figure 15: Area use based on percentage of visitation and time spent

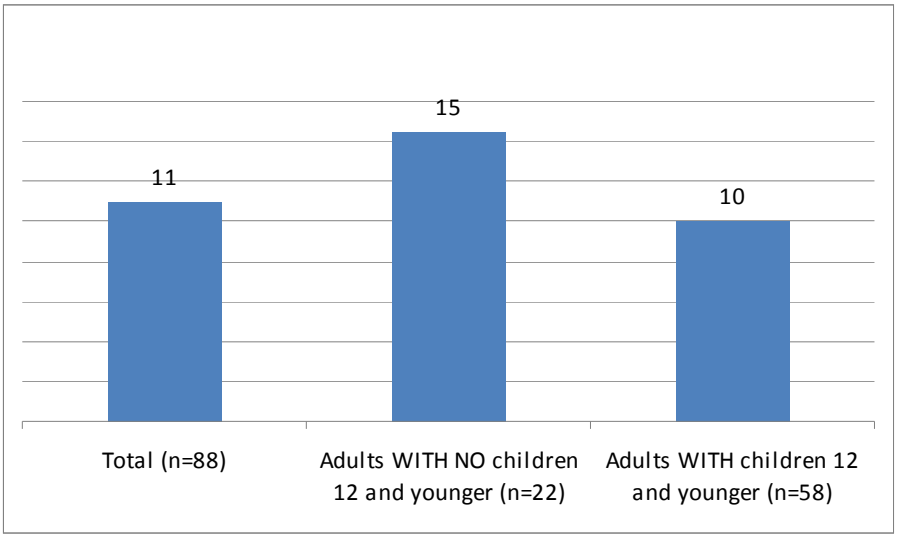


Interactions: ↓(Lowest), ↑(Highest)	Areas		
I..... Interactive (active)	Area 1 - Biodiversity	Area 8 - Open Ocean	Low visitation and little time spent
W .... Watch video / media (passive)	Area 2 - Ocean Systems/ Ocean News	Area 9 - Living on an Ocean Planet	Moderate visitation and little time spent OR Little visitation and moderate time spent
T ..... Touch	Area 3 - Global Systems	Area 10 - Changing Exhibit	
P..... Point Object	Area 4 - Coral Reefs	Area 11 - Deep Ocean Exploration	High visitation and little time spent
C..... Group conversation	Area 5 - Shores to Shallows	Area 12 - Ocean Explorer Theater	High visitation and moderate time spent OR Moderate visitation and high time spent
N ..... "Navigator" conversation	Area 6 - Collections Wall	Area 13 - Journey Through Time	
D ..... Downtime / rest	Area 7 - Poles	Area 14 - Whales	High visitation and high time spent

5) **Did adults visiting *with* younger children behave differently than those visiting *without* younger children?**

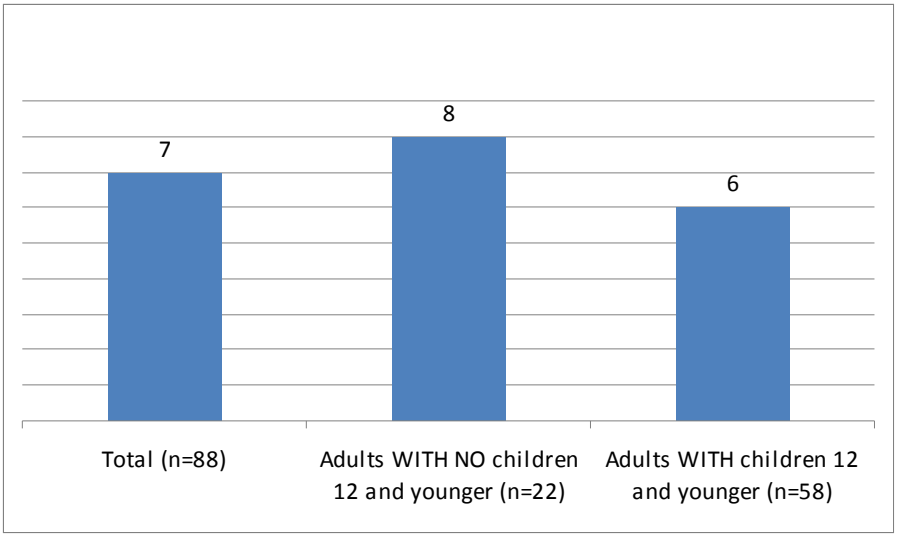
Visitation patterns were compared between visitors in groups *with* children 12 and under (target group) and visitors in groups *with no* children 12 and under[10]. In terms of number of areas visited, adults *with no* children under 12 visited a statistically significant greater number of areas, both repeated and unique, than those *with* children 12 and under (Figures 16 and 17, Appendix 9).

Figure 16: Comparison of the overall number of areas visited between group types (median)



Significant statistical differences between group types (Mann Whitney U=448.5, p<.05)

Figure 17: Comparison of unique number of areas visited between group types (median)

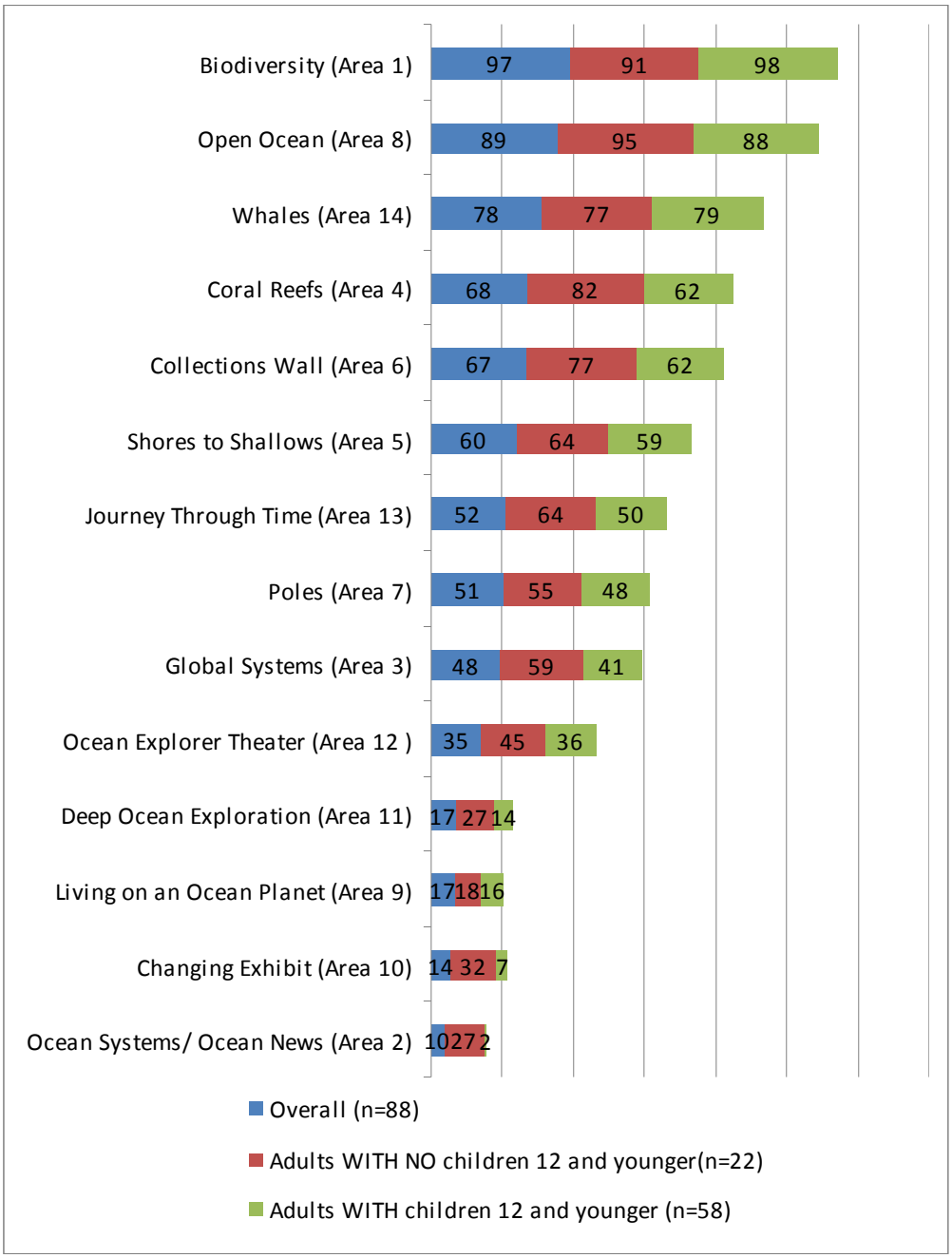


Significant statistical differences between group types (Mann Whitney U=446.0, p<.05)

[10] The designation of "Adults with no Children 12 or younger" includes both adult-only groups and groups with children 13 to 17; it includes five adults visiting alone. The designation "Adults with children 12 or younger" included two groups that had both, children younger than 12 and older than 13.

No statistically significant differences were found in which areas were visited by adults in groups *with* children 12 and under versus those *with no* children 12 and under (Figure 18, Appendix 10). For both groups, the pattern of use of the areas in the Hall was similar to the overall pattern (with all of the visitors combined, regardless of group type).

Figure 18: Comparison of areas visited between group types (percent within respective 'n')

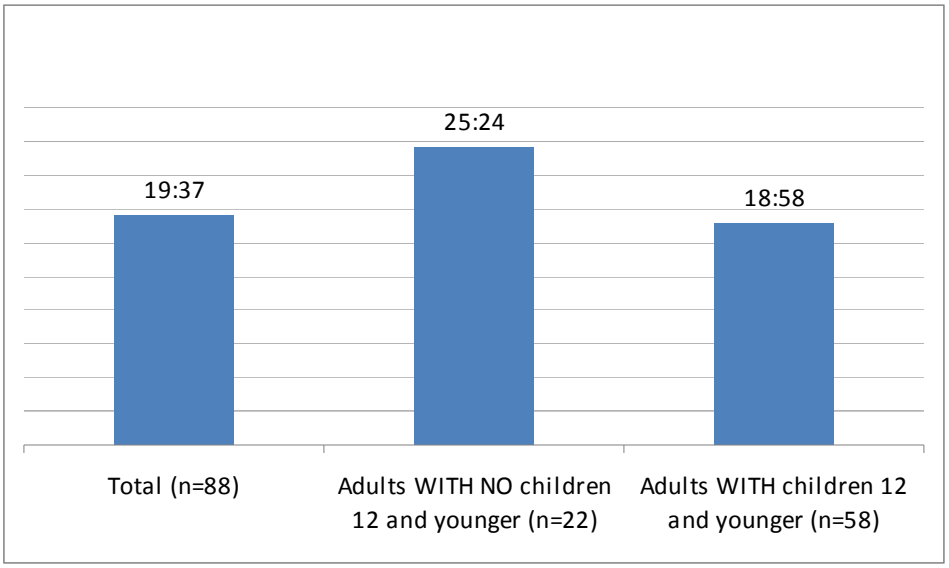


No significant statistical differences between group types (Chi square)

Visitors *with* and *without* younger children also did not present a statistically significant difference in the time they spent in the Sant Ocean Hall, both in terms of the overall time (Figure 19) and in each of the 14 areas (Figure 20) (Also, see Appendix 11).

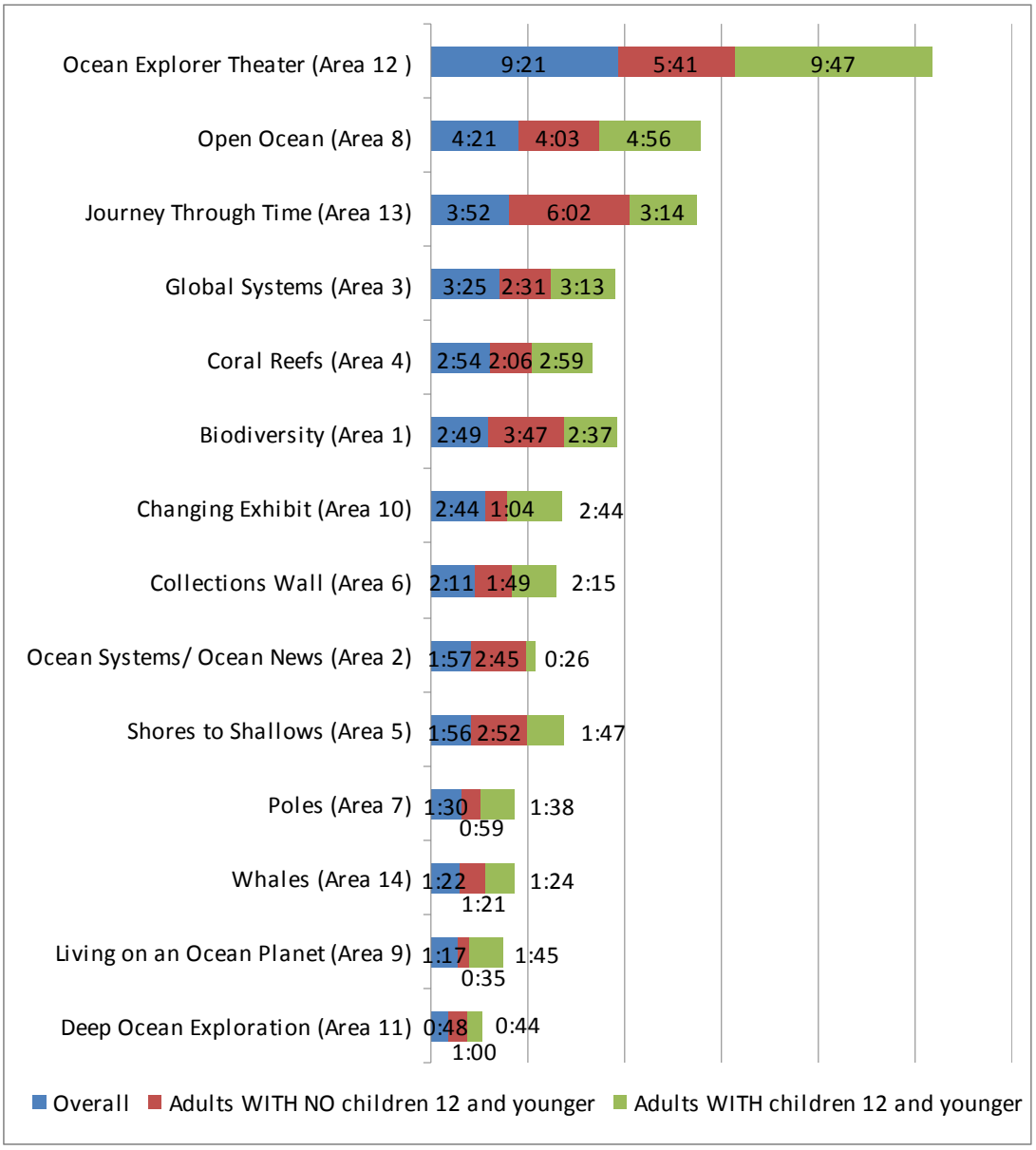
The following differences are not statistically significant. However, in general, visitors *with no* children 12 and younger spent more time in the Hall than those *with* younger children (respectively, md=25:24 and md=18:58 minutes). Visitors *with no* children 12 and younger also tended to spend more time in Journey Through Time (md=6:02 minutes). It is possible that the content of this exhibit area, minus the shark jaws of course, is less appealing to younger children; it may also be an artifact of the larger percentage of visitors *without* younger children visiting this area. On the other hand, although relatively more adults in groups *without* younger children visited Coral Reefs and Ocean Explorer Theater (Figure 20), the adults in groups *with* younger children tended to spend more time in those two areas (respectively, md=2:59 and md=9:47 minutes). In Coral Reefs the display of live and colorful fish was most likely what attracted and kept adults in groups *with* younger visitors in the area. In the case of Ocean Explorer Theater it is possible that a combination of the movie displayed and the opportunity to sit down and rest also attracted adults in groups *with* younger visitors.

Figure 19: Comparison of overall time spent between group types (in minutes:seconds, median)



No significant statistical differences between group types (Mann Whitney)

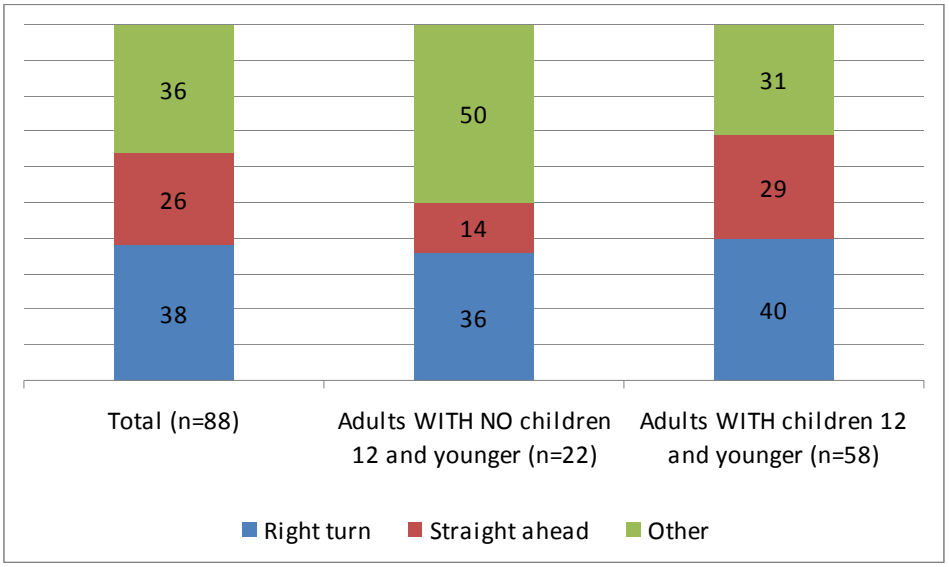
Figure 20: Comparison of time spent in each area between group types (in minutes:seconds, median)



No significant statistical differences between group types (Mann Whitney)

Adults in groups *with* younger children and in groups *with no* younger children did not present a statistically significant difference in the general path they took when visiting the Hall (Figure 21, Appendix 12). About the same percentage of groups went on the *right turn* path: 35% of adults *with no* children under 12 versus 40% of those in groups *with* children under 12. Almost double the percentage of those *with* younger children went *straight ahead* (29%), than did those *with no* younger children (14%); it is possible that these groups were first attracted by or looking for the giant squid display or the whale. The paths taken by adults in groups *with no* younger children were somewhat less predictable: about half of these groups took *other* paths, compared to 31% of adults in groups *with* children 12 and younger.

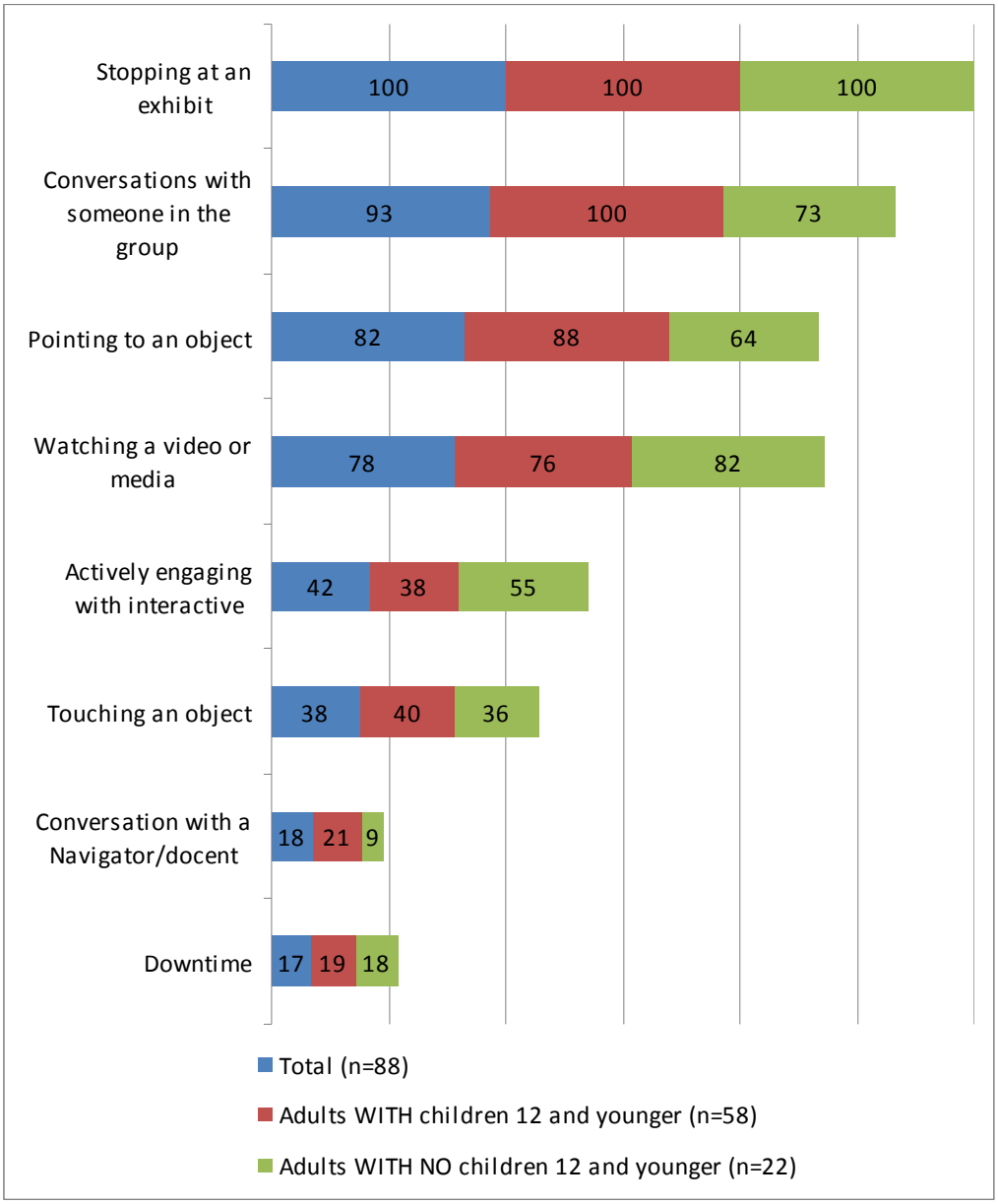
Figure 21: Comparison of paths taken between group types (percent within 'n')



No significant statistical difference between group types (Chi square)

No statistically significant differences were found between adults in groups *with* younger children and those *without* younger children, in terms of whether or not they displayed a certain behavior (Figure 22) (Appendix 13). It is interesting to note, however, that more adults in groups *with* younger children tended to have conversations with others in the group (100%), point to an object (88%) and to touch an object (40%), as compared to groups *with no* children 12 and younger (respectively, 73%, 64%, and 36%). Those in groups *with no* younger children, on the other hand, watched video/media (82%) and engaged with interactives (55%) more frequently than those *with* younger children (respectively, 76% and 38%).

Figure 22: Comparison of behaviors between group types (percent within 'n')



No significant statistical differences between group types (Chi square)

EXIT INTERVIEWS

PURPOSE OF STUDY

Exit interviews were used in the evaluation of the Sant Ocean Hall to assess visitors' initial perceptions and understanding of the exhibits. More specifically, these interviews aimed at answering the following questions:

A. What were visitors' overall reaction to and satisfaction with Sant Ocean Hall? What did visitors enjoy the most about Sant Ocean Hall?
   1. How could Sant Ocean Hall be improved?

B. What are visitors' general understandings of the Ocean?

C. What did visitors take away from Sant Ocean Hall?
   1. What did visitors learn from the Sant Ocean Hall?
   2. Which messages did visitors recall most frequently? (how ocean evolved over time, how ocean affects life on the Planet, ocean as one big global system, diversity in the ocean, how oceans remain unexplored)
   3. Where did visitors see the main messages of the exhibition?
   4. Did adults visiting with younger children behave differently than those visiting without younger children?

METHOD

In this study, exit interviews were conducted in two ways: as part of the timing and tracking observations and as stand-alone interviews. For exit interviews done as part of the timing and tracking observations, visitors were approached by ILI evaluators and invited to answer an interview after the timing and tracking was completed. In stand-alone interviews, visitors were approached by ILI evaluators as they were leaving the Sant Ocean Hall. In both cases, interviews were conducted at the end of the visit to the Hall. ILI evaluators used an interview protocol (Appendix 14) to record: 1) what visitors enjoyed and did not enjoy in the Hall, 2) the messages they learned or remembered seeing/ hearing in the Hall and 3) demographic and psychographic information. ILI evaluators collected and entered the data into statistical analysis software (SPSS, version 15).

SAMPLE CHARACTERISTICS

A total of 127 visitors were interviewed during 13 days of data collection between December 4, 2008 and February 02, 2009. The majority of completed interviews consisted of groups *with* children younger than 12 years of age (62%), and the majority of interviews were conducted during the weekend (68%).

As summarized in Table 4, about half of the sample was male (53%) and half was female (48%). Given that most groups in the sample were visiting *with* children under 12, it is not surprising that the largest age group consisted of those in the 35-44 age category (37%). About two thirds of the visitors were Caucasian (66%), followed by Hispanics (12%) and African-Americans (9%). The sample tracked was highly educated, with 94% having at least a college degree and 36% having a graduate degree or higher.

Only a small fraction of the visitors interviewed were members of the Smithsonian Institution (16%). The majority was visiting the Hall for their first time (88%) and for more than half it was their first visit to the National Museum of Natural History in the past 12 months (62%). About half of all visitors sampled reported visiting another natural history museum in the past 12 months (59%), and a little over a quarter had been to an aquarium, nature or science center in that same period (28%).

Table 4: Summary of sample characteristics

Characteristic	Exit Interviews (n=127)
Group Type	***n=126***
Adults WITH NO Children 12 or younger	38%
Adults WITH Children 12 or younger	62%
Gender	***n=120***
Male	52%
Female	48%
Age Category	***n=121***
18 to 24	12%
25 to 34	28%
35 to 44	37%
45 to 54	14%
55 to 64	8%
65 and older	1%
Race/Ethnicity	***n=122***
African-American	9%
Caucasian	66%
Asian/ Pacific Islander	8%
Hispanic/ Latino	12%
Native American	0
Other	5%
Highest Level of Education	***n=125***
Some high school	2%
High school degree	4%
Some college	15%
College degree	35%
Some graduate school	8%
Graduate degree or higher	36%
Membership to Smithsonian Institution	***n=124***
Yes	16%
First Time Visit in the Past 12 Months	***n=125***
Sant Ocean Hall	88%
National Museum of Natural History	62%
Prior Visits in the Past 12 Months (yes)	***n=124***
Other natural history museums	59%
	n=123
Aquarium, nature or science center	28%

RESULTS & DISCUSSION

Findings for this evaluation study are organized by the evaluation questions stated in the beginning of this section.

A. What were visitors' overall reaction to and satisfaction with Sant Ocean Hall?

1) What did visitors enjoy the most about Sant Ocean Hall?

According to how they described the Hall, visitors seemed to enjoy the exhibition. Figure 23 summarizes the words used by most visitors to describe the Hall to someone who has not visited the site. Most words used were positive and the most frequently mentioned terms included: informative, interesting, educational, colorful, cool, awesome and fascinating. Among least favorable words, visitors mentioned it being overwhelming. (Also see Appendix 15).

Figure 23: Wordle for words used to describe the Sant Ocean Hall[11]

[11] A "wordle" is a graphic representation of the frequency of words used in a text document, in the form of a "word cloud." The larger the word, the higher the frequency it was used by visitors to describe Sant Ocean Hall. See http://www.wordle.net/ (current at the time this report was written).

When asked what they enjoyed most about the Sant Ocean Hall, the exhibition components most frequently mentioned by visitors were the coral reef aquarium (19% of visitors), followed by the giant squid (16%), the real specimens displayed in jars (14%), the Science on the Sphere (12%) and the deep sea exploration movie (10%). The most frequently mentioned reasons for their preferences were the sense of novelty or uniqueness (18% of visitors), the fact that the component was informative or educational (14%), visually interesting (14%) or entertaining/ attractive for children (11%). (See Table 5 for a summary and Appendix 16 for examples in each category)

Table 5: What visitors enjoyed about the Sant Ocean Hall, and why

What Visitors Enjoyed	N	% (n=126)
Exhibition Component		
Coral reef aquarium	24	19
Giant squid	20	16
Real specimens	17	14
Science on the Sphere	16	13
Right whale	15	12
Deep sea movie	12	10
Entire exhibit	6	5
Layout of the space	6	5
Fossils, trilobites	4	3
Hydrothermal vent movie	4	3
Large models	3	2
Shark	3	2
Video screens above	3	2
Navigator	2	2
Other	14	11
Reasons		
Novelty, uniqueness, first time	22	18
Informative, educational, learned something new	18	14
Beautiful, visually interesting, colorful	17	14
Entertaining, attractive or educational for the kids	14	11
Alive, real	6	5
Personal connection	5	4
General positive comments	4	3

2) How could Sant Ocean Hall be improved?

Visitors were asked what they would like to see improved in the Sant Ocean Hall. More than one-third of visitors (37%) either said it was all good or could not come up with a suggestion. The most frequently mentioned suggestion referred to content of the exhibit (14%), followed by inclusion of more activities or focus on children (13%) and more presence of live animals (13%). (Table 6 summarizes these suggestions, while Appendix 17 presents examples for each category).

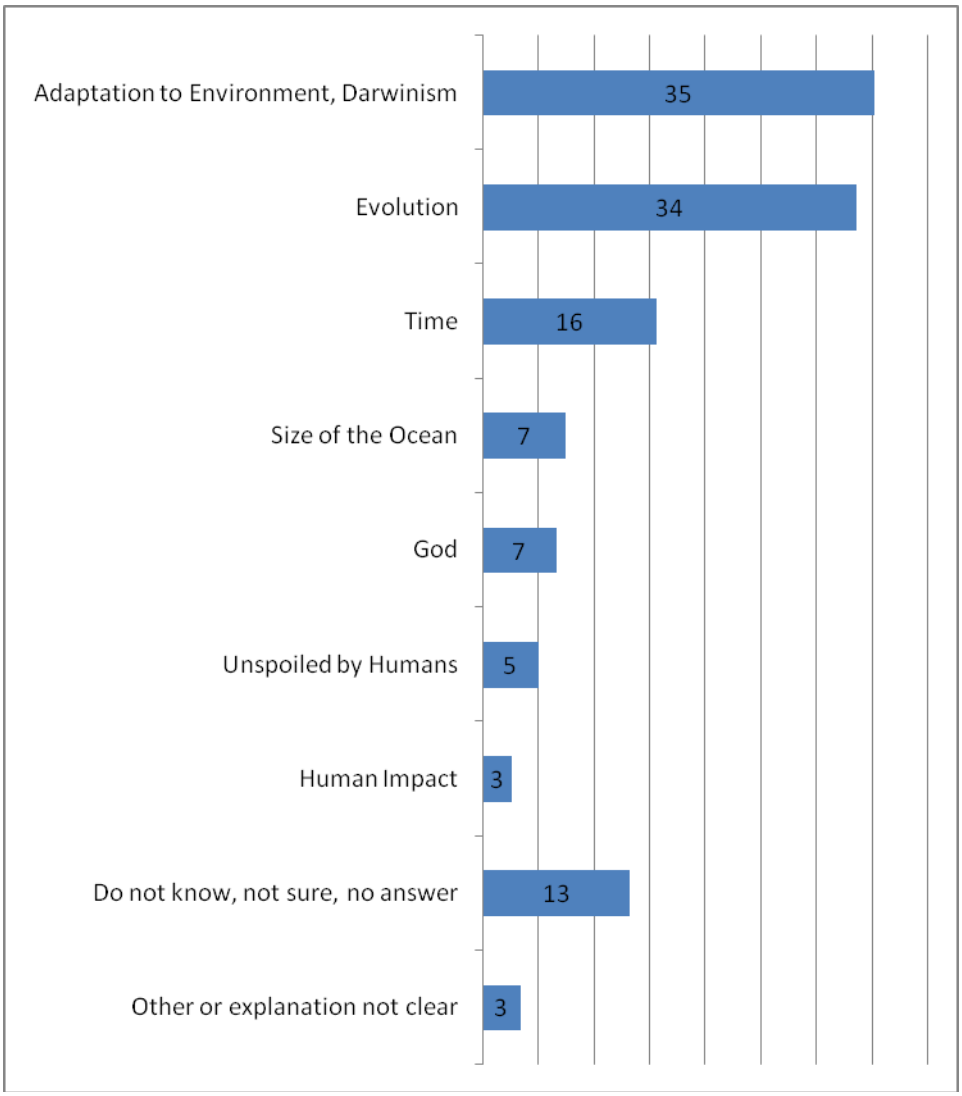
Table 6: How the Sant Ocean Hall could be improved

Suggestions for Improvement	n	% (n=122)
It is all good, improved since last visit	26	21
Do not know, can't think of anything, nothing, no comments	19	16
Content	16	14
More content, specific or general	*14*	*12*
Content is too evolution-based	*2*	*2*
More for children	13	11
More live animals	13	11
More interactive, more things to touch	11	9
Improve navigation	9	7
Improve layout and organization	8	7
Improve labels, especially for large animals	8	7
More video, media, visuals	5	4
Problem with exhibit component	5	4
People to answer questions	1	1

B. *What are visitors' general understandings of the Ocean?*

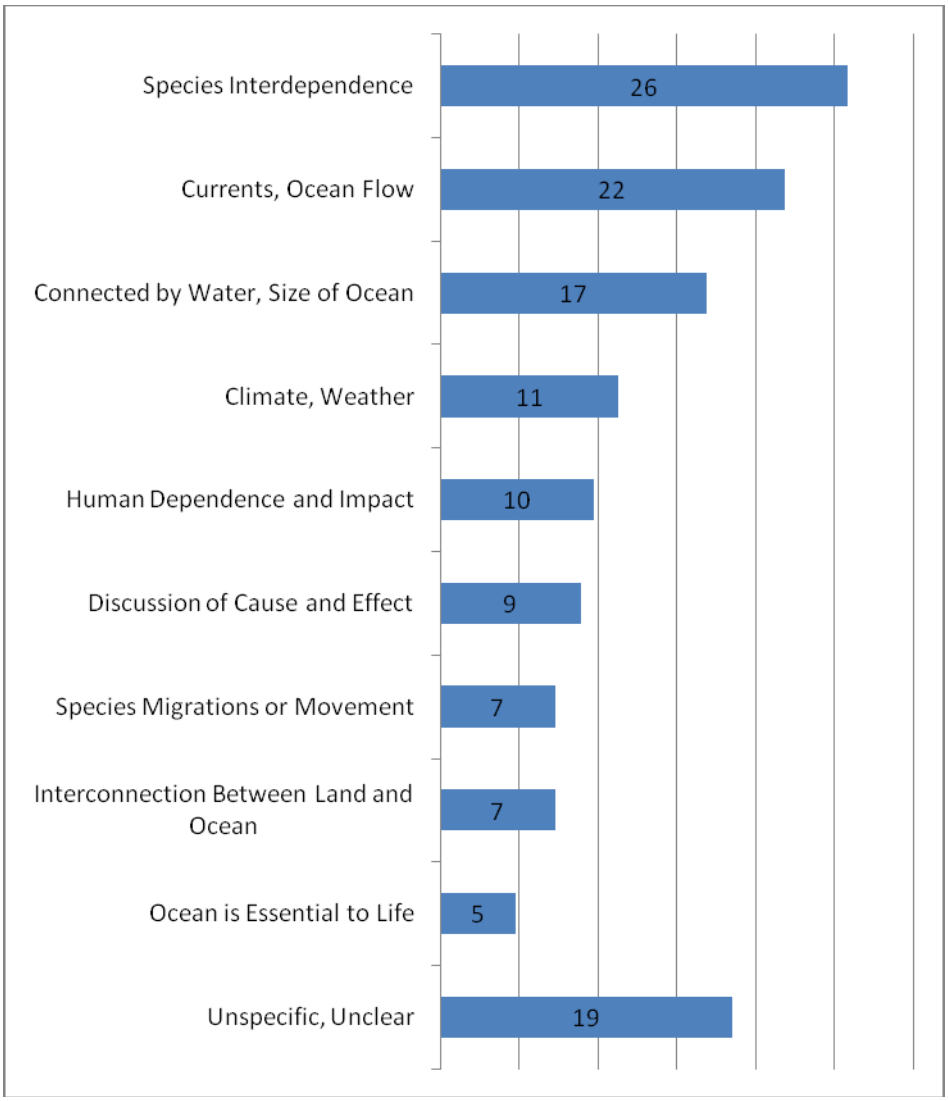
In general, visitors had a good sense of how ocean life became diverse. When asked to respond to the question, *"How do you think life in the ocean got to so diverse?",* over one third of visitors mentioned adaptation to the environment (35%) and/or evolution (34%). Other explanations presented included time (16%), the size of the ocean (7%) and God (7%). Both the lack of impact by humans (unspoiled by humans=5%) and human impact (3%) were offered as answers as well. (Figure 24 summarizes these responses, while Appendix 18 for examples in each category)

Figure 24: Visitors' thoughts on how life in the ocean got so diverse (percent within n=122)



Visitors were also asked to provide their thoughts on how the ocean functions as a *"big global system, with everything interacting and connecting."* As summarized by Figure 25, about one quarter of visitors mentioned species interdependence (26%) and/or ocean currents (22%) as explanations for the connectedness. Visitors also included in their explanations comments about how the planet is connected by water (17%) and climate/weather (11%). (Also see Appendix 19 for examples in each category)

Figure 25: Visitors' thoughts on how the ocean functions as a big global system, with everything interacting and connecting (percent within n=124)



C. What did visitors take away from Sant Ocean Hall?

1) What did visitors learn from the area?

Visitors were asked to complete the sentence, *"Before my visit to Ocean Hall, I never realized that…"* As noted in Table 7, comments about a specific species were the most frequently mentioned answers and included "the varying sizes of species" (20% of visitors) and learning about "the existence of a specific species" (11%). Visitors indicated learning about the ocean in general: they most frequently mentioned realizing "how large the ocean is" (8%) and "how diverse ocean life is" (8%). Visitors also expressed learning about "research that is done in the ocean" (7%). Some visitors were not aware that the Sant Ocean Hall was recently opened (6%). (Also see Appendix 20 for examples in each category)

Table 7: What visitors learned from the Sant Ocean Hall

What Visitors Learned	N	% (n=127)
Comments about a specific species	***74***	***60***
Size and scale	25	20
That certain species existed	13	11
Non-extinct	*7*	*6*
Extinct	*6*	*5*
Biology, ecology, anatomy	12	9
About the deep ocean and species that live there	11	9
Comments about the ocean	***35***	***29***
How vast the ocean is, bigger than expected	10	8
How diverse life in the ocean is, how important life in the ocean is	10	8
Currents	7	6
So much information here, so much to learn, so much compacted in the Sant Ocean Hall	6	5
Why ocean is blue, is beautiful	2	2
Other comments	***50***	***38***
How much research is being done, how species and the ocean can be studied	9	7
The Sant Ocean Hall or the NMHN existed, how NMNH improved, grown	8	6
Miscellaneous comments	8	6
Origen of life	4	3
Human impacts, how little, few humans are in comparison	3	2
I already knew it, nothing	12	9
No answer, do not know, so much	6	5

2) Which messages did visitors remember seeing or hearing most frequently?

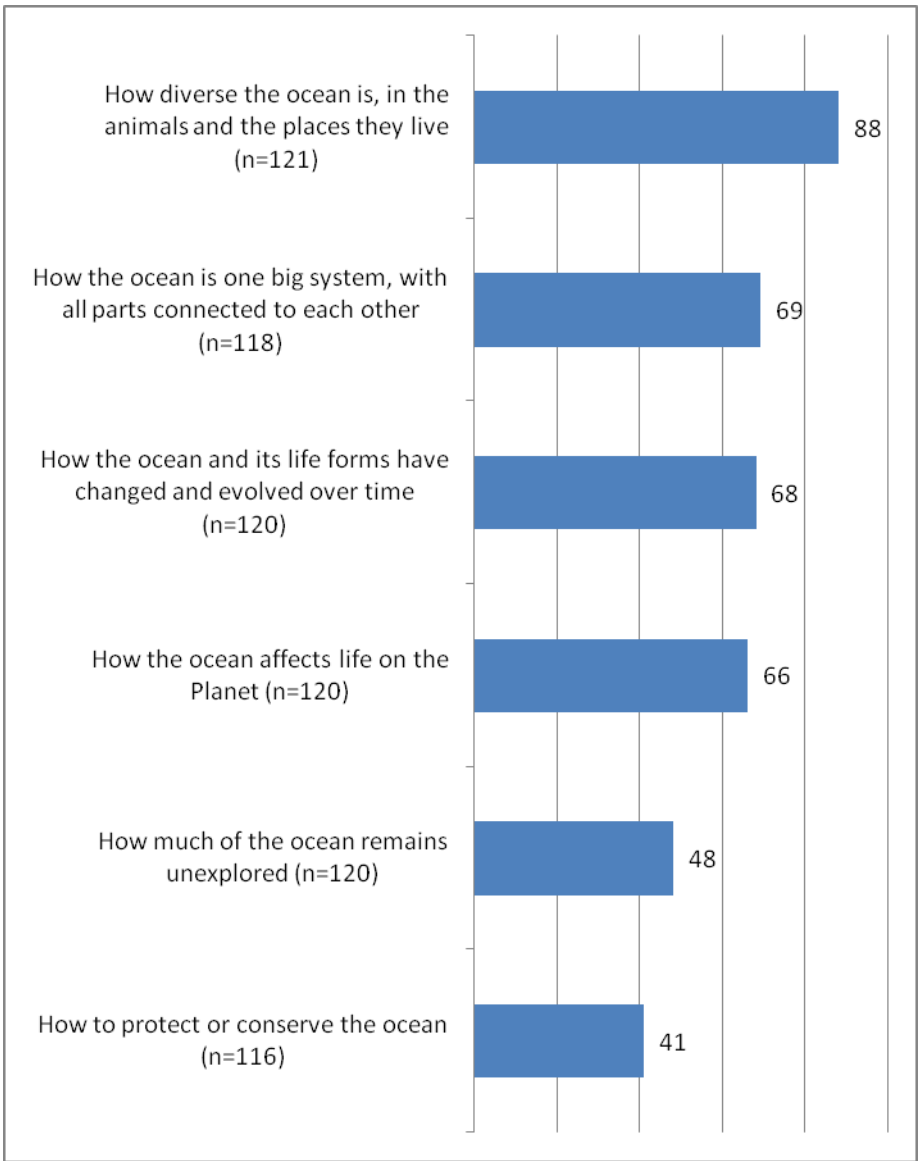
In order to see which messages the exhibition reinforced, visitors were also asked to complete the sentence *"Today's visit to Ocean Hall reminded me that…"* As summarized in Table 8, answers most frequently related to personal responsibility or a personal connection. Personal responsibility included answers such as "how little we know" (16%) or "how little *I* know about the ocean" (10%), as well as "how much we need to care for the ocean" (13%) and "how humans impact and connect with the environment" (6%). For some visitors, the visit reminded them of something personal, such as "how much they enjoy learning about marine life" (8%) and "how much they enjoy the ocean" (6%). The visit also reminded some of "how much they enjoy coming to museums or aquariums" (6%) or "going on vacation" (6%). Some visitors remembered when they used to come to the museum as a child (3%) and for others the visit made them think of bringing their own children to the museum (4%). Finally, some visitors were reminded of the diversity (13%) and size (8%) of the ocean. (Also see Appendix 21 for examples in each category)

Table 8: What visitors remembered seeing or hearing while at the Sant Ocean Hall

What Visitors Remembered	N	% (n=126)
Personal responsibility	***56***	***45***
How little we know, how much we take it for granted, how important ocean is	20	16
There is a lot I don't know, things I forgot I knew	13	10
How we need to care for the ocean	16	13
Individual impacts, human and environment connection	7	6
Personal connection	***41***	***33***
Of learning about marine life, working in a field related to marine biology	10	8
How much I enjoy the ocean, reminds of home	8	6
Of coming to museums, aquariums need to come back	8	6
My family, going on vacation, snorkeling	7	6
My children, to teach them, they would enjoy coming here	5	4
When I used to come here as a child, other childhood memory	3	3
Comments about the ocean	***28***	***23***
How diverse life in the ocean is, how important life in the ocean is	16	13
How vast, large the ocean is	10	8
How little we are	4	3
Ocean stewardship issue	2	2
Other comments	***23***	***17***
Miscellaneous comments	8	6
How important God and God creatures are	4	3
Reaction to certain species, cool, creepy	3	2
Can't think of anything, not here long enough	4	3

Visitors were presented with six messages and asked whether they remembered seeing or hearing anything about them in the Hall. Only three visitors (2%) did not remember seeing or hearing any of the six messages and 13% of the visitors remember seeing all six messages. The average number of messages remembered was 3.6 (st. dev.=1.6). As noted in Figure 26, most visitors remembered hearing or seeing the messages about "the diversity of the ocean" (88%), "the ocean as one big system" (69%), "how the ocean and its life forms changed over time" (68%) and "how the ocean affects life on the Planet" (66%). A smaller percentage of visitors remembered seeing or hearing the messages about "how much the ocean remains unexplored" (48%) and "how to protect the ocean" (41%).

Figure 26: Main messages visitors remember seeing/hearing in the Sant Ocean Hall (percent within 'n')



Some of the visitors who participated in the exit interviews had also been tracked throughout the Hall. For these visitors, the time they spent during their visit was recorded, as well as the number of areas they had visited (including repeated areas). In general, the longer visitors spent in the Hall, the greater the number of messages they remembered seeing or hearing (Pearson r=.401, p<.05). Similarly, the more areas visitors went to the larger the number of messages they remembered (Pearson r=.301, p<.05).

A comparison of the time spent between visitors who remembered and did not remember seeing or hearing the messages showed that visitors who spent significantly more time in Ocean Hall were more likely to remember specific messages about "how the ocean and its life forms changed over time"[12], "how to protect the ocean"[13], and "how much the ocean remains unexplored"[14] (Appendix 22).

Also, visitors who went to significantly more areas during their visit to the Hall were more likely to remember hearing or seeing message about "how to protect the ocean"[15] and "how much the ocean remains unexplored"[16] (Appendix 23).

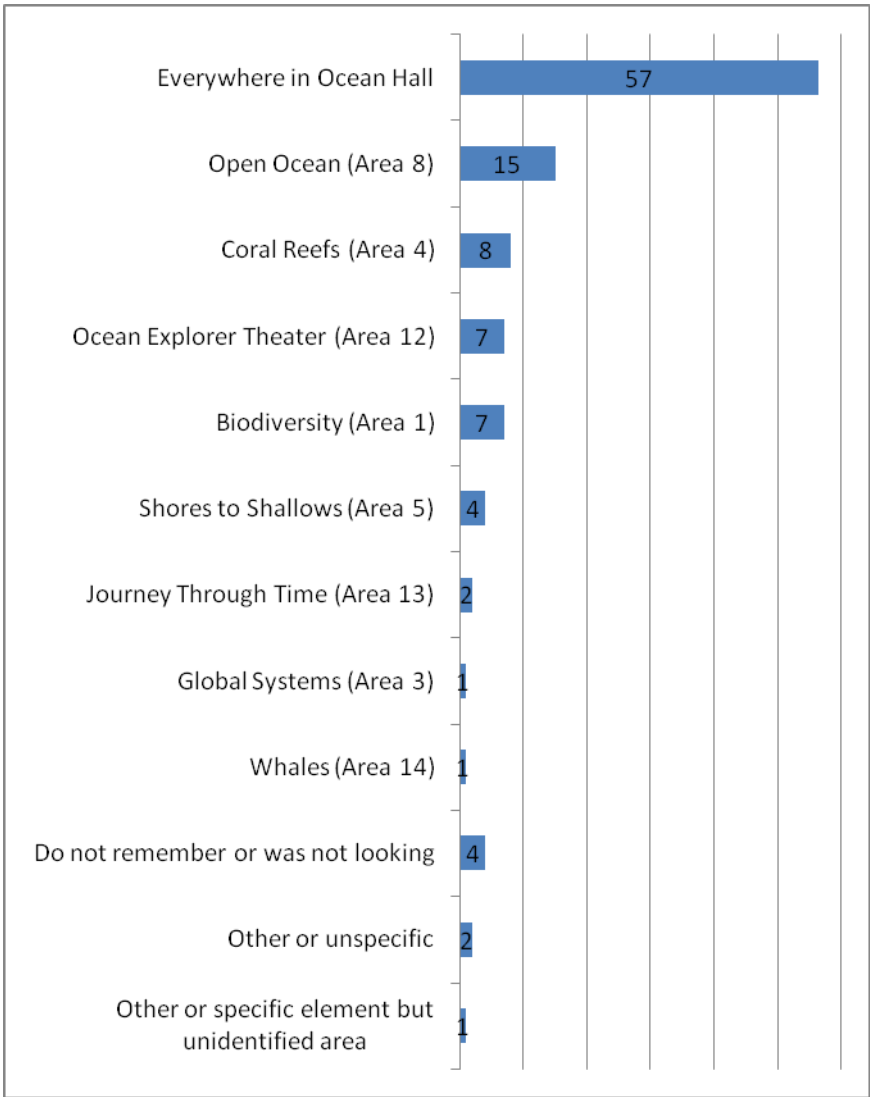
3) Where did visitors see the main messages of the exhibit?

In addition to asking if visitors whether they remembered seeing or hearing selected exhibit messages, they were asked to indicate where they saw or heard these messages. Figures 27-32 summarize responses from most frequently recalled message to least recalled message.

[12] Significant statistical differences between groups (Mann Whitney U=347.0, p<.05)
[13] Significant statistical differences between groups (Mann Whitney U=386.0, p<.05)
[14] Significant statistical differences between groups (Mann Whitney U=326.0, p<.05)
[15] Significant statistical differences between groups (Mann Whitney U=379.0, p<.05)
[16] Significant statistical differences between groups (Mann Whitney U=433.5, p<.05)

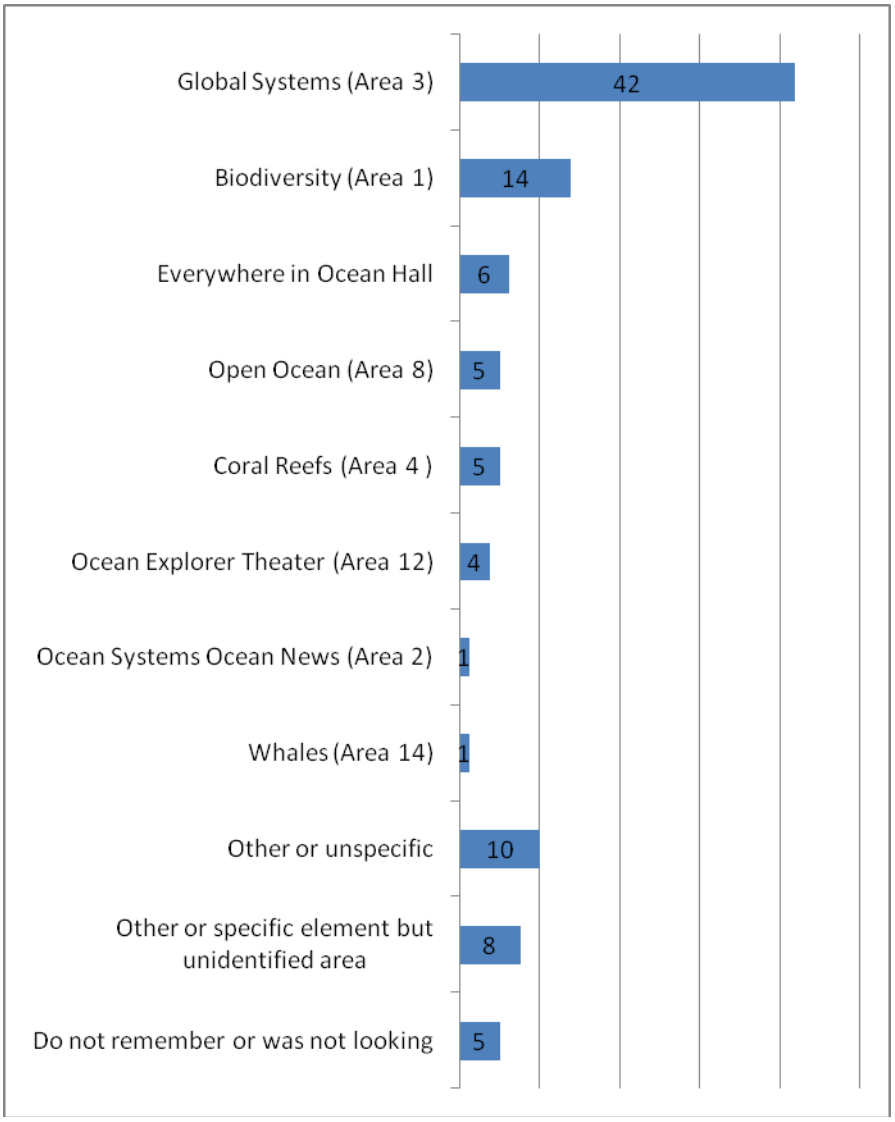
The large majority of visitors saw or heard the message about *"how diverse the ocean is."* For over half of these visitors (57%) this message was displayed "everywhere" in the Hall (Figure 27).

Figure 27: Where visitors remember seeing or hearing the message *"How diverse the ocean is, in the animals and the places they live"* (percent within n=99)



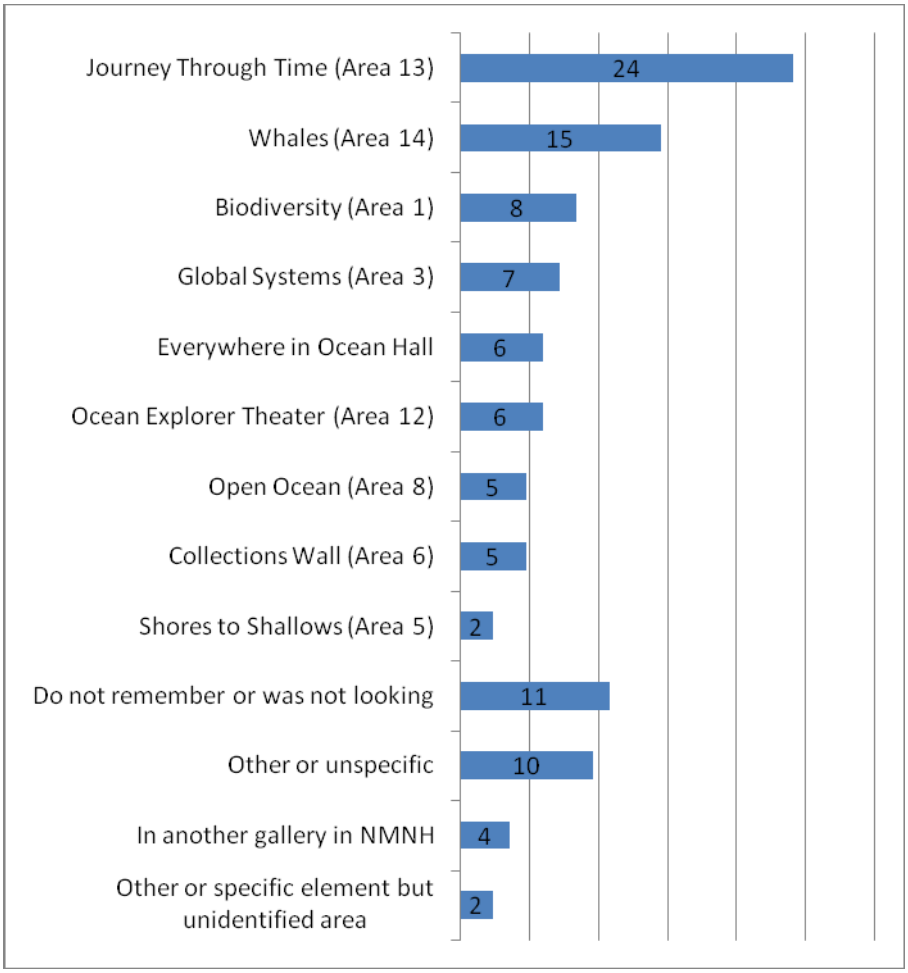
Over two-thirds of visitors saw or heard that the *"ocean is one big system"* and did so most frequently at Global Systems (42% of visitors) and in Biodiversity (14%) (Figure 28).

Figure 28: Where visitors remember seeing or hearing the message *"How the ocean is one big system, with all parts connected to each other"* (percent within n=79)



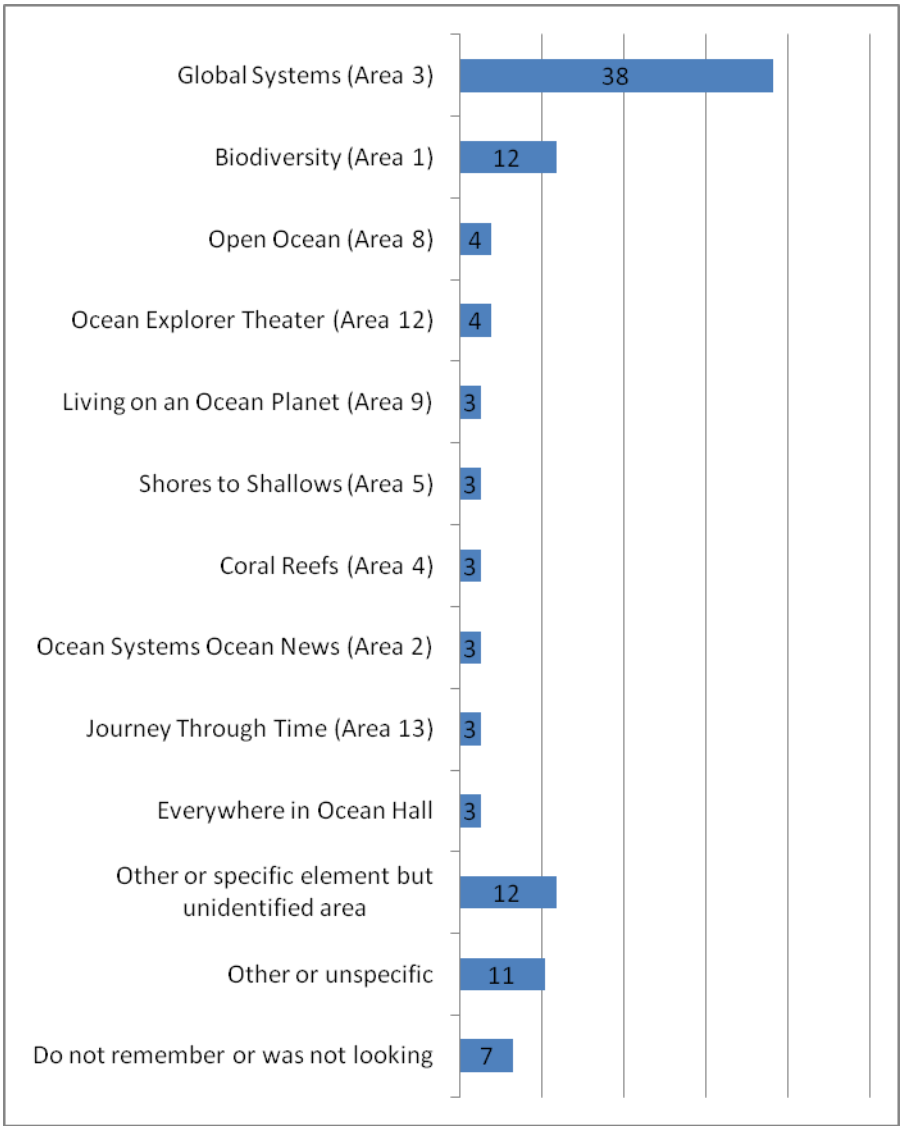
Almost a quarter of those who remember seeing or hearing about *"how the ocean changed and evolved over time"* indicated Journey Through Time as the place where they saw that message (24%), followed by 15% who saw it in Whales (Figure 29). This is not surprising as these areas display the most significant collections of fossils of the exhibition.

Figure 29: Where visitors remember seeing or hearing the message *"How the ocean and its life forms have changed and evolved over time"* (percent within n=83)



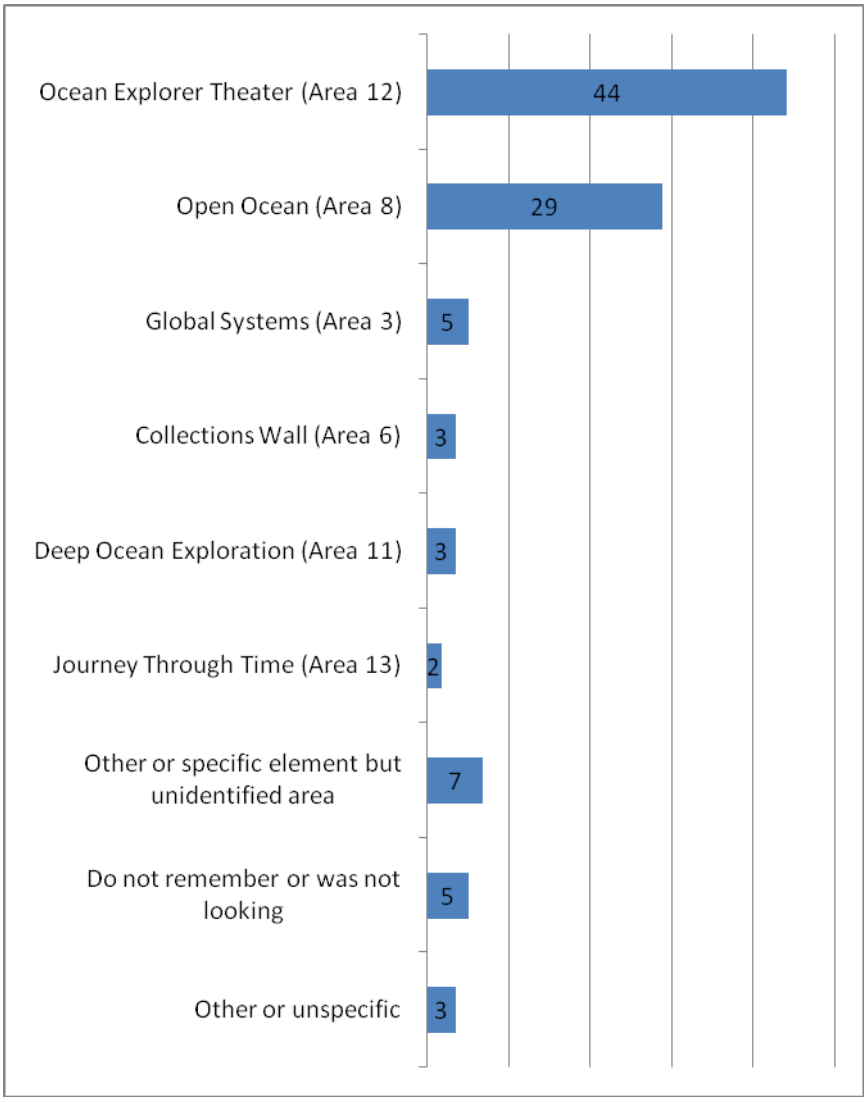
Of the 76 visitors who remembered seeing or hearing that *"the ocean affects life on the planet,"* 38% indicated Global Systems as the place where this message was displayed. Biodiversity was the second most frequently mentioned area (12% of visitors) (Figure 30).

Figure 30: Where visitors remember seeing or hearing the message *"How the ocean affects life on the planet"* (percent within n=76)



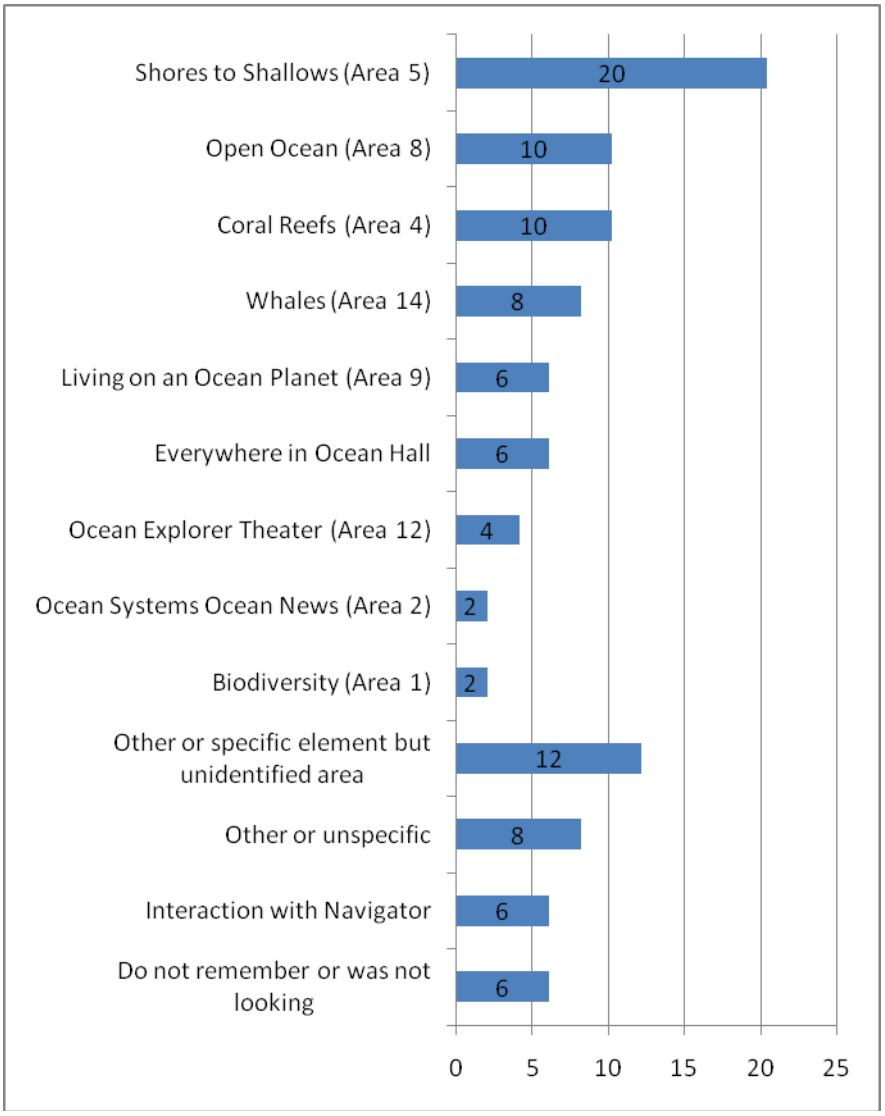
The second least seen or heard message, *"how much of the ocean remains unexplored*," was most frequently noticed in Ocean Explorer Theater (44% of visitors) and in Open Ocean (29%) (Figure 31).

Figure 31: Where visitors remember seeing or hearing the message *"How much of the ocean remains unexplored"* (percent within n=59)



Finally, only 49 visitors recalled seeing or hearing messages about *"how to protect or conserve the ocean."* Of those who did, most noted Shores to Shallows (20%), Open Ocean (10%), or Coral Reefs (10%) (Figure 32).

Figure 32: Where visitors remember seeing or hearing the message "How to protect or conserve the ocean" (percent within n=49)

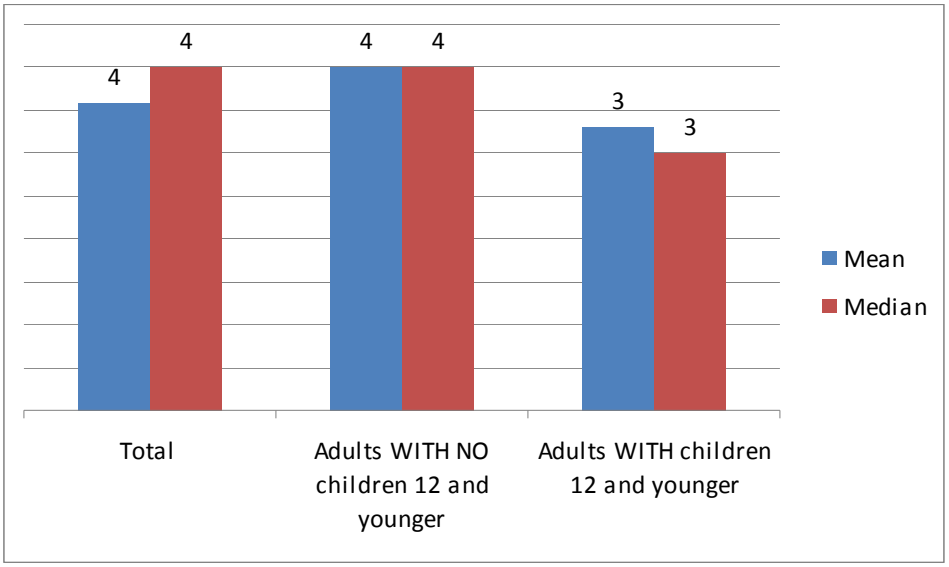


4) Did adults visiting with younger children behave differently than those visiting without younger children?

Those visitors in groups *with* children 12 years of age or younger recalled statistically significantly fewer messages than those *with no* children under 12 (Figure 33, Appendix 24). This is not surprising, given that data from timing and tracking showed that groups *with* younger children spent less time[17] and visited fewer areas[18] than those with older children, thus giving them fewer opportunities to be aware of, retain and recall messages. It is also likely that for those visiting *with* younger children the focus was more on making sure the visit was engaging for the children, and thus less attention was given to the content of the exhibition.

However, except for *"how the ocean has changed and evolved"*, no statistically significant differences were found between adults in groups with younger and older children in terms of individual message recall (Figure 34).

Figure 33: Comparison of number of messages seen or heard between group types

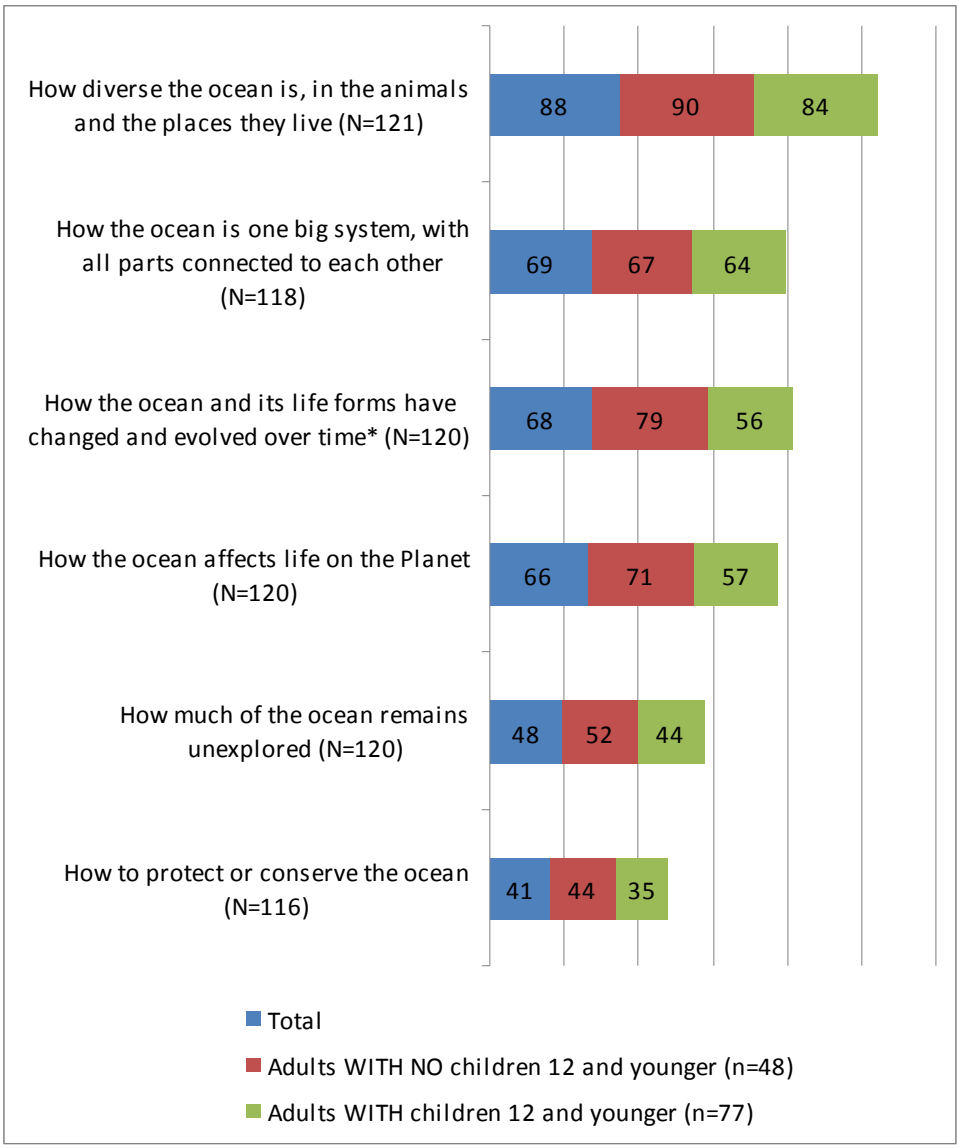


Significant statistical differences between groups (Mann Whitney U=1395.0, p<.05)

[17] The median time spent by adults in groups *with* younger children was 18:58 minutes and those *without* younger children was 25:24 minutes. This difference was not statistically significant (Mann-Whitney)

[18] Adults in groups *with* younger children visit a median 10 areas total and 6 unique areas, compared with 14.5 total areas and 8 unique areas visited by groups *without* younger children (both statistically significant; respectively Mann Whitney U=448.5, p<0.05 and Mann Whitney U=446.0, p<.05)

Figure 34: Comparison of messages seen or heard between group types (percent within 'n')



Significant statistical differences between groups (Pearson Chi-square 7.295, p<.05)

FOCUSED STUDIES

Focused studies were used in this project to understand the behaviors and interactions at particular exhibition components or experiences within Sant Ocean Hall that were identified by the exhibit team. ILI evaluators watched and recorded visitors' actions and conversations at a designated component and, at times, also asked them brief questions about use and understanding of the component and its content. This project incorporated six independent focused studies: 1) Ocean Today, 2) LOOP Interactives, 3) Tree of Life, 4) Collections exhibit, 5) Navigators and 6) Family Guide. Findings from these evaluations are summarized below. Since the Navigators and Family Guide studies did not include a physical exhibit, data collection for these studies occurred in various locations throughout the Hall.

A. OCEAN TODAY

Purpose:

The purpose of this evaluation was to determine visitor use and comprehension of the *Ocean Today* exhibit components.

Methods:

Groups were observed using the interactives in the *Ocean Today* exhibit, and which components they used and the amount of time they used the interactive were recorded. One adult member of the group was also interviewed about their experience with and impressions of the exhibit. Twenty-one groups were observed and interviewed; four of these were cued to use the exhibit interactives and then interviewed; while the others were uncued: they were observed first and then approached by an ILI evaluator who asked them for an interview. Of the 21 groups observed, 11 groups had adults with children 12 and younger, including 38 children between the ages of 0 and 12 years old; and 8 groups included only adults.

Two methods were used:

1. *Uncued observations and interviews* (n=17): visitors were observed using the interactive and, when done using it, were interviewed.
2. *Cued observations and interviews* (n=4): visitors were asked to use the interactive as they normally would. After they indicated they were done using the interactive, they were interviewed.

Overall Findings, *Ocean Today* Component:

- Median time spent in this area was 3:06 minutes. Cued visitors spent slightly more time than uncued visitors, 5:29 and 3:00 minutes respectively.
- Groups of adults (n=8) and adults with children 12 and younger (n=9) most often used the video touch screen. The videos most often watched were Shipwreck, Otters and Sounds.
- A suggestion for improving the exhibit was to increase the volume. Many visitors had difficulty hearing the audio track.

Main Findings, Observations:

For the four cued groups, the median time spent in the exhibit was 5:29 minutes, with a range from 2:23 to 7:46 minutes. This was longer than uncued groups, whose median time spent was 3 minutes, with a range of 1:20 to 8:00 minutes.

Between the five parts of the exhibit, groups were more likely to use the video touch screen (n=17), compared to any other option. Seven groups looked at the big overhead video(s), three groups examined the quote in the middle and one group looked at the intro panel.

Table 9: Behaviors Observed at Ocean Today

Group Behavior	# of groups engaging in this behavior (n=20)
Video (touch screen)	17
Big overhead video(s)	7
Quote in the middle	3
Intro panels	1
Ticker	0

Groups who used the video touch screen watched one to three videos. The top three most often watched videos were Shipwrecks (n=7), Otters (n=6) and Sounds (n=5).

Table 10: Videos viewed by visitors

Group Behavior	# of groups engaging in this behavior (n=20)
Shipwrecks	7
Otters	6
Sounds	5
Seafood	4
Grouper	3
Coral reefs	1
Kelp forest	1
Rivers	1
Fishing	1
Marine debris	1
Dams	1
Exploring history	1

Main Findings, Interviews:

What it was about: When asked what the exhibit was about, most visitors said it was about the ocean and ocean life, new discoveries and the technology used to study the ocean. More specifically, visitors said the exhibit was about protecting coral reefs, archeology, human impact on the ocean and sounds of the ocean. Responses included:

- Learning about the sea & ocean life
- Animals
- The ocean; Ocean life
- Different technologies that are being used to study the ocean

- Deep sea exploration
- Different types of things in the sea, animals & man-made; hear what they sound like; sounds
- Sea life
- The ocean
- Saw video & came over – it drew me in. New information on discoveries
- The ocean.
- Featured parts of the science of studying ocean; sounds of the ocean
- Archeology, I guess
- The ocean, seafood, shipwrecks, but didn't watch the whole shipwrecks one.
- Protecting the reef with new technologies for studying the ocean, robots
- Teach you about the latest discoveries & technologies to help the ocean
- Learning more about ocean life
- Teaching about the ocean
- Ocean life; impacts of man on ocean life
- Ocean; health of the ocean
- Teach you about fish; the environment & what we are doing to it

Learning new information: Visitors tended to have specific realizations related to the video(s) they watched. For example, visitors who watched the Shipwreck video were unaware of the shipwreck's existence. Those who watched the Otter video said they never realized otters had a storage pouch. Others talked about the negative impact fishing has and positive impact of ocean stewardship practices. One visitor mentioned the universities that are involved in ocean research while another reflected on the amazing nature of life. A few said they did not realize anything new from this component. Responses included:

- A shipwreck that was in the ocean from 200 years ago
- A shipwreck I didn't know about
- I didn't know that otters can keep food on their skin; under their arms
- On the otters, didn't know they have a pouch under their arm where they can keep a rock
- Sea otter – how it eats its food.
- Sea turtles – the bycatch – that they completely erased the turtles being caught – not like just 50% but completely erased it.
- Everything I saw was a learning experience; the grouper – it's endangered
- Grouper – starts out like a little, tiny fish [shows on hand] & grows to big [stretches out his arms]
- How life is just so amazing & that everyday you can learn something new - look at the people, how interesting they are.
- The different universities that were involved – UNC Wilmington, Texas A&M
- The parts of the kelp, just refreshed my memory
- Didn't see enough – he [son] keeps switching them
- That lobsters make noise!
- They caught extra fish' accidentally get things [catching fish] they didn't need.
- When they put up dams now they make ways for the fish to go over or through it
- Maybe good for kids.
- Nothing (n=4)

What was most interesting: To several visitors, finding shipwrecks and the techniques used to explore them were the most interesting aspects of the exhibit. Also of interest to visitors were sea turtles and otters, as well as underwater sounds, which one visitor said were unexpected and another though was fun for kids. Responses included:

- Shipwrecks
- Shipwreck - the models of it were cool.
- Shipwrecks, just showing the techniques they use to explore shipwrecks, that interests me
- When the ship went down!
- Shipwrecks, but I didn't want to sped the time watching it.
- The shipwrecks - they were finding sunk ships
- Kelp forest
- Seafood – how nutritious it is & how we need to preserve the quality.
- [Otters] They're cute of course, but also how much variety is in their diet.
- Just watched, liked the idea of video content in general.
- The sea turtles & sea otters – I like animals
- Sea turtles; knowing that we can help them.
- Grouper – my favorite fish
- Grouper gets angry when the scientist take him out of the water
- Just the big grouper really.
- Sounds from the seas – hear the sounds that you can't even if you were in the ocean.
- Noises – fun for kids
- Sounds – unexpected, didn't sound like what I thought; hopefully the level of volume [is relational], like the ship is loudest [because it is in real life]
- Patterns of how fish move, some swim up & some swim down; the new nets to catch more fish; no, to catch only the ones they want
- Otter & dams – so the dams it's a good overview of rivers and dams and the environmental impact of dams; also current events like removing old dams & building new ones.
- Marine debris - didn't know

How it relates to rest of Ocean Hall: Most visitors were not able to answer this question as they had either not been through Ocean Hall, had just begun their visit in the Hall, or had "breezed through." Those who were had seen the Hall said it related well, bringing the exhibit to life with sounds and showing what is known about the ocean. One visitor thought the exhibit acted as an over-flow area while another thought it might provide a summary of the Hall. Responses included:

- Fish; Things here we'll see in the rest of the Hall; just got there.
- Summary of the hall, hopefully
- Just another component really
- It works well
- Ocean related – there [in the hall] you see them, here you hear how some of the things you saw sounded
- A good holding place for people when its crowded
- Not sure but liked the idea of video content in general to support hall
- Haven't been to rest of hall – don't know our first stop
- 1st parts we've seen, so doesn't know
- No – all we've been to is the IMAX
- Haven't seen it yet

- Breezed through – saving the ocean & helping it thrive [on their way to gems]
- Didn't really look at it too much – but guess its all about the ocean, helping it.
- The whale is the same here and in hall, here its noises
- Only my 2nd area so I don't know
- Relates well, brings sound to life, like the whale. Also shows the impacts of fishing
- The ocean, what we know about it
- Has to do with ocean life; examples of what you saw in there is here

Suggestions for improvement: When asked what they would change, nine visitors said "nothing." Five visitors said that the volume needed to be raised, that they had trouble hearing the audio accompanying the video. Two visitors thought the component was uninteresting. One visitor said they found only some of the video menu pictures interesting and another visitor suggested adding people to the pictures to create interest. One visitor suggested shortening the coral reef video and another said the subtitles did not help children who did not yet know how to read. Responses included:

- More, I liked it.
- When I was looking at the menu of options I chose the shipwrecks & aquariums because they looked interesting; the pictures of the other 2 videos didn't look interesting.
- Couldn't tell what they were about; maybe show people in those two pictures.
- The volume needs to be louder; subtitles won't help son as he doesn't read yet but might be helpful for adults
- Is there a way to control the volume? It was hard to hear
- Couldn't hear video
- The volume – you can't hear it & these guys can't read.
- Turn up the volume
- Is the coral reef on too long? I never get to the end of it.
- Didn't grab my attention – I'd have left after 30 seconds when I still didn't know what it was about.
- Make it more interesting, less dull.
- None/Nothing/No (n=9)

Research messages: Visitors remembered several research messages related to studying shipwrecks and specific animals. Some visitors talked about the equipment or technology used for research such as sonar and submersibles. Other visitors talked about the research itself (e.g., managing coral reefs, grouper migration, and bacteria-free seafood.) Responses included:

- When they find things from shipwrecks they sometimes put them in museums and sometimes just keep it.
- Off the coast of the Keys, managing the coral reef; 4,000 ft. down is the shipwreck, seeing who was on the ship, but that was more historical than scientific.
- 60 different scientists working on the shipwreck – that's a lot! Don't realize how many on one project Looking at groupers, where they breed & things like that.
- How scientists are studying how the grouper migrates from the mangroves to the reefs to the ocean.
- Grouper: they're helping to rebuild the population; NOAA's one making aquaculture safe
- When looking at the shrimp fishing, they had to study how not to catch the turtles
- Study the fish patterns & protecting the fish
- A little – studying to try to preserve the quality of seafood

- People scuba diving, how they are monitoring it in the same place to keep watch
- The little submarine in the shipwreck video
- Using robotic cameras to study shipwrecks
- Using sonar to map the shipwreck locations
- The human sounds; seismic air gun & sonar
- In coral reef its an indicator for how the ocean is doing, pollution & stuff.
- The seafood one – to have a bacteria-free seafood for us to eat
- We didn't get that far
- No (n=2)

Human impact: Of those asked, most visitors said they specifically recalled hearing or seeing information related to threats to the ocean due to human impact. Specifically, visitors remembered learning about threats from pollution affecting coral reefs and overfishing of salmon and grouper. One visitor said remember an ocean stewardship message but could not recall anything about threats. Responses included:

- Fish; salmon & what people have done to them.
- Not threats but just do your part to protect it [a conversation message]
- Coral reef part
- The coral reef - our pollution is damaging them
- How deforestation negatively impacts coral reefs, but that might not have been here [maybe somewhere else in Ocean Hall]
- Overfishing; the fisherman & the grouper
- Catching fish
- Pollution

B. *LOOP INTERACTIVES*

Purpose:

The purpose of this evaluation was to determine visitor use and comprehension of the two LOOP Interactives, *Who Cares For the Ocean?* and *Ocean as Laboratory*.

Methods:

Groups were recruited and asked to use one of the two LOOP Interactives. They were then asked to answer some questions about their experience. Ten visitors were interviewed about the *Who Cares for the Ocean?* interactive; 5 groups included children 12 and under and 5 groups did not. Ten visitors were interviewed about the *Ocean as Laboratory*; 6 groups included children 12 and under and 4 groups did not.

One method was used:

1. *Cued observations and interviews* (n=20): visitors were asked to use the interactive as they normally would. Which components they used and the amount of time they used the interactive were recorded. The observation for each group was paired with an interview about their experiences and impressions of the exhibit, which was conducted after they indicated they were done using the interactive.

Overall Findings, *LOOP Interactives* component:

- 15 of the 88 groups tracked in the timing and tracking study entered the area these two interactives were in; these visitors were not cued into using the interactive. Median time spent in this area was 1:17 minutes.
- Among cued visitors, time spent at the interactives was around 3 or 4 minutes.
- For *Ocean as Laboratory,* groups typically viewed one video. They liked finding out about how various scientists are studying the ocean and liked the videos. However, some thought the videos could be shorter and almost everyone thought that being able to stop the videos when they wanted was a good idea. Visitors were also able to come up with ocean stewardship messages. People perceived this interactive as being more geared towards adults.
- For *Who Cares for the Ocean*, groups typically used one of the two interactives; more commonly *Confronting Climate Change.* They enjoyed the interactive nature, particularly the global footprint, and liked that it showed how to make good choices for the environment. A couple of visitors thought the introduction could be shorter.
- A suggestion for making both exhibits more attractive to visitors came up independently from multiple visitors for each exhibit. Making it more three-dimensional and noticeable were some of the suggestions.

WHO CARES FOR THE OCEAN?

Main Findings, Observations:

For the ten groups, median time was 4:36 minutes, with a range of 1:06 to 7:30 minutes. Times are likely longer than would occur with uncued groups; cued visitors tend to spend a little more time attending to exhibits.

Between the two main options, groups were more likely to use *Confronting Climate Change* (n=7), compared to *Managing Marine Fisheries* (n=4). Six groups looked at the main text panels, while four groups used the audio handheld device. Only two groups looked at the big overhead screen and/or the intro panel. For *Confronting Climate Change*, about half of the groups used all of the interactive components, while only about one-quarter did so for *Managing Marine Fisheries*.

Table 11: Behaviors observed at LOOP Interactive *"Who Cares for the Ocean?"*

Group Behavior	# of groups engaging in this behavior
Both LOOP Interactives – Use	**n=10**
Confronting Climate Change	7
Six text panels	6
Audio handheld device	4
Managing Marine Fisheries	4
Big overhead screen	2
Intro Panel	2
***Confronting Climate Change* – Use**	***n=7***
All way through	2
Most of it	4
Some of it	1
***Managing Marine Fisheries* – Use**	***n=4***
All way through	2
Most of it	2

Main Findings, Interviews:

What they liked: Visitors liked the interactivity of the exhibit, and that the touch screens allowed them to participate. The exhibit was seen as relevant and helping people make the right choices, either when purchasing seafood or making day-to-day decisions. Three visitors specifically mentioned the carbon footprint. Responses included:

- Liked the interactive, but it could be shorter if you have kids. Says here what you can do
- Shows how to make decisions to help make right choices
- A little above them [kids], the whole introduction. More for middle or high school. Interaction was good
- Relevant to when you're going out to dinner and eating fish
- As a Canadian, there's a big problem with fishing cod, and balancing the needs between fishermen, consumers, government
- Footprint, but it was a little boring
- Learned about fish, I like it
- Didn't know what a carbon footprint was, now I do
- You can listen to it and see at same time
- Touch screens, it was entertaining
- Made me hungry, the sea scallops part
- Touch screens
- It's interactive
- Interactive

- Didn't like it, the information is readily accessible, everyone should know it, it wasn't new to me
- Climate change, I'm a scientist, and as a reporter I covered the opening of the Hall
- Reducing carbon footprint was very informative
- Nothing standing out
- Didn't stand out

What it was about: When asked what they thought the exhibit was about, visitors talked about finding a balance between human actions and the impact on the environment or ocean. Specific topics mentioned included C02 gasses, pollution and global climate change. A few visitors talked about the positive role people and government should take in addressing these issues. Not surprisingly, which of the two interactives someone did affected their description of the experience; those who did *Managing Marine Fisheries* were more likely to mention fishing practices. Responses included:

- We're changing the planet, creating gases
- Says here what you can do
- Cool things, how habitats work
- CO2 level and how it affects the ocean and climates
- Reflects the balance between living in environment and how we don't have limitless resources. Be conscious about your decisions and actions
- How to make the planet a better place
- How there's stuff in the ocean and it's not healthy for sea creatures
- Managing fishing, clams, where to find them
- Ocean conservation, fish markets
- It's about balance, the fishermen don't want to have to shut down the fisheries
- Should keep the ocean cleaner
- Protecting the environment
- Attempting to personalize a global problem, and the personal role in a global issue, and what the government is trying to do as well
- Interactions of humans and oceans, oceans with humans
- To raise awareness of what we can do to help oceans
- Saving the fish based on global climate change

What was memorable: Those who did *Confronting Climate Change* tended to mention one aspect of the experience: the carbon footprint graphic. Those who did *Managing Marine Fisheries* talked about various topics like the scallop story and how fish and turtles are caught as bycatch. Responses included

- Graphic showing carbon footprint
- Like the animation of trends, for kids you don't need to show scientific trends
- Climate and all the choices
- Scallop story at end, shows what we're able to do
- Able to turn scallops around
- How they catch fish
- Ways to decrease your carbon footprint. I didn't realize things we already changed are helping out
- Picture of dead turtle, the bycatch
- How nets work, it would be nice to see it animated or in claymation

- The choices you can make – but I knew it already
- Actual foot graphic was interesting
- That some choices didn't reduce the footprint too much, that was surprising
- Firewood reducing CO2 was counter-intuitive
- Calculator of carbon footprint
- Nothing

How it relates to rest of Ocean Hall: Visitors tended to give very general answers to this question, such as saying that it's about how the ocean is changing or about the whole ecology of the ocean. A couple of visitors talked about the human impact on the ocean. One visitor did talk about how the *"Rest of the Hall is more passive; this gets visitors more involved."* Responses included.

- It's more about non-ocean choices, global warming. Climate seems to be a little separate from oceans
- The ocean and how things are changing
- Just started, I don't know
- It's about the whole ecology of the ocean
- The carbon footprint and marine part have to do with oceans
- People assume the ocean is so big, it's not affected but it is
- Each part is its own [each exhibit]
- The exhibit shows changes of climate and the effects a greater human presence can have
- Global warming heats up Earth, melts ice, and the changes put more H2O into ocean
- The rest of hall is more passive, this gets visitors more involved
- Relative to whole exhibit, it's about climate change and saving fish

Suggestions for improvement: When asked what they would change, visitors came up with a variety of ideas, with no single idea being mentioned by the majority. Four visitors talked about making the exhibit itself more attractive so people would be more likely to use it, by adding an object, flashing lights, making it less drab or making it more three dimensional. Additionally, a couple of visitors mentioned making the introduction shorter and a couple other visitors suggested making it more child-friendly. Responses included:

- For kids, make it a game, or use Google Earth
- Get to the footprint part sooner
- Change the introduction, make it shorter and easier to understand for children
- Bring the example up front, and different perspectives are good
- A few more facts and species that have declined - I'm a scientist
- For kids, knowing what little effort it would take, right now it looks hopeless
- Make it more interactive, have more questions
- Get your mind more in it
- Something for younger kids
- Have flashing lights, say you have something interactive
- Managing a specific fishery, like New England Cod in 18th century. Have something about agricultural runoff?
- Explain some things more
- Add some humor – it's a little too serious, it's a little dry
- Have a third object, that changes size [to attract attention]. Make it more 3D, less like a billboard

- Didn't notice you could touch the screen at first
- Would have missed it if not cued, it's pretty drab. Make the panel bigger
- Panels seem more like they're from scientific journals
- The film at the start didn't have enough pizzazz. This is more a downward thing, this is slightly depressing
- Needs an item [object] you just see the screen right now

Ocean stewardship messages: Visitors were not able to come up with examples of how scientists are helping to protect the ocean, but most visitors did say they saw something about what they could personally do. Responses included:

- Not in that one
- No (n=3)
- The video of the scientist
- Not really
- Really didn't see anything
- Don't think so
- About nets maybe, I lost interest

Changing behavior: They talked about changing their carbon footprint or making the right choices, including one visitor that mentioned specific options like turning down the heal, riding a bus and making a fire. Responses included:

- Mainly about changing your footprint
- All the choices
- Not specifically, it's about regulation
- Don't know
- Carbon footprint
- It's mostly about others
- Not really
- Turn down the heat, ride a bus, make a fire
- Use different light bulbs
- All the choices
- Reducing carbon footprint - not so strong a connection to the ocean

Human impact: Of those interviewed, most visitors said they did see something about human impact on the ocean, especially those who did *Managing Marine Fisheries*. They mentioned dumping of trash, sea scallops, CO2 levels and a shift in biodiversity. Responses included:

- Shift in biodiversity, I don't know if it's about oceans.
- Sea scallop, bottom trawling
- Picture of trash, or dumping
- CO2 levels
- The whole thing

THE OCEAN AS LABORATORY

Main Findings, Observations:

For the ten visitor groups, the median time was 3:12 minutes, and ranged from 1:24 to 15:00 minutes. Times are likely longer than would occur with uncued groups; cued visitors tend to spend a little more time attending to exhibits.

All visitor groups watched the videos, and almost every single group looked at the world map. The majority looked at the big overhead video and half used the audio handheld device. The labels below the overhead videos were used by less than half the groups and none of the ten groups used the intro panel. Half of the groups watched one video, three watched two videos, one watched three, and one watched four. Especially since these were cued groups, it is likely to expect groups to view at least one of the videos. When there were children in the group, both adults and children watched the videos.

Table 12: Behaviors observed at LOOP Interactive *"Ocean as Laboratory"*

Group Behavior	# of groups engaging in this behavior (n=10)
Videos	10
World map with scientists	9
Big overhead video	6
Audio handheld device	5
Labels below overhead videos	4
Intro Panel	0
Videos – number watched	***n=10***
One	5
Two	3
Three	1
Four	1

Main Findings, Interviews:

What they liked: Visitors mentioned various aspects of the exhibit, with multiple visitors mentioning the information or the variety of videos as what they liked most about the experience. A couple of visitors, in responding to this question, talked about the videos being too long. Responses included:

- Different choices for video
- That there are multiple stations, but it's confusing that the audio stick was only in one place. I thought because there was only one audio stuck then that's where you begin
- Like the cool stuff, it was cool
- Hand speaker is good, but you couldn't really hear the audio
- Smaller screen was good, it was easier than the bigger one
- The animals that lived in the sea
- Informative, it was easy to understand
- Don't know
- Not really, because I couldn't hear it and that got in the way of everything
- It's pretty to watch, but took a lot to find the stick for audio

- Didn't want to watch them really, it was kind of boring
- The video, but it was just too long, especially for children
- Videos are too long
- That it's an avenue between sciences and the public, expresses the enthusiasm scientists have for understanding the natural world. The public can understand that, the enthusiasm
- The scientists and videos are great. It's informative and shows what people are studying right now
- It's informative, with a lot of different videos. We keep a coral reef tank so it's interesting

What it was about: Visitors thought the exhibit was about how scientists are studying the ocean, and the new kinds of information they are learning. They mentioned specific examples depending on which videos they saw: mangroves, the DNA of sharks, etc. One visitor specifically mentioned learning about pollution and how it is impacting the ocean. Responses included:

- How scientists are looking more into the ocean than before
- Different research in different fields around the world, all relating to water or oceans
- The ocean environment and how scientists use it to explore new aspects of the ocean
- DNA of sharks, that certain things that are done to them
- A lot of info about sea life
- How important mangroves are and their development
- Research
- About different animals and species in the ocean, and about trying to learn more about them
- A lot of different aspects of the ocean, it's complex and fragile and we don't understand it. And we are having an impact on it
- What research scientists are studying – the different aspects of the ocean today
- The huge research we need to know before we go destroying it [coral], pollutions

What was memorable: Answers to this question depended on the video(s) the visitors watched. Visitors mentioned fish farming and the cage, mangroves, oil spills and the ship flipping to do research. Responses included:

- Fish farming
- The giant cage
- Mangroves, underwater video was neat. Oil spill, it showed the core samples, it could look fine on surface, but isn't. The impact 40 years later
- Don't know, I was watching the kids
- How shark hunting affects the ecosystem
- Cutting up sharks
- Nothing, I couldn't hear it
- The underwater part
- The flipping boat
- I thought the boat was going to sink [flipping boat]
- They all bring out something surprising for people
- Wanted to see more
- No, not really

How it relates to rest of Ocean Hall: Some visitors thought the videos tied the various exhibits together, showing the research that is going on to study the animals in the Hall. A couple of visitors mentioned that it is helpful to have a more comprehensive understanding of the ocean, and viewing the videos can do that. Responses included:

- How delicate the ocean is
- About the ocean, it shows the life of some of the fish you're showing
- Ties in all the work going on in the exhibits, the research going on. Having it in back is a good idea - you go through exhibits first, this ties it all together
- Conservation
- We're walking through quickly, this is kind of by itself, so it's not too related
- Wouldn't have stopped normally
- It doesn't look as put together as other exhibits, it doesn't make you notice it
- This is the avenue for how we've learned the stuff in the rest of the hall. It's important for visitors to have an end-to-end perspective
- Haven't seen the rest yet, but I'd guess this is current events. It is an important aspect of the ocean
- It's about the ocean, to see how cool sea creatures are and to know that we don't pay attention to what we're doing. If we don't, then Ocean Hall will be a "look at what's extinct hall."

Suggestions for improvement: There were a variety of suggestions given, mostly relating to improving the design or layout. A few visitors suggested making it more interactive, and two visitors specifically suggested putting the videos on the map itself. One visitor commented on the fact that you could not watch videos of every visitor on the map. Two visitors suggested increasing the font size, and one visitor thought it was important to make it more three-dimensional like the other exhibits. There were also a couple of comments about this exhibit component being more oriented towards adults than children. Responses included:

- Not sure
- Have the map be larger, have the videos actually on the map instead of photos
- The volume being louder, text on map is small, run trailers on the big screen to attract people
- The map is a little complicated for children to understand, the captions and the writing is too small
- More videos - different animals, how they live, how they eat
- More inspiration, also where animals live
- It's a pretty exhibit, but not a lot of hands-on. It's more for adults, there's a lot of information
- Make it more interactive
- Put the videos on the globe
- Have sea turtles. Have all the options on the map available in videos, especially Penguins & Italy.
- Make it more interactive, not just videos
- Cut each clip to 2-3 minutes. You need to get to the point a little faster, you're probably close the attention spans of people. Have a few activities with a touch screen to do something, make it more dynamic

- It would make a great web site, put it on the web. The layout, there's not much there, it's a little flat, not too inviting. Make it more 3D, like the other exhibits
- Videos are a little long, the font is really tiny on the map, especially the little blurbs. the one at the top - you can't read it
- Videos are hard to hear

Ocean stewardship messages: Two of the visitors were able to come up with examples of how scientists are helping to protect the ocean; specifically regarding the mangroves (not all visitors were asked this question). Responses included:

- Mangroves
- Mangroves, rebuilding them. Oil spill, long term damage
- No
- Didn't watch enough, maybe studying DNA

When asked if they remembered anything about the threats to the ocean, they came up with the following examples: overfishing, oil spills, pollution, nutrients, CO2, fertilizer and destruction of ecosystems. Responses included:

- Overfishing (n=2)
- Oil spill, damage to wildlife
- No, I was watching the kids
- Talking about fertilizer
- No
- Nutrients, fragile coastal landscape that's away or polluted. Amount of CO2 in ocean
- Overnutrients in mangroves, CO2 and marines and fisheries
- Pollution, oil spills, destruction of one ecosystem
- Overkill/overfishing of one species

Starting and stopping videos: A couple of questions in the interview inquired about the videos and the ability to determine when they started and stopped. Visitors were asked if they ever wished they could have stopped a video or skipped to a different one, and all visitors except for one said they did. Another question asked about the advantage of having a menu of all the videos on one screen to choose from, similar to "select a scene" on DVDs. All of the visitors thought this was a good idea. Visitors liked the idea of having more control over the operation of the videos.

C. *TREE OF LIFE*

Purpose:

The purpose of this evaluation is to determine visitor use and comprehension of the *Tree of Life* graphic panel.

Methods:

Two methods were used to collect data on the Tree of Life graphic panel.

1. *Uncued observations (n=300):* graphic panels were mounted in both the current location (i.e., towards the back of the "Diversity" area) and also at the entrance to the "Diversity" area. A total of 300 visitors, 150 at each location, were observed as they passed by the area containing the graphic panel – those who were simply passing through the area were not included in the sample. For each person, one of the following behaviors was noted: didn't notice (0 sec.), glanced at (1 to 2 sec.), or attended to / stopped at (3+ sec.) the graphic panel.
2. *Cued interviews (n=25):* visitors were asked to look at the graphic panel and then told they would be asked some questions about the panel. A total of 25 interviews about their experiences and impressions of the exhibit were conducted with visitors that included children 12 years and under - only visitors with children 12 and under were included in the sample.

Main Findings, Observations:

The placement of the graphic panel did make a difference in terms of behavior at the panel. Compared to its current location near the back of the Diversity area, more people glanced at or attended to the panel when it was located near the entrance to the Hall. However, most of the increase occurred in the "glanced at" category, there was a slight increase in the proportion of visitors who attended to the panel for more than 3 seconds.

Table 13: Visitor behavior towards Tree of Life display

Visitor Behavior	Current Location (n=150)	Entrance Location (n=150)
Didn't notice (0 sec.)	85%	65%
Glanced at (1 to 2 sec.)	5%	24%
Attended to / Stopped at (3+ sec.)	9%	11%
Total	100%	100%

Statistically significant differences between location (chi-square $\chi^2=22.38$, $p < .05$)

Main Findings, Interviews:

Comprehension: While some visitors did get the Tree of Life graphic representation, it was mostly the adults (and not all of them) who were able to explain it in enough detail to determine that they understood the diagram. While some thought it was mainly or exclusively about sea animals, others realized it was about the relationship between animals in general. A few specifically mentioned evolution or the origins of different kinds of animals. It was not necessarily obvious to all adults that there was a time component to the diagram. Selected quotes include:

- Connections to oceans, how we're connected and how all life is connected
- It's a family tree – to see how things are related to each other, they all come from the same source
- Evolution that started from the beginning, mammals to invertebrates
- How different animals are related, It's mainly about sea creatures
- All the stuff in the food chain
- Family tree

Familiarity with the diagram: Most visitors were at least somewhat familiar with this type of diagram, although there seemed to be more recognition among children 8-12 who had seen similar diagrams in school. Some adults remembered these kinds of diagrams from school, but did not provide as much detail as the children (probably because so many years had passed since they were in school). The children most commonly related the diagram to food chains or family trees. A few children were able to adequately explain what the diagram represented. Selected quotes include:

- Yes, we made one yesterday in class. An Atlantic Ocean food web
- Like in making a family tree
- I've seen smaller models in school, but usually with a timeline
- At school, in science class
- Science books, encyclopedia
- In my science textbooks about plants
- Science books, biology class
- Probably, but can't remember

Connection to Diversity Displays*:* When asked about the relationship between the diagram and the Diversity displays, many visitors suggested that some of the things in the diagram were represented in the displays. A few visitors either did not know or had not spent enough time looking at the displays to say for sure what the relationship was. A few adults suggested making the relationship more obvious by clearly stating the relationship on the graphic panel itself. Selected quotes include:

- We saw the octopus there. It shows what you see and what differences there are
- Everything on the panel is in there [the cases]
- You look in the cases, then can look on there [TOL diagram] and find out where an animal goes
- Some could be in the cases and different cases, and are done by different relationships
- Helps it sum it up for you – tells you what is gonna come next
- Shows all the fish and how they are connected
- Haven't seen the cases so it's hard to say
- Shows examples of what different divisions there are

Connection between three groups of life: There was some confusion as to how the three groups of life were related. Visitors often gave ambiguous or incomplete answers. Children did not answer this question very often, the adults generally attempted to explain this relationship. Selected quotes include:

- They're everything that we know about so far, all the organisms
- Both connected to the others and maybe connect to other groups not shown
- Everything comes from the same origin
- All life has Bacteria and Archae in it

- Those two are the origin of everything, the one-cells
- Can't tell, it's kind of confusing
- They're part of the third group [Eukarya]

D. *COLLECTIONS*

Purpose:

The purpose of this evaluation was to determine visitor of use and comprehension of the *Collections* exhibit component.

Methods:

Groups were observed attending to *Collections* exhibit components and, when they were done using it, they were approached to participate in an interview about their experience and impressions of the exhibit. Nineteen groups were observed and interviewed. Of the 19 groups, 9 groups included adults and children under 18, with 15 children between the ages of 0 and 12 years old; 6 groups included only adults. Group information for four groups was not recorded.

One method was used:

Cued observations and interviews (n=19): visitors were asked to view the exhibit as they normally would. Which components they used and the amount of time they used the interactive were recorded. The observation for each group was paired with an interview.

Overall Findings, *Collections*:

- Median time spent for cued visitors in this area was 4:01 minutes.
- The variety of experiences offered were well-utilized by visitors, with more than half of visitors observed attending to the specimens, giant squid, pull-out drawers, large objects above eye level and the coelacanth.
- Visitors did realize that the exhibit was about collections and the classification and organization of living things. They thought that the Smithsonian researchers was most likely to have collected them, although they noted stories in the labels about some of the specimens like the coelacanth and giant squid being collected by other people.
- In terms of learning new information, visitors were most likely to mention the flounder, how specimens are preserved and the coelacanth. They were most interested in the giant squid and the coelacanth.
- They did imagine that people besides Smithsonian researchers could use the collections, including other scientists and the general public (provided they had a reason to do so). Visitors thought the collection was used for both research and educational purposes.

Main Findings, Observations:

For the groups, the median time spent in the exhibit was 4:01 minutes, with a range of 1:33 to 9:27 minutes. For the seven possible components, the majority of visitors attended to the following: the specimens, giant squid, pull-out drawers, large objects above eye level and the coelacanth. Only two components were attended to by fewer than half of the visitors observed: the video and the introductory panels.

Table 14: Components Attended to at Collections exhibit

Components Attended to	# of groups engaging in this behavior (n=19)
Specimens	18
Larval specimens	17
Giant squid	17
Drawers	15
Bird Drawers	9
Large objects above eye	13
Coelacanth	13
Video	8
Intro panels	4

Groups of adults with children 12 and younger tended to pull open three to six drawers in the Collections exhibit. Adult-only groups tended to pull open one or two drawers. Of the nine groups that pulled open the drawers containing bird specimens, those with adults and children 12 and younger tended to open three drawers, while adult only groups opened one or two bird drawers.

Main Findings, Interviews:

What it was about: When asked what the exhibit was about, visitor responses focused primarily on the classification and organization of specimens for research and education. The secondary focus was on more general "things in the ocean," followed by the diversity of ocean life and evolution. Responses included:

- Specimens; how museum collect, what goes in them – the cases; how they classify them.
- Classifying and organizing animals and species
- Specimens, to check for education
- How scientists collect information
- Contributing to all kinds of research, specifically ocean life
- About how scientists study marine life; how they have developed their classification – male & female of one species, but at first they thought they were two different species; or two different sizes, were the same fish but they didn't know
- Why they have the different samples of fish
- Past to present species
- Showing you how the fish are structured and the different structures and types of fish out there
- Fish, how scientists classify fish; how creatures take on different forms
- Show the value of science

- Science behind species, especially unknown things like giant squid, coelacanth, unicorn of the sea
- Different things you don't usually see in the ocean; see things close up; fossils
- Fish, birds, ocean stuff
- Marine life
- Life cycle of fish, larva
- Underwater life
- All about sea animals and birds, things that survive on the sea
- Diversity; evolution
- Evolution of fish
- Various forms of marine life, some preserved and some models
- Different types of life

Who collected the specimens: Thirteen visitors said that scientists – marine biologists, oceanographers – were responsible for procuring the specimens on display. Nine visitors indicated that researchers from or affiliated with the Smithsonian had been involved with collecting the specimens, although one of those visitors felt that any research conducted by the Smithsonian was related to the exhibit itself and not specifically with animals. A few visitors talked about where the specimens were found and that some items in the collection were donated or on loan. A couple of visitors mentioned that the stories told of others who found them, specifically citing the coelacanth and giant squid as found by non-Smithsonian people. Responses included:

- People funded by the Smithsonian
- Mostly Smithsonian people
- Scientists affiliated with Smithsonian; some are on loan
- Oceanographers, ocean biologists; probably not all from Smithsonian
- Marine biologist from Smithsonian and other places too, some are on loan
- Scientists, both Smithsonian Institute and other places
- Marine biologists, not Smithsonian. A lot is donated, that's how they get their stuff.
- Scientist, fisherman, individuals; both Smithsonian and non-Smithsonian
- Independent marine biologist, from people who caught them, not all Smithsonian or even scientists
- Oceanographers, not necessarily just the Smithsonian
- Scientists, biologists, oceanographers
- Scientists from other places; fishermen
- Scientists, could be independent
- Coelacanth is on loan, maybe different people found them and provided them for exhibit [didn't really think Smithsonian does research specifically with animals, more doing research before putting on the exhibit]
- Scientists, marine biologists throughout world
- Some were caught off South Africa, the squid off of Spain
- Maybe donated, like the giant squid; don't know how the coelacanth got here
- It's donated, on loan, some are NOAA, some are Smithsonian
- Donations

Learning new information: Visitors gave a variety of responses when asked to complete the following sentence about the Collections exhibit: *"I never realized that…"* Several visitors indicated that the collections on display, or some information about them, were new to them. A dozen visitors talked about one of the following topics: how flounders' eyes develop, the coelacanth (e.g., something thought to be extinct so long ago was caught so recently); how specimens were kept and preserved, and how long narwhale tusks can be. A few never realized all of the details involved with classifying and organizing specimens. Two visitors said they did not realize anything new and one visitor indicated they preferred live animal collections. Responses included:

- Awful lot of it is new to me; giant squid, larva of fish
- It's all new to me
- Didn't know it existed
- All new
- All new to me
- Coelacanth
- Coelacanth – that something caught that recently was thought to be extinct 65 million years ago
- Finding the prehistoric Coelacanth – didn't know they were still finding things like this.
- Had awfully long horns [narwhale]; that they keep fish in jars
- The locking mechanism [dorsal fin?], it wasn't related to tuna
- They thought this was a tuna, but then found out it wasn't;
- The flounder's eyes are both on one side
- The fish that had two eyes on one side [flounder]
- The eye moving in the fish as it grows; goes from one side of the body to the other
- The eyes on the flounder, how they move from one side to the other [as it grows]
- The flounder's eyes move
- The batfish, it had a manta-like wings, never seen that
- Don't know a lot about classifying. The one that wasn't a tuna, minute characteristics – so detailed. It was interesting.
- There were so many names for fish, the scientific name, common name, nickname everything was new to me!
- The new chemical they use to preserve specimens
- Familiar with it already, watched a lot of these shows
- Nothing really
- Too much dead stuff in there [liked live animals better]

What was most interesting: When asked to say what were the two most interesting parts of the Collections area, visitors most often mentioned the giant male squid (n=11), which most had heard of but only seen on television, and the coelacanth (n=10), which people found interesting and many had not heard of before.

Table 15: Visitor comments on Collection components

Component	Why is it interesting?
Giant Squid	See the size Never seen before Don't see something that size usually Interesting to look at See it on TV, nice to see it here Never seen one Really interested; on the History channel saw a show on it Never seen one up close The suckers have little teeth on them It's big and it was once alive; is it real or not? The set-up was cool, how it was head down with its tentacles all around
Coelacanth	Ugly-looking prehistoric fish; they thought it was extinct Interesting to adults and kids Interesting to adults and kids From TV commercial Never seen and did a report on it Never seen it before Has a small mouth for such a big body He's big Heard about it, never seen it I've been reading about it for years Never seen a fish like that before
Fish (The parasitic male fish; Fish tinted with different colors; Cuttlefish; Narwhale tusks; Weird fish [narwhale]; Unicorn fish)	Still don't know enough about it It's cool It's like a map, easy to understand wit the colors How it can walk on land Didn't know fish had those Never seen it. Process of embryos/born, how the flesh is dyed
Birds	They were dead!
Coral	The pattern of it is different, unique
X-rays	Cool with the one above, [its] so big like you can hear the ocean Little less interesting in marine biology
Larvae	Son liked So colorful
Turtle/Tortoise shells	It's so huge It's big, stands out
What's in a name?	Fascinating, scientific names
Julius Pagoras (sp?) shell	It's pretty

How it relates to rest of Ocean Hall: Visitors talked about several ways that the Collections area related to the rest of Ocean Hall: to the ocean theme (n=5); it was about diversity and evolution messages within the exhibition (n=5); by providing a classification system (n=3); some thought the classification system was not specific to Ocean Hall (n=3); as a natural pathway through the exhibit and offered a good amount room to view objects (n=2), among others. Responses included:

- Fits in with marine theme; are similar to things you find in the ocean.
- Ocean theme
- Outlines stuff we don't know/things think we know but don't; how vast ocean is and how little we know
- It's about marine life, so where else would it be?
- It's sea life; this is the main exhibit so it has to be here, this is the center of the museum.
- About biodiversity, showing different kinds of creatures. Need to explain that. Shows how scientists and researchers explain biodiversity through classification.
- How evolution works, what's related, different kinds of fish and how they evolved that way
- Shows the variety of fish
- The way life develops and the paths it takes
- Probably extinct
- To build your knowledge of the classification system
- So you can see how the different things are related
- Each part of the collection has special subjects
- It's interesting to learn about it here
- But they could have put it [that topic] in mammals, too.
- It's applicable to all parts of the museum, really. It's not just about the ocean
- So there's enough room to walk around
- Traffic flow – keep you moving back
- For the kids, seeing them use it, the interactives they are always full
- Sounds like you're looking for funding for scientist's contributions
- Don't know

Suggestions for improvement: Three visitors offered ideas for improving the *Collections* area. One visitor suggested adding a label *"for the two tucked things"* and raising *"the little peepholes."* Another requested more information related to the *"parasitic male fish on the female fish, but they didn't say why it was there"*; and a third visitor said they found the *"two-horned thing"* [narwhale] interesting adding, *"What is it? Needs a label!"*

Perceptions of who uses the collection: When asked who uses the collection, visitors talked about both Smithsonian and non-Smithsonian scientists and researchers (n=6), the general public (n=5), university and school students and teachers (n=5), International organizations (n=2) and other museums (n=1). Responses included:

- Mainly Smithsonian Institute; mainly researchers, not so much public access
- Internal scientists, if the Smithsonian has them; also visiting scientists
- Don't know if Smithsonian Institute uses research, probably do
- Scientists from Smithsonian Institute and other scientists. There's always more to learn.
- The general public and Smithsonian Institute; other museums also
- Other scientists to do research, also Smithsonian scientists
- Other scientists
- Open to public
- Everyone; professional researchers; everyone in the world
- They share outside the museum; schools
- Everybody
- International groups; they do loans so they can go all over
- Teachers, anybody; I'm a teacher, I use museums
- Students, ocean biologists, general people like me

- Researchers, anyone because its a national museum, ask them and if you have the right credentials you can
- Universities, researchers, other museums
- College students doing research could use them
- Scientists and researchers and the public uses this in the museum

What collection is used for: In a follow-up question about what the collection was used for, visitors talked primarily about research and education, often mentioning both. Responses included:

- Continued research; new found species and can compare them.
- Education of the American public; research also, I assume
- Education and research
- Research, education, advocacy for conservation; chemical research, evolution
- Studies, like looking at dorsal fins, research
- Preservation, what life used to be like, how things have changed
- For exhibits; before it goes in the exhibit they run tests, like maybe on the squid
- Research
- Go back to identify new fish based on the specimens, find new things and see if they are a new species or not, to evaluate new finds.
- Researching sea life & our impact on it.
- Studies, education
- Studies – environmental impact; how we are impacting the world
- To study them more; to compare between species
- Identification studies, find out what's out there and ID it, then study it, so taxonomic studies
- For research and education – this is for education [museum] but they've got to have something to compare to when they classify it; classification purposes
- To teach people about marine life and to help people care for them; to preserve animals so they won't go extinct.
- Learning purposes; to teach kids especially
- Educate the public
- Education
- To let people know what's out there in the sea [education]

Additionally, two visitors said the collection was used to create awareness. One said, *"To inform the average person; other scientists to do research, also Smithsonian scientists"* and another said, *"[To] sell their book [on] evolution and creation."*

E. NAVIGATORS

Purpose:

The purpose of this focused study is to determine visitor interaction with Navigators (volunteer docents) in Sant Ocean Hall.

Methods:

Cued interviews – A total of 20 cued interviews were conducted with groups with and without children 12 and younger. Visitor groups were sampled purposefully so that roughly half of the groups had interacted with Navigators, and half had not. Those who had interacted with Navigators were asked a series of questions about that experience. If they had not interacted with Navigators, they were asked what kind of information they would ideally seek from interactions with Navigators.

Main Findings, Interviews:

Navigator Use: The types of information that visitors said they typically look for from volunteers or staff in exhibits fall into three categories: 1) exhibit-specific; 2) child-focused; and 3) basic museum information. Four of the 20 visitors interviewed said they do not usually ask questions, preferring to use brochures or the information provided in the exhibit (labels, videos, etc.).

Exhibit-specific information ranged from how to move through the exhibit to gaining additional information above and beyond what was provided in labels and other media, to making connections to the their own experiences. For example:

- More information on the subject; more than what the sign says
- Directions and the organization of the exhibit and how to approach it.
- History of things in the exhibit area
- Information about whatever we're seeing. We're curious! If they're standing by the stuff (e.g., the shark, the person [volunteer/staff]) must be an expert in that.
- About the exhibit, something that we don't know or understand from the blurbs.
- Something out of the ordinary related to our personal experience.

Child-centered information focused on age/grade-appropriate information, making connections to children's lives, and opportunities to extend learning. For example:

- Questions that can help kids understand more about what we're seeing, learn more about what we're looking at.
- Info to give to kids on their level, related to pre-school, and that they can make connections to, e.g., the coral reef and human impacts.

Basic museum information included general directions to specific objects or exhibits and restroom locations.

Of the visitors interviewed, nine had talked with Navigators, 11 had not. Of those who talked with Navigators, six initiated the conversation while three did not. The visitors that initiated the conversation inquired about the following exhibit components:

- Whale model
- Fish tank
- Ceiling skeleton
- Squid
- The entrance
- "What's a Microbe"

Comprehension: The majority of conversations with Navigators were object-related. Object-related conversations included providing identification, confirming authenticity and/or sharing or explaining numerical information. For example:

- How big squid could be - two-times bigger than that since it's not full grown yet.
- Asked if it's a model or real? Asked about statistics in front wall (95% living space).
- Fish in the tank: feeding, species in tank, their habits, where they got the fish.
- Explanations about the skeleton.

Of the nine visitors that interacted with a Navigator, six said that their interactions enhanced the experience; the remaining three said it did not make a difference. Conversations with Navigators primarily provided additional information or clarification for a specific exhibit or object:

- Asked if these were seahorses.
- Learned more about squid; made it more interesting. It wasn't only a squid in a box.
- Noticed some species in the panel were not in the tank and vice-versa. They helped us see that – the information wasn't clear. Learned what they feed the fish.
- More information about the skeleton.

All but one of the visitors that interacted with a Navigator indicated that they felt their questions to Navigators were answered adequately; the remaining visitors did not provide a reason for why the interaction was inadequate. Of the visitors whose questions were answered adequately, five visitors indicated that they learned something new or thought differently about something from talking with a Navigator. New learning or thinking included:

- Understanding more about the topic.
- The best way to move through the exhibit.
- Didn't know a squid could get that big.
- Learned what a Goulpi was; Children wanted to come, they like the movie Nemo. Navigator showed which fish were in the movie, making a connection for the kids.

F. *FAMILY GUIDE*

Purpose:

The purpose of this evaluation was to determine visitor use and comprehension of the *Family Guide* exhibit components.

Methods:

Adults visiting with children were intercepted, handed a Family Guide and asked to give their thoughts about the guide and to think about how they might use it. Twenty-one visitors were interviewed consisting of 35 adults and 48 children between the ages of 0 and 17 years old. Fifteen of the visitors said that was their first visit to Ocean Hall; six indicated they had previously been to the exhibition.

Overall Findings, *Family Guide*:

- Visitors understood the Family Guide primarily as a navigation and information tool.
- Most liked the size and length of the Guide and thought the information it contained would be helpful for making the most of limited time or attending to the specific interests of a group's members.
- A suggestion for improving the Guide was to include more visuals or icons to help visitors with children more easily find child-friendly components in the Hall.
- Half of the visitors interviewed thought they were likely to do one or more of the Ocean Friend Challenge activities as a follow up to their Ocean Hall experience.

Main Findings, Interviews:

Purpose of the Guide: When asked what the purpose of the guide was, half of the visitors (n=11) said it was for navigating through the exhibition. Other visitors mentioned that the guide would provide information about the exhibit (n=10), and/or things for families to do to make the visit more meaningful. One visitor said they did not know what the purpose of the guide was and probably would not use it. Reponses included:

- Would have helped by pointing things out.
- Highlights what's here.
- To tell me what's in the exhibit, where to go.
- Lead you through.
- Tell all about what's going on here; map out Ocean Hall, which areas to go through-follow kids' interests.
- Information about the exhibit, guide you through the exhibit.
- Orientation map.
- Help understand where things are, to navigate.
- Good introduction, how to get started; what area to be particularly interested in so you can go right there; [without Guide] you would have to look, look, look.
- Guide to look around Hall, "Quick Guide to Ocean Hall."
- Help us visit; guide us to interesting places to visit
- Since it's a Family Guide, it suggests it's for the whole family.
- Tells you how to get around this hall.

- Tell us more about the exhibit.
- Which ways, directions to where stuff is.
- To guide on what to see in this hall.
- It's a guide about ocean stuff; how to go through.
- Map of different parts of the exhibit; what's in the exhibit.
- To let people know where everything is and what you can learn, what the symbols mean.
- Make people learn in a fun way.
- Don't know; I'm not a reader so I wouldn't really use something like this.

How it enhances family visits: In a follow-up question about how the *Family Guide* might enhance the experiences of families visiting Ocean Hall, visitors mentioned that it would help streamline the visit to meet children's needs (n=10) and ease of navigation (n=6); it would also help to create connections for learning (n=4) and act as a review for after the visit (n=1). One visitor did not know how it might help as it was his/her first time at Ocean Hall and another did not think it would enhance much as he/she had previously visited the exhibition. Responses included:

- Helps to navigate in the hall.
- Helps you get to the best points since there's not a lot of time with kids.
- Helps put kids in the right area.
- Figure out where to go. I'm visual, so attracted to whatever interests me rather than a planner; kids are that way, too.
- Makes it easier to go through the exhibit.
- If there's not enough time, helps pick areas to focus on.
- Makes it more meaningful.
- If time is restricted or looking for something specific (e.g., plankton, it's by the whale exhibit).
- Just arrived but it helps us not stay on whatever we see since it's only the visual; more learning connections as I see here.
- Gives questions to ask, so children can figure them out.
- Probably take it home to discuss later as a review; guide us through while we're here.
- Helps plan better where to go, what's more interesting to kids and hit there first.
- Especially with 10 year old, you go look, answer questions; like that it's kid-friendly, gives more directions.
- Better for little kids because there are pictures.
- Depending on what you want to see, could help you decide where to go first.
- Questions helpful to learn about certain things.
- So they know where to go; to make it kid-friendly.
- It's kid-friendly, makes it a little easier to visit.
- Not much, have been here before.

What they liked: Because visitors had not had a chance to use the *Family Guide*, most talked about its look and feel. Nearly half (n=10) of the visitors liked the size and length of the Guide; others (n=6) said it was clear, easy to read, and well presented; and still others (n=4) talked about how the Guide encouraged and/or challenged children to learn. Responses included:

- Size is good, concept is good.
- It's small and short.
- Very clear, easy to read.

- Small.
- Color scheme is nice; Blue goes with theme, with Ocean. Map is presented well, helps you understand where you are; if you wanted to focus on some area you could. It makes people think, with these exercises here, so the family takes time to talk about global issues.
- Simplicity.
- Gives more information, where things are.
- Small, you can handle it, it's handy; It's something you can take home to remember your visit. Nice pictures in the front, gives you a connection.
- Color, the picture is very vivid; kids would like the challenges to learn more about these things.
- Icons because they let me know what's kid-friendly and what's not.
- Short and sweet, to the point; it gives resources to go to; I like the Ocean front cover.
- Small, not several pages long. Everything is portrayed on one page.
- Colorful, easy to carry, not a lot to it. A lot in a little thing, with all I'm carrying.
- Picture of the whale is good.
- Helps you ask questions. Definitely [helps to have questions others have come up with].
- Only thing that is helpful is the map.
- It's simple.
- Tells things, where everything is in Sant Ocean Hall; I like the questions; Bubbles, looks like somebody's conversation. Shows where things are.

What new things they might learn or think about differently: Visitors had a hard time answering this question, with roughly half (n=9) of the visitors not being able to say because they had not had a chance to actually use the Guide. Those who did respond tended to talk about being able to easily and efficiently get around the exhibit (n=4), being able to pinpoint areas of interest or kid-friendly components (n=4), having a deeper, more connected interactive experience (n=3), that the Guide would promote thinking and conversation (n=2) and act as a follow-up to the visit (n=2). Responses included:

- Helps you know where to start, organize your time or go to a target area (i.e., a popular area or area of special interest to your kid).
- Helps us remember what we saw so we can read more about it later.
- What things are kid friendly and kids can review it afterwards.
- If we didn't know the different areas, lets them know which areas to visit. For example, the Global Systems, the theater – I didn't even know there was a theater here; show kid-friendly things, where they are.
- Learn more about a specific area.
- The more in tune you can be more clear instead of scattered. These questions here give you things to think about.
- Gives you a website so you can go home and look up more information about what you saw here.
- Enrich the visit as a learning experience, not only as an entertaining activity. These questions make experience more interactive rather than just observing.
- Makes the experience more in-depth, gets you more connected.
- Better for managing time, planning to spend a little or as much time depending on what interests you.
- Just talk about what we're seeing.
- It's very brief but it was a good summary, not a lot of info itself.
- Tells things I don't know.

Suggestions for improvement: Suggestions for improving the *Family Guide* ranged from "none" (n=5) to including more visuals (n=4), reformatting (2) and making it more kid-friendly (n=2). Several visitors simply did not know how it might be improved since they had not had a chance to use it. Responses included:

- Just fine…for age at least 8 years old, the graphics are good.
- Not child-friendly, more for adults. Maybe do something for the kids.
- Orientation – make left be left, have it oriented for when you walk in. Flip it around. There's too much on it.
- Don't see anything. It looks good to me.
- It's okay.
- It should fit in a shirt pocket. For kids, it's nice; the size, fold-it-in-three shape.
- Change bubble sizes – to have the shape of an animal. Boring all around, make them more kid-friendly.
- Looks good to me.
- Tri-fold – I like them better.
- Maybe have suggested ages for the different areas.
- Add more pictures like the whale. Add one more color to the big attractions to make them pop out.
- Pretty self-explanatory.
- Great – no improvements.
- Looks pretty good.
- Better if it had more visuals, icons. You have to read, would be better if you had icons (i.e., fish, a symbol). The titles don't tell me what things are, they don't mean anything to me. Nothing sticks out with these blue/green colors. As a mom, a user, it needs to be more visual "at a glance," especially with kids. Show what you can see, what you can touch. Be more about the experience than content.
- Have a couple of books listed as one of the follow up activities that you could get out at the library. A lot of people don't have a computer so they can't go to the website.

Likelihood of doing the Ocean Friend Challenge: When asked if they would be likely to do any of the activities in the Ocean Friend Challenge, 11 visitors said they thought they would, four said they would not, and six did not answer or were not asked. Challenges 1, 2, 3, and 4 were each selected by five visitors, Challenge 5 was selected by two visitors, and two visitors said they would likely do all of the Challenges.

Table 16: Visitor interest in Ocean Friend Challenge

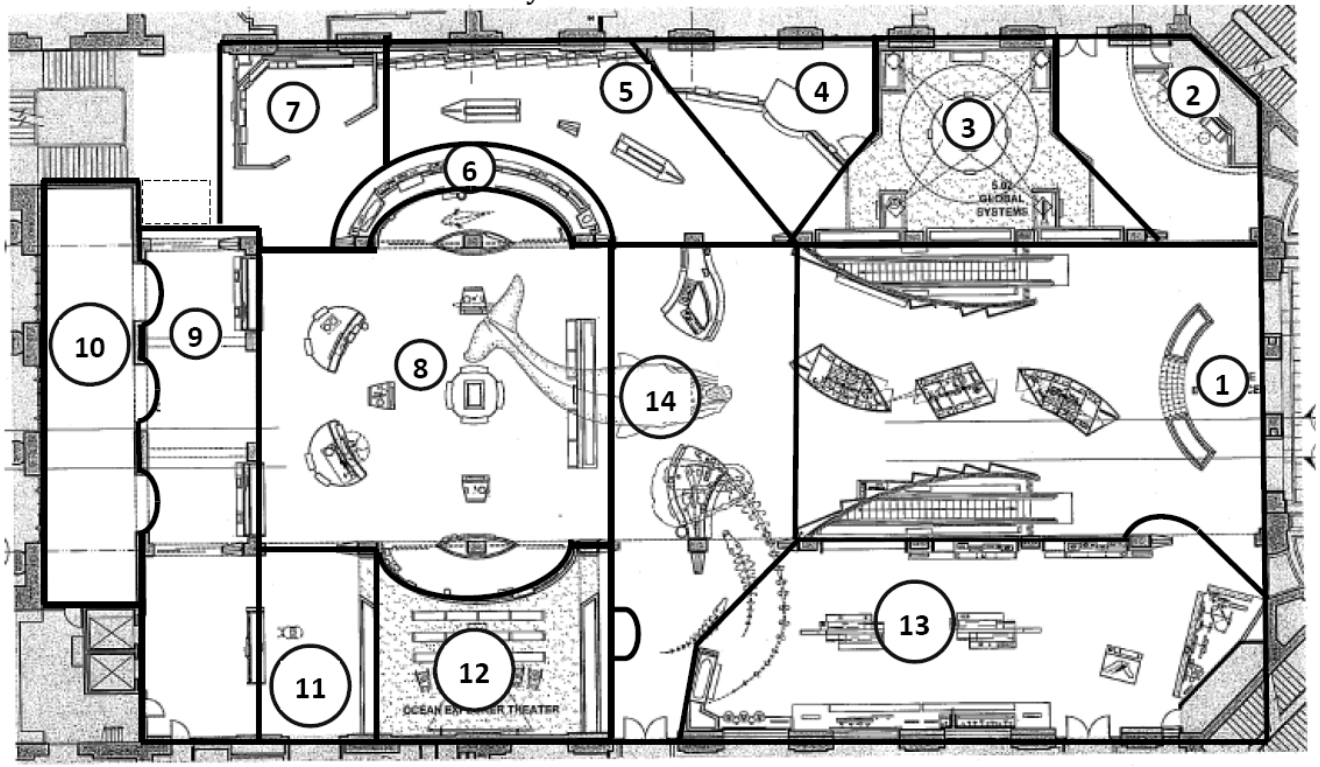
Ocean Friend Challenge	Number of visitors who selected: (n=11)
Challenge 1 – Continue learning about the ocean after your visit at www.ocean.si.edu	5
Challenge 2 – Look for connections between your life and the ocean.	5
Challenge 3 – Find out how your actions are affecting the ocean's health.	5
Challenge 4 – Share what you learned at the Sant Ocean Hall with others.	5
Challenge 5 – Register and print your Ocean Friend certificate	4
All Challenges	2

Additional responses included:

- I wouldn't ask my [7 year old] son that [Challenge 2]
- Not with whom I have here today. Depends on the kid's age. My 10 and 12 year old would spend more time.
- We go to ocean every summer; [Challenge 2] to keep thinking about it while we're there.
- Not certain about [doing these] myself but kids would. Like #2, we don't live near the ocean.
- [Would do] #3 but do not have the kids all the time.
- I would encourage kids to go to the website.

Appendix 1: Timing and Tracking Observation Sheet

National Museum of Natural History's *Ocean Hall* Evaluation



Crowd Density:	Interactions:	Notes:
☐ 1 = Empty ☐ 2 = Sparsely visited ☐ 3 = Moderately crowded ☐ 4 = Very crowded	**I**..... Interactive (active) **W** ... Watch video / media (passive) **T** .... Touch **P**..... Point Object **C**..... Group conversation **N** .... "Navigator" conversation **D** .... Downtime / rest	Mitigating Factors: [Tour, temperature, IMAX, Family Guide, etc.]

TIMING & TRACKING

DATE: _____

RESEARCHER/ ID: _____

	START	STOP
TIME OF DAY		
SITE TIME	00.00	

		TIME IN	TIME OUT
1	Biodiversity		
2	Ocean Systems / Ocean News		
3	Global Systems		
4	Coral Reefs		
5	Shores to Shallows		
6	Collections Wall		
7	Poles		
8	Open Ocean		
9	Living on an Ocean Planet		
10	Changing Exhibit		
11	Deep Ocean Exploration		
12	Ocean Explorer Theater		
13	Journey Through Time		
14	Whales		

Appendix 2: Summary of number of areas visited in Sant Ocean Hall

Number of Areas Visited	N	Mean	Median	Std. Dev.	Min	Max
Total	88	12.3	11.0	5.88	3	29
Unique areas	88	7.0	7.0	2.81	2	14

Appendix 3: Summary of time spent in Sant Ocean Hall (overall and by area)

Time Spent in the Visit (in minutes)	N	Mean	Median	Std. Dev.	Min	Max
Overall	88	28:31	19:37	22:18	2:47	1:30:00
Areas						
Area 1 - Biodiversity	85	3:56	2:49	3:24	0:16	15:58
Area 2 - Ocean Systems/ Ocean News	9	5:15	1:57	7:23	0:26	23:41
Area 3 - Global Systems	42	5:22	3:25	5:29	0:01	21:19
Area 4 - Coral Reefs	60	3:38	2:54	3:06	0:07	18:08
Area 5 - Shores to Shallows	53	2:33	1:56	1:58	0:14	8:23
Area 6 - Collections Wall	59	2:45	2:11	2:27	0:10	14:16
Area 7 - Poles	45	1:42	1:30	1:09	0:07	5:07
Area 8 - Open Ocean	78	5:36	4:21	4:28	0:27	18:00
Area 9 - Living on an Ocean Planet	15	4:43	1:17	10:09	0:15	40:16
Area 10 - Changing Exhibit	12	4:50	2:44	5:07	0:10	16:16
Area 11 - Deep Ocean Exploration	15	0:50	0:48	0:29	0:10	2:10
Area 12 - Ocean Explorer Theater	31	8:28	9:21	5:42	0:18	17:08
Area 13 - Journey Through Time	46	5:02	3:52	3:50	0:58	17:24
Area 14 - Whales	69	2:32	1:22	2:33	0:15	13:21

Appendix 4: Comparison of time spent in Sant Ocean Hall among path types

Total time of the visit[a]	N	Mean	Median	Std. Dev.	Min	Max
Right turn path	33	34:16	23:43	23:56	5:16	1:30:00
Straight ahead path	23	24:33	17:26	22:10	2:47	1:21:19
Other path	32	25:26	19:44	19:57	3:00	1:14:00

a No significant statistical differences between groups (Kruskal Wallis))

Appendix 5: Comparison of number of areas visited in Sant Ocean Hall among path types

Number of areas	N	Mean	Median	Std. Dev.	Min	Max
Total[a]						
Right turn path	33	13.97	14.00	3.917	7	24
Straight ahead path	23	10.78	9.00	6.473	4	26
Other path	32	11.63	10.00	6.795	3	29
Unique areas[b]						
Right turn path	33	7.76	8.00	2.475	2	12
Straight ahead path	23	6.13	6.00	2.668	3	13
Other path	32	6.94	6.50	3.110	2	14

a Significant statistical differences among groups (Kruskal Wallis Chi Square=8.87, $p<0.05$). Statistically significant difference was found between *right turn* and *straight ahead* paths (post hoc Mann-Whitney U=209.0, $p<0.05$) and between *right turn* and *other* paths (post hoc Mann-Whitney U=361.0, $p<0.05$). No differences between *straight ahead* and *other* paths.

b No significant statistical differences between groups (Kruskal Wallis))

Appendix 6: Summary of the number of behaviors recorded in Sant Ocean Hall (overall)

Total Number of Behaviors	N	% w/in N=88	Mean	Median	Std. Dev.	Min	Max
Stopping at an exhibit	88	100	22.7	20.5	15.42	3	82
Actively engaging with interactive	37	42	0.9	0.0	1.39	0	8
Watching a video or media	69	78	2.1	2.0	2.02	0	10
Touching an object	33	38	0.5	0.0	0.91	0	4
Pointing to an object	72	82	4.4	3.0	4.74	0	27
Conversations with someone in the group	82	93	8.9	7.0	7.95	0	46
Conversation with a Navigator/docent	16	18	0.4	0.0	0.97	0	5
Downtime	15	17	0.3	0.0	0.71	0	4

Appendix 7: Summary of the number of behaviors recorded in Sant Ocean Hall (in each area)

Interaction in Each Area Visited	N	% w/in N=88	% w/in N in entries	Mean	Median	Std. Dev.	Min	Max
Area1 - Biodiversity								
Number of entries	85	96.6		1.2	1.0	0.48	0	3
Number of stops	81	92.0	95.3	4.7	4.0	3.37	0	15
Interactive (active)	0	0.0	0.0	0.0	0.0	0.00	0	0
Watch video/ media (passive)	28	31.8	32.9	0.5	0.0	0.79	0	3
Touch	17	19.3	20.0	0.2	0.0	0.40	0	1
Point object	56	63.6	65.9	1.4	1.0	1.68	0	8
Group conversation	70	79.5	82.4	2.3	2.0	2.23	0	13
Navigator conversation	0	0.0	0.0	0.0	0.0	0.00	0	0
Downtime/ rest	3	3.4	3.5	0.1	0.0	0.35	0	3
Area 2 - Ocean Systems/ Ocean News								
Number of entries	9	10.2		0.1	0.0	0.30	0	1
Number of stops	9	10.2	100.0	0.2	0.0	0.69	0	4
Interactive (active)	5	5.7	55.6	0.1	0.0	0.23	0	1
Watch video/ media (passive)	4	4.5	44.4	0.0	0.0	0.21	0	1
Touch	0	0.0	0.0	0.0	0.0	0.00	0	0
Point object	0	0.0	0.0	0.0	0.0	0.00	0	0
Group conversation	2	2.3	22.2	0.0	0.0	0.34	0	3
Navigator conversation	1	1.1	11.1	0.0	0.0	0.11	0	1
Downtime/ rest	1	1.1	11.1	0.0	0.0	0.11	0	1
Area 3 - Global Systems								
Number of entries	42	47.7		0.5	0.0	0.61	0	3
Number of stops	39	44.3	92.9	0.8	0.0	1.19	0	7
Interactive (active)	0	0.0	0.0	0.0	0.0	0.00	0	0
Watch video/ media (passive)	36	40.9	85.7	0.4	0.0	0.54	0	2
Touch	0	0.0	0.0	0.0	0.0	0.00	0	0
Point object	2	2.3	4.8	0.0	0.0	0.30	0	2
Group conversation	8	9.1	19.0	0.1	0.0	0.38	0	2
Navigator conversation	1	1.1	2.4	0.0	0.0	0.11	0	1
Downtime/ rest	0	0.0	0.0	0.0	0.0	0.00	0	0
Area 4 - Coral Reefs								
Number of entries	60	68.2		0.8	1.0	0.63	0	2
Number of stops	58	65.9	96.7	1.1	1.0	1.11	0	4
Interactive (active)	0	0.0	0.0	0.0	0.0	0.00	0	0
Watch video/ media (passive)	0	0.0	0.0	0.0	0.0	0.00	0	0
Touch	0	0.0	0.0	0.0	0.0	0.00	0	0
Point object	33	37.5	55.0	0.4	0.0	0.56	0	2
Group conversation	46	52.3	76.7	0.6	1.0	0.58	0	2
Navigator conversation	3	3.4	5.0	0.0	0.0	0.26	0	2
Downtime/ rest	2	2.3	3.3	0.0	0.0	0.24	0	2

Appendix 7 continued

Interaction in Each Area Visited	N	% w/in N=88	% w/in N in entries	Mean	Median	Std. Dev.	Min	Max
Area 5 - Shores to Shallows								
Number of entries	53	60.2		0.9	1.0	0.93	0	4
Number of stops	48	54.5	90.6	1.7	1.0	1.98	0	8
Interactive (active)	8	9.1	15.1	0.1	0.0	0.38	0	2
Watch video/ media (passive)	0	0.0	0.0	0.0	0.0	0.00	0	0
Touch	0	0.0	0.0	0.0	0.0	0.00	0	0
Point object	24	27.3	45.3	0.4	0.0	0.73	0	4
Group conversation	35	39.8	66.0	0.6	0.0	0.98	0	5
Navigator conversation	0	0.0	0.0	0.0	0.0	0.00	0	0
Downtime/ rest	2	2.3	3.8	0.0	0.0	0.34	0	3
Area 6 - Collections Wall								
Number of entries	59	67.0		1.1	1.0	1.04	0	4
Number of stops	59	67.0	100.0	1.8	1.0	1.67	0	6
Interactive (active)	7	8.0	11.9	0.1	0.0	0.41	0	2
Watch video/ media (passive)	7	8.0	11.9	0.1	0.0	0.27	0	1
Touch	0	0.0	0.0	0.0	0.0	0.00	0	0
Point object	21	23.9	35.6	0.3	0.0	0.57	0	3
Group conversation	29	33.0	49.2	0.6	0.0	1.17	0	5
Navigator conversation	5	5.7	8.5	0.1	0.0	0.23	0	1
Downtime/ rest	0	0.0	0.0	0.0	0.0	0.00	0	0
Area 7 - Poles								
Number of entries	45	51.1		0.5	1.0	0.55	0	2
Number of stops	39	44.3	86.7	1.0	0.0	1.31	0	5
Interactive (active)	0	0.0	0.0	0.0	0.0	0.00	0	0
Watch video/ media (passive)	0	0.0	0.0	0.0	0.0	0.00	0	0
Touch	0	0.0	0.0	0.0	0.0	0.00	0	0
Point object	7	8.0	15.6	0.1	0.0	0.33	0	2
Group conversation	21	23.9	46.7	0.3	0.0	0.66	0	3
Navigator conversation	0	0.0	0.0	0.0	0.0	0.00	0	0
Downtime/ rest	2	2.3	4.4	0.0	0.0	0.15	0	1
Area 8 - Open Ocean								
Number of entries	78	88.6		1.3	1.0	0.93	0	6
Number of stops	77	87.5	98.7	5.7	5.0	4.96	0	22
Interactive (active)	21	23.9	26.9	0.3	0.0	0.54	0	3
Watch video/ media (passive)	32	36.4	41.0	0.5	0.0	0.77	0	4
Touch	0	0.0	0.0	0.0	0.0	0.00	0	0
Point object	34	38.6	43.6	0.9	0.0	1.67	0	8
Group conversation	55	62.5	70.5	2.3	1.0	3.06	0	17
Navigator conversation	8	9.1	10.3	0.1	0.0	0.56	0	4
Downtime/ rest	4	4.5	5.1	0.0	0.0	0.21	0	1

Appendix 7 continued

Interaction in Each Area Visited	N	% w/in N=88	% w/in N in entries	Mean	Median	Std. Dev.	Min	Max
Area 9 - Living on an Ocean Planet								
Number of entries	15	17.0		0.2	0.0	0.61	0	3
Number of stops	12	13.6	80.0	0.2	0.0	0.66	0	5
Interactive (active)	2	2.3	13.3	0.0	0.0	0.15	0	1
Watch video/ media (passive)	6	6.8	40.0	0.1	0.0	0.31	0	2
Touch	0	0.0	0.0	0.0	0.0	0.00	0	0
Point object	0	0.0	0.0	0.0	0.0	0.00	0	0
Group conversation	4	4.5	26.7	0.1	0.0	0.28	0	2
Navigator conversation	0	0.0	0.0	0.0	0.0	0.00	0	0
Downtime/ rest	0	0.0	0.0	0.0	0.0	0.00	0	0
Area 10 - Changing Exhibit								
Number of entries	12	13.6		0.1	0.0	0.39	0	2
Number of stops	10	11.4	83.3	0.4	0.0	1.44	0	7
Interactive (active)	0	0.0	0.0	0.0	0.0	0.00	0	0
Watch video/ media (passive)	0	0.0	0.0	0.0	0.0	0.00	0	0
Touch	0	0.0	0.0	0.0	0.0	0.00	0	0
Point object	4	4.5	33.3	0.1	0.0	0.28	0	2
Group conversation	6	6.8	50.0	0.1	0.0	0.80	0	7
Navigator conversation	0	0.0	0.0	0.0	0.0	0.00	0	0
Downtime/ rest	1	1.1	8.3	0.0	0.0	0.11	0	1
Area 11 - Deep Ocean Exploration								
Number of entries	15	17.0		0.2	0.0	0.38	0	1
Number of stops	13	14.8	86.7	0.2	0.0	0.56	0	2
Interactive (active)	0	0.0	0.0	0.0	0.0	0.00	0	0
Watch video/ media (passive)	0	0.0	0.0	0.0	0.0	0.00	0	0
Touch	0	0.0	0.0	0.0	0.0	0.00	0	0
Point object	1	1.1	6.7	0.0	0.0	0.11	0	1
Group conversation	4	4.5	26.7	0.0	0.0	0.21	0	1
Navigator conversation	0	0.0	0.0	0.0	0.0	0.00	0	0
Downtime/ rest	0	0.0	0.0	0.0	0.0	0.00	0	0
Area 12 - Ocean Explorer Theater								
Number of entries	31	35.2		0.4	0.0	0.48	0	1
Number of stops	28	31.8	90.3	0.3	0.0	0.47	0	1
Interactive (active)	0	0.0	0.0	0.0	0.0	0.00	0	0
Watch video/ media (passive)	31	35.2	100.0	0.4	0.0	0.48	0	1
Touch	0	0.0	0.0	0.0	0.0	0.00	0	0
Point object	1	1.1	3.2	0.0	0.0	0.11	0	1
Group conversation	5	5.7	16.1	0.1	0.0	0.23	0	1
Navigator conversation	0	0.0	0.0	0.0	0.0	0.00	0	0
Downtime/ rest	0	0.0	0.0	0.0	0.0	0.00	0	0

Appendix 7 continued

Interaction in Each Area Visited	N	% w/in N=88	% w/in N in entries	Mean	Median	Std. Dev.	Min	Max
Area 13 - Journey Through Time								
Number of entries	46	52.3		0.6	1.0	0.56	0	2
Number of stops	44	50.0	95.7	2.7	0.5	3.62	0	16
Interactive (active)	10	11.4	21.7	0.2	0.0	0.65	0	3
Watch video/ media (passive)	7	8.0	15.2	0.1	0.0	0.27	0	1
Touch	7	8.0	15.2	0.1	0.0	0.44	0	3
Point object	16	18.2	34.8	0.4	0.0	0.96	0	6
Group conversation	32	36.4	69.6	0.9	0.0	1.69	0	8
Navigator conversation	2	2.3	4.3	0.0	0.0	0.15	0	1
Downtime/ rest	4	4.5	8.7	0.0	0.0	0.21	0	1
Area 14 - Whales								
Number of entries	69	78.4		1.2	1.0	0.90	0	4
Number of stops	63	71.6	91.3	1.8	1.0	1.86	0	7
Interactive (active)	2	2.3	2.9	0.0	0.0	0.15	0	1
Watch video/ media (passive)	8	9.1	11.6	0.1	0.0	0.29	0	1
Touch	10	11.4	14.5	0.1	0.0	0.32	0	1
Point object	26	29.5	37.7	0.4	0.0	0.74	0	4
Group conversation	37	42.0	53.6	0.8	0.0	1.18	0	6
Navigator conversation	3	3.4	4.3	0.1	0.0	0.35	0	3
Downtime/ rest	0	0.0	0.0	0.0	0.0	0.00	0	0

Appendix 8: Summary of percentage of visitation and time spent

	Visitation		Time spent		Categories of Visitation and Time Spent (see below)
	%	Category[a]	Median	Category[b]	
Area 8 - Open Ocean	88.6	High	4:21	A lot	High
Area 12 - Ocean Explorer Theater	35.2	Moderate	9:21	A lot	Medium high
Area 13 - Journey Through Time	52.3	Moderate	3:52	A lot	Medium high
Area 3 - Global Systems	47.7	Moderate	3:25	A lot	Medium high
Area 1 - Biodiversity	96.6	High	2:49	Moderate	Medium high
Area 4 - Coral Reefs	68.2	High	2:54	Moderate	Medium high
Area 6 - Collections Wall	67.0	High	2:11	Moderate	Medium high
Area 14 - Whales	78.4	High	1:22	Little	medium
Area 5 - Shores to Shallows	60.2	Moderate	1:56	Little	Medium low
Area 7 - Poles	51.1	Moderate	1:30	Little	Medium low
Area 10 - Changing Exhibit	13.6	Low	2:44	Moderate	Medium low
Area 11 - Deep Ocean Exploration	17.0	Low	0:48	Little	Low
Area 2 - Ocean Systems/ Ocean News	10.2	Low	1:57	Little	Low
Area 9 - Living on an Ocean Planet	17.0	Low	1:17	Little	Low

a Categories of visitation: high (above 67%), moderate (35-60%), or low (10-17%)
b Categories of time spent: a lot (3:25-9:21), moderate (2:11-2:54), or a little (0:48 – 1:57)

Categories of Visitation and Time Spent	**Median time spent in the area**		
Percentage of visitors in the area	**A Lot**	**Moderate**	**A Little**
High	High	Medium High	Medium
Moderate	Medium High	Medium	Medium Low
Low	Medium	Medium Low	Low

Appendix 9: Comparison of number of areas visited between group types

Number of Areas Visited[a]	N	Mean	Median	Std. Dev.	Min	Max
Overall						
Total	88	12.3	11.0	5.88	3	29
Adults with no children 12 and younger	22	14.1[b]	14.5	5.21	4	23
Adults with children 12 and younger	58	11.5[b]	10.0	5.97	3	29
Unique						
Total	88	7.0	7.0	2.81	2	14
Adults with no children 12 and younger	22	8.1[c]	8.0	2.87	3	14
Adults with children 12 and younger	58	6.6[c]	6.0	2.66	2	12

a The group of adults *with* children under the age of 12 included two groups that had both, children younger than 12 and older than 13. The group *with no* children under the age of 12 included five adults visiting alone
b Significant statistical differences between groups (Mann Whitney U=448.5, p<0.05)
c Significant statistical differences between groups (Mann Whitney U=446.0, p<0.05)

Appendix 10: Comparison of number of visitors in each area of Sant Ocean Hall between group types

Areas Visited[a, b]	Total		Adults with no children 12 and younger		Adults with children 12 and younger		Total (based on group type)	
	n	% (n=88)	n	% (n=22)	n	% (n=58)	n	% (n=88)
Area 1 - Biodiversity	85	97	20	91	57	98	77	88
Area 2 - Ocean Systems/ Ocean News	9	10	6	27	1	2	7	8
Area 3 - Global Systems	42	48	13	59	24	41	37	42
Area 4 - Coral Reefs	60	68	18	82	36	62	54	61
Area 5 - Shores to Shallows	53	60	14	64	34	59	48	55
Area 6 - Collections Wall	59	67	17	77	36	62	53	60
Area 7 - Poles	45	51	12	55	28	48	40	45
Area 8 - Open Ocean	78	89	21	95	51	88	72	82
Area 9 - Living on an Ocean Planet	15	17	4	18	9	16	13	15
Area 10 - Changing Exhibit	12	14	7	32	4	7	11	13
Area 11 - Deep Ocean Exploration	15	17	6	27	8	14	14	16
Area 12 - Ocean Explorer Theater	31	35	10	45	21	36	31	35
Area 13 - Journey Through Time	46	52	14	64	29	50	43	49
Area 14 - Whales	69	78	17	77	46	79	63	72

a The group of adults *with* children under the age of 12 included two groups that had both, children younger than 12 and older than 13. The group *with no* children under the age of 12 included five adults visiting alone
b No significant statistical differences between groups were found or groups too small to compare (Chi-square)

Appendix 11: Comparison of time spent, overall and in each unique area, between group types

Time of the Visit (in minutes) [a, b]	N	Mean	Median	Std. Dev.	Min	Max
Overall						
Total	88	28:31	19:37	22:18	2:47	1:30:00
Adults with no children 12 & younger	22	33:02	25:24	22:52	2:47	1:14:00
Adults with children 12 & younger	58	26:31	18:58	21:35	3:00	1:30:00
Area 1 - Biodiversity						
Total	85	3:56	2:49	3:24	0:16	15:58
Adults with no children 12 & younger	20	4:09	3:47	3:07	0:42	10:18
Adults with children 12 & younger	57	3:49	2:37	3:16	0:16	14:00
Area 2 - Ocean Systems/ Ocean News						
Total	9	5:15	1:57	7:23	0:26	23:41
Adults with no children 12 & younger	6	6:01	2:45	8:47	0:29	23:41
Adults with children 12 & younger	1	0:26	0:26		0:26	0:26
Area 3 - Global Systems						
Total	42	5:22	3:25	5:29	0:01	21:19
Adults with no children 12 & younger	13	5:19	2:31	6:06	0:01	19:45
Adults with children 12 & younger	24	4:52	3:13	4:39	0:23	17:53
Area 4 - Coral Reefs						
Total	60	3:38	2:54	3:06	0:07	18:08
Adults with no children 12 & younger	18	3:05	2:06	2:27	0:15	6:38
Adults with children 12 & younger	36	3:39	2:59	2:37	0:07	11:08
Area 5 - Shores to Shallows						
Total	53	2:33	1:56	1:58	0:14	8:23
Adults with no children 12 & younger	14	2:54	2:52	2:05	0:14	6:49
Adults with children 12 & younger	34	2:16	1:47	1:53	0:20	8:23
Area 6 - Collections Wall						
Total	59	2:45	2:11	2:27	0:10	14:16
Adults with no children 12 & younger	17	2:38	1:49	2:07	0:22	6:58
Adults with children 12 & younger	36	2:36	2:15	1:55	0:13	9:40
Area 7 - Poles						
Total	45	1:42	1:30	1:09	0:07	5:07
Adults with no children 12 & younger	12	1:31	0:59	1:26	0:09	4:53
Adults with children 12 & younger	28	1:47	1:38	1:06	0:07	5:07
Area 8 - Open Ocean						
Total	78	5:36	4:21	4:28	0:27	18:00
Adults with no children 12 & younger	21	4:54	4:03	3:29	0:31	15:33
Adults with children 12 & younger	51	5:55	4:56	4:51	0:27	18:00
Area 9 - Living on an Ocean Planet						
Total	15	4:43	1:17	10:09	0:15	40:16
Adults with no children 12 & younger	4	2:12	0:35	3:24	0:20	7:18
Adults with children 12 & younger	9	5:56	1:45	12:55	0:35	40:16

a The group of adults *with* children under the age of 12 included two groups that had both, children younger than 12 and older than 13. The group *with no* children under the age of 12 included five adults visiting alone

b No significant statistical differences between groups were found (Mann-Whitney)

Appendix 11 continued

Time of the Visit (in minutes) [a, b]	N	Mean	Median	Std. Dev.	Min	Max
Area 10 - Changing Exhibit						
Total	12	4:50	2:44	5:07	0:10	16:16
Adults with no children 12 & younger	7	5:22	1:04	6:25	0:10	16:16
Adults with children 12 & younger	4	3:46	2:44	3:20	1:00	8:36
Area 11 - Deep Ocean Exploration						
Total	15	0:50	0:48	0:29	0:10	2:10
Adults with no children 12 & younger	6	1:06	1:00	0:34	0:28	2:10
Adults with children 12 & younger	8	0:36	0:44	0:20	0:10	1:07
Area 12 - Ocean Explorer Theater						
Total	31	8:28	9:21	5:42	0:18	17:08
Adults with no children 12 & younger	10	7:14	5:41	6:23	0:18	16:33
Adults with children 12 & younger	21	9:04	9:47	5:24	0:21	17:08
Area 13 - Journey Through Time						
Total	46	5:02	3:52	3:50	0:58	17:24
Adults with no children 12 & younger	14	6:17	6:02	4:09	1:50	17:24
Adults with children 12 & younger	29	4:31	3:14	3:47	0:58	15:38
Area 14 - Whales						
Total	69	2:32	1:22	2:33	0:15	13:21
Adults with no children 12 & younger	17	2:51	1:21	3:33	0:15	13:21
Adults with children 12 & younger	46	2:24	1:24	2:07	0:21	9:00

a The group of adults *with* children under the age of 12 included two groups that had both, children younger than 12 and older than 13. The group *with no* children under the age of 12 included five adults visiting alone

b No significant statistical differences between groups were found (Mann-Whitney)

Appendix 12: Comparison of path taken by group types

Path [a, b]	Adults with no children 12 and younger		Adults with children 12 and younger	
	n	% (n=22)	n	% (n=58)
Right turn	8	36	23	40
Straight ahead	3	14	17	29
Other	11	50	18	31

a The group of adults *with* children under the age of 12 included two groups that had both, children younger than 12 and older than 13. The group *with no* children under the age of 12 included five adults visiting alone

b No significant statistical differences between groups were found (Chi Square)

Appendix 13: Summary of behaviors between group types

Behavior [a, b]	N	% (within n)	Mean	Median	Std. Dev.	Min	Max
Stopping at an exhibit							
By adults with no children 12 and younger	22	100	28.0	25.0	16.07	8	75
By adults with children 12 and younger	58	100	20.8	19.0	13.23	3	68
Actively engaging with interactive							
By adults with no children 12 and younger	12	55	1.6	1.0	2.15	0	8
By adults with children 12 and younger	22	38	0.6	0.0	0.93	0	3
Watching a video or media							
By adults with no children 12 and younger	18	82	2.5	2.0	2.58	0	10
By adults with children 12 and younger	44	76	1.9	2.0	1.71	0	6
Touching an object							
By adults with no children 12 and younger	8	36	0.6	0.0	1.05	0	4
By adults with children 12 and younger	23	40	0.6	0.0	0.90	0	4
Pointing to an object							
By adults with no children 12 and younger	14	64	1.6	1.0	2.13	0	9
By adults with children 12 and younger	51	88	5.6	4.0	5.22	0	27
Conversations with someone in the group							
By adults with no children 12 and younger	16	73	6.2	4.0	7.02	0	24
By adults with children 12 and younger	58	100	10.0	8.0	8.38	1	46
Conversation with a Navigator/docent							
By adults with no children 12 and younger	2	9	0.2	0.0	0.87	0	4
By adults with children 12 and younger	12	21	0.3	0.0	0.85	0	5
Downtime							
By adults with no children 12 and younger	4	18	0.3	0.0	0.63	0	2
By adults with children 12 and younger	11	19	0.3	0.0	0.78	0	4

a The group of adults *with* children under the age of 12 included two groups that had both, children younger than 12 and older than 13. The group *with no* children under the age of 12 included five adults visiting alone

b No significant statistical differences between groups were found or groups too small to compare (Chi-square)

Appendix 14: Interview Protocol

Smithsonian
National Museum of Natural History

***Ocean Hall* Evaluation Visitor Tracking – Interview**

Date: _____

Researcher / Visitor ID: _____

1. **What did you enjoy most about *Ocean Hall* and why?**

2. **How could *Ocean Hall* be improved upon?**

3. **Which words would you use to describe the Hall to someone who had never seen it?**
   [Probe: can you think of another word (until get at least 3 words)]

   _____ _____ _____ _____ _____

4. **Please complete the following sentence: *"Before my visit to Ocean Hall, I never realized that..."***

5. **Please complete the following sentence: *"Today's visit to Ocean Hall reminded me that..."***

6. **In the Hall do you specifically remember seeing or hearing anything about...**

a)	...how the ocean and its life forms have changed and evolved over time.	☐Yes	☐No	☐D/K
	Where did you see this? _____			
b)	...how the ocean affects life on the planet.	☐Yes	☐No	☐D/K
	Where did you see this? _____			
c)	...how the ocean is one big global system, with everything connected.	☐Yes	☐No	☐D/K
	Where did you see this? _____			
d)	...how to protect or conserve the ocean.	☐Yes	☐No	☐D/K
	Where did you see this? _____			
e)	...how diverse the ocean is, in the organisms and the places they live.	☐Yes	☐No	☐D/K
	Where did you see this? _____			
f)	...how much of the ocean remains unexplored.	☐Yes	☐No	☐D/K
	Where did you see this? _____			

7. **How do you think life in the ocean got so diverse?** *[Probe: How did animals get so different?]*

8. **Some people see the ocean as one big global system, with everything interacting and connecting. How do you think it's connected?** *[Probe: Which parts are connected?]*

Smithsonian
National Museum of Natural History

***Ocean Hall* Evaluation Visitor Tracking – Interview**

NOW WE JUST HAVE A FEW QUESTIONS ABOUT YOU AND YOUR GROUP.

9. Not including yourself, please indicate how many people you are visiting the museum with today, in each category.

0-6 years old	_____	people	☐ None	Which grade(s) are they in: _____
7-12 years old	_____	people	☐ None	Which grade(s) are they in: _____
13-17 years old	_____	people	☐ None	
Over 18 years old	_____	people	☐ None	

10. Please tell us a little bit about your interest or experience with the ocean.

Do you...	Yes	No
...currently live within an hour of the ocean?	☐	☐
...use it for recreation, like going to the beach?	☐	☐
...work in a field related to marine biology / oceanography?	☐	☐
...have a degree in marine biology / oceanography?	☐	☐
Have you ever taken 1 or more classes in marine biology or oceanography	☐	☐

11. Are you currently a member of the Smithsonian Institution or this museum?

☐ Yes ☐ No

12. Including today, how many times have you been to each of the following in the last 12 months?

Ocean Hall	_____	times	
This museum	_____	times	
Other natural history museums	_____	times	☐ None
An aquarium, nature or science center	_____	times	☐ None

13. Please look at this list and tell me which letter, or combination of letters, best describes your ethnicity. This helps the museum know how well we're reaching different communities.

A B C D E F: _____

14. Please flip that over and tell me the number that corresponds with the highest level of education you have attained.

1 2 3 4 5 6

15. What year were you born? _____

16. What is your zip code?
[If outside of U.S., please indicate country.]
_____ zip code

Thank you very much for your time.

17. Gender
☐ Male
☐ Female

Appendix 15: Words used to describe Sant Ocean Hall

Words used to describe the Sant Ocean Hall	N
informative, informing, very informative	27
interesting	24
big, biggest selection of marine life, large, huge, size, grand, expansive	17
cool, very cool, super cool, really cool	14
educational, to science and non-science person: come away with knowledge and understanding of the ocean	14
colorful, colors	13
awesome, sense of awe	12
busy, high density of exhibits, full, full of stuff, condense, lots to see, lots to look at, lots of stuff to see, lots going on, lots of good exhibits	12
beautiful, pretty	11
fascinating	10
interactive, hands-on	10
amazing	9
modern, modern and up to date, current, new, improved, now	9
exciting, stimulating	8
cartoons, display (squid), amazing whale, monumental whale, like different fish symbolism, screen (visually a lot going on), real material	7
fun	7
overwhelming, a little confusing/ almost too much/ sensory overload, overwhelming /content-wise	7
blue	6
bright, well-lit, pretty light	6
diverse, diverse experience, diversity	6
great, excellent, overwhelmed by quality, best	6
impressive	6
slow down to see, have patience, need time (to go through) or come multiple times, spend longer, non-science person: spend 35-40 min, science person: spend 3 hours	6
unique, rare, authentic, different, place to explore different things you haven't seen before	6
variety, various specimens of different sort	6
very comprehensive, thorough, comprehensive, in-depth, detailed	6
visually appealing, visually spectacular, visual at all levels, eye-catching, Illustrative	6
worthwhile, worth a visit, worth coming to visit, worth seeing, don't miss	6
appealing, engaging, inviting, engrossing, immersive	5
spectacular, mesmerizing, extraordinary, outstanding, majestic	5
good atmosphere, peaceful, serene/ calming, refreshing	4
high tech, mixed media	4
intriguing, surprising, curious	4
open, open space	4

Appendix 15 continued

Words used to describe the Sant Ocean Hall	N
well organized, well set up, well done	4
wonderful	4
come again, would come back again	3
eye-opening, enlightening, cautionary	3
fantastic	3
kid-friendly, family-oriented	3
neat	3
nice, nice space, nicely presented	3
ocean mood, undersea, underwater-like	3
accessible	2
breath taking, wow	2
clean	2
creative, artistic	2
dynamic, active (screens)	2
enjoying, like	2
good	2
historic	2
incredible	2
lot to learn, lots of information	2
ocean, oceanic	2
read everything, bring camera	2
scientific, Smithsonian	2
boring at some parts	1
central	1
crowded	1
free form	1
good overview (deep/shallow, small/big)	1
larger than life (prehistoric stuff)	1
like 10,000 hot dogs	1
live experience	1
pleasant to walk around	1
rich	1
touchy-feely	1

Appendix 16: What visitors enjoyed about Sant Ocean Hall

Exhibition Component

Coral reef aquarium (n=24, 19%)

- aquarium in the coral reef area
- Aquarium was fabulous, theater was comfortable
- aquarium: I'm a fish person, nice to see something live here
- aquarium: pretty
- coral reef
- Coral Reef - it's bright, friendly, animated
- coral reef aquarium because youngest boy really enjoyed it
- coral reef aquarium. we've seen these before at aquariums, but the first time we were close enough to see little things up close
- coral reef tank
- coral reef: bright colors
- coral reef: colorful, alive, real, kids attracted to it
- Enjoyed the little aquarium, it's beautiful.
- fish tank (n=2)
- Fish tank: beautiful.
- fish- we spend a lot of time in Caribbean (open and colorful exhibit)
- fishes: real, can see them
- focusing on him (son). both of us enjoyed the aquarium
- I love fish, love aquarium
- live aquarium - they're live, live animals are always more interesting because you can see how they move and stuff
- live fish at the coral reef aquarium
- reef: had never seen it, liked seeing ones from all over world
- reef: live fish, excited kids
- the aquarium
- the aquarium: colors
- the aquarium: fascinating, it's real
- the aquarium: real colorful and bright

Giant squid (n=20, 16%)

- coolest thing and the I enjoyed the most was the giant squid
- giant squid (n=3)
- giant squid - well developed, talked to a docent about it
- giant squid: cool
- giant squid: it's cool
- giant squid: just so cool, to actually see one
- giant squid: never seen anything like that
- giant squid: real, odd
- real creatures: octopus/squid
- squid (n=4)
- Squid: drew my attention
- squid: it's unique
- The giant squid, I've never seen anything like that before. It was cool
- The giant squid: fact that have heard about it for many years and was able to see one here. They're hard to see and there are two of them here!
- the squid

Real specimens (n=17, 14%)

- Coelacanth: neat
- critters because it's stuff largely unseen before - new to us
- large models of creatures: life like, interesting
- little fish in jars
- live preserved animals most interesting
- real creatures: octopus/squid
- real specimens: cool to see them
- seeing the preserved fish: see what they really look like
- Show different creatures that live in the world; it's crazy how many there are: big, little ones. Amazing the different creatures in the sea.
- specimens/exhibits: hadn't seen before, didn't know about [the specimens]
- the creatures in it: lots of knowledge to see
- the preserved specimens: it's another visual rather than text or book [photo in]
- the samples, real fish in jars, good to see the real think
- the specimens: how they looked, size and shape
- the specimens; the real ones in jars

- there was so much to see here - and lots of pictures and specimens
- things you can see in the water. things (animals) you can see in the water - crabs for example

Science on the Sphere (n=16, 13%)

- Global Systems room (Science on the Sphere) it was beautiful and very informative
- Global Systems was so cool
- Globe (n=4)
- globe exhibit: interesting facts, visuals
- Globe movie, refreshing innovative way to give people information; we're a visual society, it has a narrator. It's attractive to kids, more than reading blocks of text
- globe presentation: nice audiovisual presentation
- globe theater: interesting info in nice presentation
- globe: the technology is cool, great way to show information
- I liked the Globe best also.
- The Globe - My favorite: well done, explain clearly for the lay person; told me a lot I didn't know.
- the Globe - very unique, great information
- The Globe: never seen anything like that
- the movies and globe, they were very cool. I'm a videographer and those video displays are amazing

Right whale (n=15, 12%)

- big whale
- Illustration about proportion : size and depth (size of whale)finding out how all of us are needed, even the shark -she liked the Phoenix, how you can find whales and follow them
- story of the whale. Sailor's valentine message in the back gallery
- the story of Phoenix the whale
- whale (n=5), whales
- Whale - learning about her story.
- whale evolution - very thorough explanation.
- whale: best to look at
- whale: hard to see a real one
- whale: so massive, [gives a] good idea [of] how big it would be in the ocean

Deep sea movie (n=12, 10%)

- "Twilight" (Open Ocean) is very unique (vs. aquariums) you don't learn about those creatures in aquariums usually
- also the film on history channel - deep sea explorations
- Deep sea creatures: rare, don't usually see
- Documentary [Area 12] is a good introduction.
- film and deep ocean: good video/break
- Movie (Area #12): very informative
- Movie (Deep Sea): not something I had thought/seen before (animals were amazing)
- Ocean Explorer Theater - great movie, very informative
- theater was comfortable
- twilight section - just to learn how they see in that darkness
- video (deep sea) liked the screen
- Visuals are very good: film (Area 12) very well done.

Entire exhibit (n=6, 5%)

- [the whole Ocean Hall]: it educates people about the importance of the ocean
- all exhibits fascinating
- all of it
- Don't know, all of it. It's fantastic. Lots of imagination.
- everything
- everything: it's a new exhibit

Layout of the space (n=6, 5%)

- 2nd time here, everything so well organized.
- layout of the hall, well organized
- New layout: a lot easier to get around
- open and colorful exhibit
- open, easy to navigate and there were sections where kids could goof-off -OK. Arranged so that there was adult stuff on top and kid stuff at their height.
- We want to come back, the layout is modern and attractive. "It's very attractive to the eye"

Fossils, trilobites (n=4, 3%)

- fossils
- fossils: interesting
- I am a science nerd so I liked the massive trilobite display, they were 3D fossils- usually see 2D only cool to see how they fit in, their evolutionary role
- the cases with fossils - I can stand and look and see all the detail

Hydrothermal vent movie (n=4, 3%)

- deep sea vents - docent explained/clarified a lot of info
- the film: lively colors, thermal fisher movie (geo thermal)
- The video on hydrothermal vents.
- undersea vents: amazing all of those creatures living off chemicals rather than light. (wow)

Large models (n=3, 2%)

- Loved the models (whale, jellyfish)
- Pre-historic (models): real life, fascinating; don't know where else could see this.
- the really big models life the whale, jellyfish, skeleton.

Shark (n=3, 2%)

- shark jaw
- teeth
- the shark stuff: mainly interested [in sharks] ocean-wise

Video screens above (n=3, 2%)

- the video screens everywhere: weren't here before
- The visuals up in the ceiling are well done; don't know if people notice them. Enjoy this sensory activity.
- video screens above

Navigator (n=2, 2%)

- giant squid - well developed, talked to a docent about it; deep sea vents - docent explained/clarified a lot of info
- there were guides to point out something

Other (n=14, 11%)

- Arctic of interest to me
- being a tourist for my kids, taking photos
- Bioluminescence
- center part (area #1) because I have a shell collection
- description of history of life in the ocean
- documentary - formation of the Earth: scientific point of view.
- Illustration about proportion : size and depth
- Sailor's valentine message in the back gallery
- The big and small scale
- The exhibit talking about repetition of shapes (water/light) is awesome.
- the film: interesting
- The interactive about managing fisheries - "I'm a recreational fisherman and big on catch and release and preserving for future generations"
- The movie: animals
- video: informative

Reasons

Novelty, uniqueness, first time (n=22, 18%)

- "Twilight" (Open Ocean) is very unique (vs. aquariums) you don't learn about those creatures in aquariums usually
- coral reef aquarium. we've seen these before at aquariums, but the first time we were close enough to see little things up close
- critters because it's stuff largely unseen before - new to us
- Deep sea creatures: rare, don't usually see
- giant squid: just so cool, to actually see one
- giant squid: never seen anything like that
- giant squid: odd
- Globe movie, refreshing innovative way to give people information
- globe: the technology is cool, great way to show information
- I am a science nerd so I liked the massive trilobite display, they were 3D fossils- usually see 2D only cool to see how they fit in, their evolutionary role
- It's different. From a smaller town that doesn't have anything like this
- Movie (Deep Sea): not something I had thought/seen before (animals were amazing)
- reef: had never seen it

- specimens/exhibits: hadn't seen before, didn't know about [the specimens]
- squid: it's unique
- stuff you don't see every day
- The giant squid, I've never seen anything like that before. It was cool
- The giant squid: fact that have heard about it for many years and was able to see one here. They're hard to see and there are two of them here!
- the Globe - very unique
- The Globe: never seen anything like that
- whale: hard to see a real one

Informative, educational, learned something new (n=18, 14%)

- [the whole Ocean Hall]: it educates people about the importance of the ocean
- finding out how all of us are needed, even the shark
- Global Systems room (Science on the Sphere) it was beautiful and very informative
- globe exhibit: interesting facts
- globe theater: interesting info in nice presentation
- learning experience: good info
- Movie (Area #12): very informative
- Ocean Explorer Theater - great movie, very informative
- story of the whale.
- the creatures in it: lots of knowledge to see
- The Globe - My favorite: well done, explain clearly for the lay person; told me a lot I didn't know.
- the Globe - very unique, great information
- the story of Phoenix the whale
- The way it explains biodiversity; explanations do a good job explaining complex issues/field so people who don't study them can understand: makes everybody smarter
- twilight section - just to learn how they see in that darkness
- video: informative
- Whale - learning about her story.
- whale evolution - very thorough explanation.

Beautiful, visually interesting, colorful (n=17, 14%)

- aquarium: pretty
- beautiful
- color, soothing
- Coral Reef - it's bright, friendly, animated
- coral reef: bright colors
- coral reef: colorful, alive, real, kids attracted to it
- Enjoyed the little aquarium, it's beautiful.
- Global Systems room (Science on the Sphere) it was beautiful and very informative
- globe exhibit: interesting facts, visuals
- globe presentation: nice audiovisual presentation
- globe theater: interesting info in nice presentation
- open and colorful exhibit
- the aquarium: colors
- the aquarium: real colorful and bright
- the cases with fossils - I can stand and look and see all the detail
- the film: lively colors
- Visuals are very good: film (Area 12) very well done. The visuals up in the ceiling are well done; don't know if people notice them. Enjoy this sensory activity.
- We want to come back, the layout is modern and attractive. "It's very attractive to the eye"
- whale: so massive, [gives a] good idea [of] how big it would be in the ocean

Entertaining, attractive or educational for the kids (n=14, 11%)

- beautiful, kids were entertained
- children enjoyed the big whatever - life, looking, they enjoy. They're too young to understand. I can't wait until they are older so I can teach them
- coral reef aquarium because youngest boy really enjoyed it
- coral reef: colorful, alive, real, kids attracted to it
- For him it was the big models, he loves animals, we go to the zoo a lot, in winter we come here. … There are some interactive things for him; most is not relatable to his age (2.5) he liked the drawers, touched the [model] by the shark (really enjoyed finding out about the) crafts events on 2nd Saturdays
- Globe movie, refreshing innovative way to give people information; we're a visual

society, it has a narrator. It's attractive to kids, more than reading blocks of text
- great white exhibit: being a tourist for my kids
- interactive things she could touch
- just watched him go around (2 yr old son); let him go around, he really liked the octopus
- Kids liked the whale the most
- open, easy to navigate and there were sections where kids could goof-off -OK. Arranged so that there was adult stuff on top and kid stuff at their height. Aquarium was fabulous, theater was comfortable
- reef: live fish, excited kids
- seeing children's reaction "mother's love"
- variety of things to see here, there was something cool for us (adults) and the kids
- we went through there so fast, they (daughter and son) enjoyed the movies of the octopus (I enjoyed) they could see (animals both) the real thing and models

Alive, real (n=6, 5%)
- aquarium: I'm a fish person, nice to see something live here
- coral reef: colorful, alive, real, kids attracted to it
- fishes: real, can see them
- giant squid: real
- live aquarium - they're live, live animals are always more interesting because you can see how they move and stuff
- reef: live fish, excited kids
- the aquarium: fascinating, it's real

Personal connection (n=5, 4%)
- aquarium: I'm a fish person
- I am a science nerd so I liked the massive trilobite display
- center part (area #1) because I have a shell collection
- the interactive about managing fisheries - "I'm a recreational fisherman and big on catch and release and preserving for future generations"
- fish- we spend a lot of time in Caribbean

General positive comments (n=4, 3%)
- lots of stuff, don't know
- overall quality: clarity is good, interesting
- pretty diversified
- the whole experience - it was a good balance between stopping and reading and watching stuff

Appendix 17: How Sant Ocean Hall could be improved

Suggestions for Improvement

Content (n=16, 14%)

More content, specific or general (n=14, 12%)

- deep sea creatures - project could be expanded (saw display but not the movie). Deep sea in most interesting because information is not easily accessible (his work related with submarine)
- majority of exhibit is deep sea, could add better known surface animals to attract people
- more exhibits
- more geographic linkage to display pieces
- more info about dolphins and other whales
- more information about conservation and human impact (e.g. water use)
- more information about human impact on fish stock - connect our dinner to the ocean
- More of the geology of the ocean floors - there was some, but there could be more
- more reconstructions of fish
- more shark stuff
- more sharks, piranhas, things that can hurt you, like the (animal) in Australia with big tentacles that can really hurt people; scary ones
- organization - set up bays by species
- provide context for some things, i.e. Krill in jar - is that a days worth of food or one meal??
- things to show scale of specimens

Content is too evolution-based (n=2, 2%)

- Too evolution based
- he said: surprised at the amount of research and intelligence (that went into building the exhibit) yet doesn't mention intelligent design. It's not representing all the alternative views, only the evolutionary. There are other research on how life came about and change over time. She agrees and said, we stopped watching the globe because it was all about too many billion years of this, evolve this, and that...

More for children (n=13, 11%)

- brochures, handouts, guides- hall seems geared toward adults
- could be more interactive for kids
- grandkids like pushing buttons, would be fun to have more hands-on
- having more about animals children like and are big mysteries. Like monsters of the sea. Want to see because it's scary. You get a glimpse (w/shark) but could have more. - more audio visual (like the deep sea movie) that kids would enjoy. The exploration (deep sea) is not so interesting for little ones - more change to touch, look through equipment (even pretend ones)
- more hands on for kids
- more hands on for kids, like touch tanks with shells rather than just stuff to look at
- more interactive for adults and kids
- more interactive for kids - they were getting bored
- More interactive stuff for kids
- more stuff for kids to touch - more textures, shark skin
- Real life, life squid and dinosaur fish [coelacanths] are well received. Would love for 6 year old to have a worksheet to do while visiting. I see school kids with worksheets and would use it if it was available
- we have a really little kid with us, could be more hands on, [seems] geared toward older kids
- well organized but could be more interactive for small children to touch

More live animals (n=13, 11%)

- could add an aquarium with live fish
- Don't know. Maybe have an aquarium
- more live creatures, or actual creatures
- more live creatures, or actual creatures
- more live exhibits
- more live exhibits/creatures
- more live fish; more fish tanks; more fish
- more live specimens
- more live stuff
- more live things
- more living specimens

- more of the animals
- real fish

More interactive, more things to touch (n=11, 9%)
- more interactive (n=3)
- more interactives for adults and kids
- more interactives, computers
- more interactives, things to touch
- more interactivity
- more stuff for kids to touch - more textures, shark skin
- more things to touch (i.e. what bone)
- more things to touch, more interactive stuff
- more touchable things like the barnacle

Improve navigation (n=9, 7%)
- [needs more] organization, not as much free form
- a map or guide through exhibit
- confusing when come in: finding a way to find things and not miss anything
- flow of traffic- difficult to navigate
- Hard to navigate. It could have suggestions on how to tackle (the exhibit)
- I was a bit overwhelmed when we first came here. I didn't know where to start
- no general flow - hard to figure out where to go next
- not a start - finish flow, It's a "la cart" a bit of everything everywhere
- pattern or path getting through the hall, didn't see a continuous thread of a story, jumped around, navigator provided us with a "highlight" tour
- there was a lot to look at and there wasn't a good path or direction to go so we were a bit scattered

Improve layout and organization (n=8, 7%)
- bigger exhibits: people pass by the smaller exhibits
- could be a little more spacious
- draw more attention to video panels in hall - they are very cool, but didn't notice them
- having something that grabs you immediately when you walk in
- I don't know if it's a general exhibit thing now, but they tend to have too many things, too bright colors; it's a little distracting for me. I'm more of a minimalist. Sometimes I feel they throw you in there and you get too focused too quickly. It's Disney-fying. Having said that, there are wonderful things to see in there
- it's congested
- more places to sit in middle
- organizing - more explanation of how each section is connected

Improve labels, especially for large animals (n=8, 7%)
- better info about "big" things/displays
- better labels, couldn't tell what some of the hanging model animals were
- better sign labels between the whale labels and Phoenix, we had a hard time figuring out what we were looking at
- bilingual presentation (videos) or labels. perhaps a section with multi language choices
- can't tell what kind of animal some things are, like sharks above exhibits
- labels on big models- exhibit that shoes different levels of the ocean, starts on the floor then goes up [can walk through]
- narration- wireless headsets [audio guide]
- pronunciations for words (e.g. species names)

More video, media, visuals (n=5, 4%)
- just notices the video up there, really cool. The dynamic part (e.g. video, fish tank) add more of them
- more detailed images of deep sea
- more interactives, computers
- more visually appealing things in the Deep Ocean section - not as vibrant as fish area.
- more videos about the ocean

Problem with exhibit component (n=5, 4%)
- better viewing on Globe Theater - narration didn't match what we were looking at
- condensation in the squid tank - couldn't see at all!
- national geo movie - start time so you know how long till the next show
- screens too dark [on upper part of wall]

- some things were very low (e.g. pull out drawers) needed to get on knees, would be had for older visitors

People to answer questions (n=1, 1%)

- people to answer questions

Do not know, can't think of anything, nothing, no comments (n=19, 16%)

- can't come up with anything
- can't think of anything (n=2)
- Can't think of anything right now
- didn't see everything because I was taking care of him (son), so I don't know
- didn't spend much time, no comment
- Don't know how could be improved. Perhaps a science person could tell.
- don't know, pretty high tech, don't know
- no
- no comment (n=2)
- no idea [probed several times]
- No idea. Would need to think more about it.
- no specific ideas
- nothing (n=5)
- nothing I can think of

It is all good, improved since last visit (n=26, 21%)

- already spectacular, organization is great, the layout (excellent)
- better than a lot of places (more description of things)
- couldn't answer that, I think it looks great
- don't know, it's great the way it is
- don't know. We were just discussing how great the hall is.
- Don't see how. It's all there for you: statements to read all there for you. It's pretty good.
- everything's okay
- good as is (n=2)
- good enough
- great as is
- I don't. It was wonderful. It touched so many different areas
- it looks alright to me
- it's vastly improved; last time here was 20 years ago
- kids enjoyed the interactives, anything they can touch, pull
- looks good, nothing
- much improved since last time
- No idea! It's beautiful. Have done a great job.
- no little kids: good flow, access, easy to read
- not at this point, it's more up to date now
- nothing comes to mind (very well done)
- nothing, it's a great space, very stimulating environment for kids
- pretty cool (aware more line?)
- pretty good (n=2)
- pretty good, don't know how could improve
- wouldn't know, I think it's great

Appendix 18: Visitors' thoughts on how life in the ocean got so diverse

Adaptation to Environment, Darwinism (n=43, 35%)

- adaptation of animals to environment
- adaptation of animals to their environments, different levels of the ocean, so animals had to change to meet challenges of their environment
- adaptation of organisms and environments
- adaptation, environment species live in
- adaptations
- Adaptations to different elements in the ocean
- all the different chemicals [man made and naturally occurring], ecosystems, temperature
- because different temperatures of the water, different depth, how much sun light there is, the water composition, pollution
- because of depth and how (creatures) derive their energy (sun) - sea snow
- challenges faced - temps, predators; adapting to surroundings
- changing currents, different nutrients, water temperature, different animals evolved in different ways
- climate change.
- Darwinism
- depend on location in ocean and how deep the water is
- different climate conditions
- different layers of the environment in the ocean, each layer is it's own eco-system
- different waters meet, rivers with sea, different layers of ocean, over time things evolve
- diverse ocean environments, different depths of ocean support different life
- environment of ocean is diverse - the layers, sections, temperatures
- environments, different levels of ocean, different species
- environments, levels of the ocean, have to adapt to survive different conditions - get food
- evolution - creatures have to adapt to their environment
- I don't really know. [probe] adaptation
- it [life] just had to adapt to survive
- Just adapting to different environments, what was there for them to grow, they had to adapt to.
- just over years and years of changes, adapting to different climates, microclimates
- life started in the ocean, adapted - search for food
- millions of years of evolution and natural selection based on stressors and CO2
- migrating animals to different environments and adaptation
- natural selection operating in lots of areas, lots of creatures over a long period of time - see Darwin evolutionary biology
- nature finds its way to adapt to its habitat- animals adapt to their habitat
- over millions of years of adapting to different situations
- part of it comes from different temperatures, migration patterns
- so many different climates and temps, things need to adapt to survive = evolution, darkness and light
- so much space and different environments allows for different evolutionary paths
- temperature in water, salinity, and depth of the water
- the ocean has been there for so long, all started there. It started before anything else. the different temperature and conditions
- the way it was created, Pacific and Atlantic different sides of planet and have different weather
- there are different temps, like the heat vents in the movie
- they evolved over time and diversified depending on their environments
- various adaptations
- where the animals live, their environment
- where they live and the temperature and the things they eat. Other animals

Evolution (n=41, 34%)

- (ocean is) so big; with evolution there's no reason why it wouldn't be diverse
- All different animals evolving together. Creatures combining and creating new ones.
- As different species moved around and adapted and evolved
- changing currents, different nutrients, water temperature, different animals evolved in different ways
- competition for resources
- evolution (n=17)
- evolution - creatures have to adapt to their environment
- evolution- it being untouched. It's arguable that's where life started.
- evolution, cross-pollination so to speak
- evolution, life started in water, being there so long
- evolution, mutation, bacteria causes mutation that causes (metamorphosis?)
- evolutionary
- I believe in evolutionary theory and there is so much in the ocean - anything is possible
- millions of millions of years of evolution
- millions of years of evolution and natural selection based on stressors and CO2
- natural selection operating in lots of areas, lots of creatures over a long period of time - see Darwin evolutionary biology
- over time things evolve
- pathologic evolution
- pockets that seem to have evolved and pockets that don't- deep sea versus areas that humans have affected
- so many different climates and temps, things need to adapt to survive = evolution, darkness and light
- they evolved
- they evolved over time and diversified depending on their environments
- thousands of years of evolution
- through evolution (n=2)

Time (n=19, 16%)

- adapting to different situations
- being there so long
- don't know, I guess with time
- I'm not a philosopher, couldn't begin to guess. They've been there for a long time, had a chance to diversify.
- it's a process, things change over time
- just over years and years of changes, adapting to different climates, microclimates
- length of time
- life started in the ocean and then living on land- ocean is big and old
- over time (n=3)
- over time things evolve
- they evolved over time
- time (n=5)
- time, lots and lots of time, also how people may have changes/affected it over time

Size of the Ocean (n=9, 7%)

- because it's a huge living space compared to the land
- because it's so big
- because it's so large, never ending things to find
- it's twice as big as land masses are, lots of room there
- life started in the ocean and is still changing, it's just vast by the sheer nature of it, it has to be diverse
- ocean is big and old
- ocean is larger than the land so it makes sense that it is more diverse
- so much space and different environments allows for different evolutionary paths
- so much unexplored that nothing goes extinct because of pollution, at least not yet

God (n=9, 7%)

- God - he made the species, environment they lived in (e.g. deep sea)
- God created
- God made it diverse
- God made it that way (n=2)
- God's creation
- I guess God created them
- museum scientists will probably laugh at us, but we believe that God created them
- God created it that way, a reflection of his creativity

Unspoiled by Humans (n=6, 5%)

- because there's no man in the ocean
- it being untouched
- life comes from water; man hasn't explored the ocean that much so more species survive
- man stayed out of it
- people left it alone, untouched by human hands
- so much unexplored that nothing goes extinct because of pollution, at least not yet

Human Impact (n=3, 3%)

- because of the various ways we as humans started doing that we affected natural balance. Human factors in affecting the balance.
- people took the time to clean it up
- pockets that seem to have evolved and pockets that don't- deep sea versus areas that humans have affected

Do not know, not sure, no answer (n=16, 13%)

- [could not answer]
- can't really speak to that
- didn't focus on that part [in the exhibit]
- don't know (n=5)
- I have no clue
- no clue, I'd just say that's the way it was made
- no idea
- not sure (n=2)
- really can't think of anything
- with all the evolution

Other or explanation not clear (n=4, 3%)

- animals have been in the ocean longer than they have been on land
- everything uses the same aqua system
- I defer to religious answer, or evolution [she didn't seem to know or have one opinion or another, I didn't feel comfortable to probe further]
- the micro to macro range (couldn't articulate exactly what this meant)

Appendix 19: Visitors' thoughts on how the ocean functions as a big global system, with everything interacting and connecting

Species Interdependence (n=32, 26%)

- [husband: everyone, all animals depend on each other, even land animals depend on weather patterns that affect sea as well] he covered it
- a lot of life forms began from the ocean. How we certainly live off the ocean and the ocean off us. Evaporation, it's all interconnected
- a lot of relationships with big feeding chain: human --> fish --> what the fish are eating
- all animals and the plants depend on each other
- all part of a giant food chain
- all the varieties of animals and species living together in harmony
- Animals species around the globe are related to each other
- basically with food chain
- can't have one without the other, food chain
- couldn't tell you... food chain; everything depends on each other; take some out affects all
- cycle of life, evolution
- ecological connections: creatures depend on each other for survival - food webs - Interdependence in terms of atmosphere: blue green algae releasing 02 -Many different ways: chemical, physical, biological connections -water cycle; currents
- everything feeds off each other and needs it to survive- so much we haven't explored, so it must be surviving and sustaining
- everything that happens is connected, example, the whale dies and becomes a habitat for animals
- food chain, big eat small
- how different organisms eat each other and that whole cycle
- How everything is evolving, we're evolving as well. All is connected that way. Fish source of food (for us).
- human dependence on the sea
- in terms of/by food sources
- it is its own incredible ecosystem- all life forms depend on each other, the air and the sun
- it's like a chain of links, take one link out and the chain fails
- like any other ecosystem, everything has a purpose, without one species, the others would die
- number of resources coming from ocean, anything pulled out affects something else, could write a dissertation on this question. (food chain)
- ocean is connected to the weather, which is connected to the temperature of the water, which is connected to the food chain- all affects each other
- orcas eat seals eat fish, food chain
- part of life, part of the food chain
- the fish and organisms live with each other and eat each other
- the food chain
- through food chain
- Watching the Global System video - the link between plankton and humans was a great story. Also, talking to the guide (navigator) at the aquarium, she was talking about how the shrimp and fish had a symbiotic relationship - that was cool
- we use the water, animals, and vegetation in the ocean and need to remember what we do on land can adversely affect that. Examples: run off/ illegal dumping
- we're all kind of interconnected, food web

Currents, Ocean Flow (n=27, 22%)

- Also the fact that things can travel because of the ocean currents
- connected by currents and migration patterns
- Connected by the Ocean Currents, back t o the Globe, interconnectivity of water, continents, species
- currents
- currents connect throughout the ocean
- different seas and waters connected by current

- even though oceans are named differently (e.g. Pacific) it's really one big ocean and 90% of currents are deep in the ocean connecting it all
- in the Globe movie they showed how ocean currents affect weather
- in the theater, the example of the dead whale falling to the bottom and how the ocean ecosystem uses its energy - symbiotic relationship among animals
- It's one ocean, same water. For example, a fish can go anywhere with salt water.
- like the Gulf Stream
- no land between each part, they're just all connected
- not sure, currents maybe
- ocean currents - their affect on weather systems
- ocean currents (affects the weather)
- Ocean currents affect our weather system, it's once big ocean moving across the planet
- ocean currents.
- physically it is connected, the currents going all over the world
- the currents moving through the ocean and oceans
- the globe presentation addresses some of that when show currents
- The Ocean flows; how it takes 1,000 years to mix the water from one area to another
- the water and currents
- The whole ocean can be connected by currents
- through the currents, they all connect eventually
- tides, currents that go around the planet, the water cycle/water system - how if affects landmasses
- water cycle; currents
- yes, currents move, flow ... no ocean is separated from another

Connected by Water, Size of Ocean (n=21, 17%)

- (we use an) artificial division to call oceans by different names (Atlantic, Pacific)but they are all connected; it's one big body of water
- all connected sources of water 2/3 planet is water "we're an ocean world"
- all oceans connected together
- all one body of water, so it's undoubtedly connected
- all the oceans are connected, you can get in a boat and travel all the oceans and meet 75% of the world's population
- by the water
- even though oceans are named differently (e.g. Pacific) it's really one big ocean and 90% of currents are deep in the ocean connecting it all
- every ocean connected to other ocean. Hasn't always been that way, things move around
- everything in the water connects things subtly, no beginning or end
- how would not be connected? it's only one ocean
- it's all around us
- it's all connected of course, all oceans/seas bound together, we are bound to the ocean because we're made of water
- it's water so has to be connected, it's all over the place [water, the ocean]
- literally- all waters are connected, unless it's land locked
- most of the planet is water, it's cyclical, ocean circles the continents
- My husband used to say "The Earth is 3/4 water and I can prove it" because he's from the Navy!
- Ocean in the majority of the earth - everything is connected
- the entire world is connected by the oceans, everything impacts everything, humans are quite dependant on the ocean
- the water all flows from body of water to body of water
- the water and currents
- the water itself

Climate, Weather (n=14, 11%)

- [husband: everyone, all animals depend on each other, even land animals depend on weather patterns that affect sea as well] he covered it
- All interconnected [there is] some massive plan with weather patterns, etc.
- because different water sources are connected; ocean affects weather, crops

- because everything is connected. Water [is connected to] weather systems, weather systems move over land. All one big system of transporting water
- food web
- how ocean currents affect the climate - we had a discussion about this and global warming
- in the Globe movie they showed how ocean currents affect weather
- it is its own incredible ecosystem- all life forms depend on each other, the air and the sun
- ocean currents - their affect on weather systems
- ocean currents (affects the weather)
- Ocean currents affect our weather system, it's once big ocean moving across the planet
- ocean is connected to the weather, which is connected to the temperature of the water, which is connected to the food chain- all affects each other
- Various ecosystems, weather, tectonic plates.
- weather systems

Human Dependence and Impact (n=12, 10%)

- by the people that live on the planet, doing the studies
- can't talk too much about this except we know human impact ocean conditions and life
- ecological connections: creatures depend on each other for survival - food webs
- huge market for food, especially for Chinese and Japanese, how they thrive. A lot of our waste goes there. Maybe there is an answer in ocean some place that can help us.
- particularly with human impact on ocean life e.g. overfishing, over use of water, shipping channels, everything is connected
- pollution affects food
- pollution affects what's on the surface and that affects eventually all the water
- the entire world is connected by the oceans, everything impacts everything, humans are quite dependant on the ocean
- the planet as a whole is a system, what we do in one part affects something else
- we affect the life and organisms, global warming affects it
- we import exotic species and it screws up ecosystems, there is a natural equilibrium
- weather systems

Discussion of Cause and Effect (n=11, 9%)

- couldn't tell you... food chain; everything depends on each other; take some out affects all
- everything is connected in some way, there's a ripple effect everywhere; what do in land (affects) the ocean
- in the Globe movie they showed ... how something that happens in the ocean one place in the world - tsunami - has impact all over the world (weather tides, etc)
- number of resources coming from ocean, anything pulled out affects something else, could write a dissertation on this question. (food chain)
- one thing depends on another, I'm not a biologist, but that's the way it is. You destroy [one thing] something else suffers.
- pollution affects what's on the surface and that affects eventually all the water
- the entire world is connected by the oceans, everything impacts everything, humans are quite dependant on the ocean
- the planet as a whole is a system, what we do in one part affects something else
- we import exotic species and it screws up ecosystems, there is a natural equilibrium
- we use the water, animals, and vegetation in the ocean and need to remember what we do on land can adversely affect that. Examples: run off/ illegal dumping
- what happen is in one place affects something else

Species Migrations or Movement (n=9, 7%)

- all the oceans are connected, you can get in a boat and travel all the oceans and meet 75% of the world's population
- cause of the fish
- connected by currents and migration patterns
- it's all open, can go anywhere in it, creatures don't have boundaries
- It's one ocean, same water. For example, a fish can go anywhere with salt water.
- migration of species

- North Atlantic Right Whale - how a large creature moves globally all over as well as depth
- pockets of life moving freely
- yes, … animals migrate from one part of the ocean to another. no ocean is separated from another

Interconnection Between Land and Ocean (n=9, 7%)

- air and water flow together
- because different water sources are connected; ocean affects weather, crops
- because everything is connected. Water [is connected to] weather systems, weather systems move over land. All one big system of transporting water
- everything is connected in some way, there's a ripple effect everywhere; what do in land (affects) the ocean
- rivers and streams feed the ocean
- through the physical environments overlapping
- tides, currents that go around the planet, the water cycle/water system - how if affects landmasses
- we need the sea, it helps the land, water/food.
- we use the water, animals, and vegetation in the ocean and need to remember what we do on land can adversely affect that. Examples: run off/ illegal dumping

Ocean is Essential to Life (n=6, 5%)

- all life is connected through it
- can't have one without the other, food chain
- it supports all life on the planet
- it's essential to all life forms
- only in that everything is dependent on water for its existence
- we're all made of water anyway, so without the ocean's water life would cease to exist

Unspecific, Unclear (n=23, 18%)

- [could not answer] (n=3)
- an undersea world, it's a completely different world than what's on land, it's constantly evolving
- definitely connected because there is a variety of things, a lot of it is unexplored, wonder if ocean is more diverse in its species [than land]
- don't know (n=2)
- everything is connected
- in complex ways
- it is and isn't. different pockets with creatures we've never seen or don't live in other pockets. [ocean is] connected but divided at same time
- it's a system
- it's all one big system
- it's an ecosystem all of its own
- it's the beginning of life [probe] I wouldn't know
- no idea
- not sure, never thought about it
- not sure
- odd question, don't know, it's probably connected to everything
- rivers and streams feed the ocean
- surface part and deep part don't really interact
- the ocean floor
- they just are! I don't think it was random.
- we know they're connected, don't know how

Appendix 20: What visitors learned from the Sant Ocean Hall ("I never realized that…")

Comments about a specific species (n=74, 60 %)

Size and scale (n=25, 20%)

- 6ft worms. Squid could be so tiny
- a jelly fish was/could be that big.
- a squid can grow to be so long
- a squid could be that big
- animals were so big
- Giant squid is 11 meters long.
- how big the shark jaw actually is
- how big the whale is
- how deceiving size and scale of things are - things you thought were little are big and things you thought were big are microscopic
- How large coral reefs are in micro Polynesia
- I didn't know that a whale was this big
- shark mouth so big!
- size of the whale, whale teeth
- some animals (e.g. jellyfish) could get so big
- some creatures are so small
- squid could be so long.
- tadpole fish could be 7 ft long
- that the great white's mouth was so large
- the football fish is so small
- the mouth on the whale skeleton was so big
- the squid was that long
- there is a creature bigger than the blue whale, in length
- there is a squid that big!!
- there were sharks that big
- tiny shark, the one that fits in your hand

That certain species existed (n=13, 11%)

Non extinct (n=7, 6%)

- coelacanth: never had heard of it, that it existed, that it wasn't extinct
- how many animal species I'd never hear of before
- sea spider
- some that I've never seen before
- that there is such a thing as the giant squid
- there were so many types of coral reefs
- there were tiny organisms in ocean that create oxygen

Extinct (n=6, 5%)

- that there was something so incredible as a giant prehistoric great white shark!
- the long snakey thing that had little feet
- there was a great white before the one now
- variety of trilobites
- whales had land ancestors
- whales had legs [in the past]

Biology, ecology, anatomy (n=12, 9%)

- flounders have two eyes on one side
- I didn't know right whales could be found along the US coast
- parasites on lobster lips!
- so many fish with teeth; fish get really ugly, … jellyfish are cool
- that barnacles grow on whales
- that fish change sexes - alpha fish become female
- that so many underwater creatures had defensive mechanism light (products?) Lot's I didn't know
- The dead whale in the film attracted so many other animals
- the importance of phytoplankton to ocean animals
- the only hard part of the octopus is the beak
- there are some birds (terns) that migrate from the south pole to the north pole
- vertical ocean migration is the largest migration on the planet, everyday deep sea creatures are in deep ocean, but every night the rise to the surface to feed

About the deep ocean and species that live there (n=11, 9 %)

- bottom of the ocean contained as much life as it does
- fish on the bottom, how old they are.
- how illumination of fish (in the twilight zone) is for various reasons
- Ocean floor is so barren
- so many animals on the ocean floor

- the age of the ocean floor/bedrock [that it was so old]
- the importance of transparency as a mechanism of camouflage in Deep Ocean.
- there was a whole ecosystem at the bottom of the ocean. The dead whale in the film attracted so many other animals
- twilight creatures had big heads (vs. bodies) because at that depth they need to be "designed" efficiently with smaller bodies
- what it's like to go down there (to the bottom of the ocean; from deep sea videos) natural resources at the bottom of the ocean
- with time, how the floor of the ocean, you could tell what was going on a long time ago

Comments about the ocean (n35, 29 %)

How vast the ocean is, bigger than expected (n=10, 8%)

- 71% of earth's surface is covered in water
- how big the world is and half of it is water.
- how important the ocean is
- how vast it is with the animals in it, more in depth look at what is there [on the ocean]
- how vast the ocean is
- immensity of the ocean
- ocean is much bigger than expected
- so much more to the ocean than I thought
- the ocean is just one body of water
- the ocean was so big

How diverse life in the ocean is, how important life in the ocean is (n=10, 8%)

- how important sea life is
- how vast the ocean is, so many intricacies from fish to shells to worms to plants
- it was so many different types of sea creatures never seen before
- so many creatures living in ocean
- so many different things in the ocean
- So many tropical creatures
- There are so many species in the ocean
- there are so many things in micro to macro in size
- there was many different creatures such as these
- there was so many different kinds of ocean life- didn't realize the spectrum

Currents (n=7, 6%)

- currents connected in all oceans
- currents separate the ocean
- interconnectivity of the ocean currents
- it takes 2000 years for water to circle the earth [they saw this in Global Systems (2) before being intercepted)
- that the currents went around the whole planet
- the ocean currents moved so slowly and that the connect throughout the globe
- There are so many types of ocean currents

So much information here, so much to learn, so much compacted in the Sant Ocean Hall (n=6, 5%)

- 1. there was this much compacted in a small exhibit hall 2. so much info in such a compact hall
- all the fish in the reef tank came from FL
- had a live squid; someone caught that fish (coelacanths)
- that there is a specimen of a giant squid here
- there was so much information here
- there was so much to learn about the ocean

`

- blue light is reflected back that's why it's blue [the ocean]
- the ocean can be so beautiful

Other comments (n=, %)

How much research is being done, how species and the ocean can be studied (n=9, 7%)

- extinction of the right whale; the fact the can track Phoenix and her family all over the ocean.
- how far down to drill the sample course.
- Study of ocean could be of experimental type, like the growth of mangroves, thought studies would be more observational (only)
- that there is a boat that can drill down 7000 meters
- the reef's health could be diagnosed - that's cool. That people study so many things about the ocean (e.g. tracking crabs)
- there were so many people involved in researching this field

- there's the ocean drilling ship in Japan
- they use a whales permanent barnacles to identify them and that they track whales with suction cups!
- we are still in our infancy in our explorations of the ocean

The Sant Ocean Hall or the NMHN existed, how NMNH improved, grown (n=8, 6%)

- it was here [the Ocean Hall]
- it was here. Heard about it on the radio, but I didn't know where it was
- NMNH had come so far - used to come as a child - much bigger now.
- ocean hall was here!
- that it was here [the Ocean Hall]
- the museum had such large display of biodiversity
- the ocean hall has here 2. it's an open, free museum
- there was an Ocean Hall!

Miscellaneous comments (n=8, 6%)

- fish were called animals
- how much fun a 2 yr old could have with the things he's looking at
- never seen a giant squid up close, only in books
- ocean life is not really that scary
- squid could shrink by half in preservative water
- the darkness is more of a problem than the cold in the Arctic Ocean (learned in Poles) thought cold was the obvious challenge
- they call driving a submarine 'flying'
- you could organize an exhibit based on the layers of the ocean. Like surface water, twilight, deep ocean...

Origin of life (n=4, 3%)

- animals usually evolved from the water
- chemical synthesis - that life may not have begun with the sun
- how old some of the fossils are
- the asteroid theory on dinosaurs is real

Human impacts, how little, few humans are in comparison (n=3, 2%)

- how small we are, how dangerous we are, how we damage so much
- people made mittens from salmon skin
- There are more creatures than us.

I already knew it, nothing (n=12, 9%)

- all info was familiar
- already knew a lot about ocean- catching a live giant squid 3 years ago
- already knew there is an amazing variety of creatures, the beauty of all creatures, their colors and forms
- already very aware of everything - has PhD in marine biology
- didn't really learn anything new, to be honest
- I am a scientist so I am very informed already. I was taking care of him; didn't take time to read in detail
- I knew a lot before
- most things already know, didn't learn anything knew since I have an oceanography background
- nothing new today (how large shells grow)
- nothing surprised me today [I probed several times]
- tough to think about it. Worked for the Navy under the Ocean, followed all these developments because was associated with people who worked at the deep sea (retired now).

No answer, do not know, so much (n=6, 5%)

- [wouldn't answer question]
- boy, I didn't know what to expect so I don't know, there was so much!
- come for kids, have kids in mind so let them go where they find fascinating; try to engage them
- don't know (n=2)
- I have to think about it
- no answer

Appendix 21: What visitors were reminded of while in the Sant Ocean Hall ("It reminded me that…)

Personal responsibility (n=56, 45%)

How little we know, how much we take it for granted, how important ocean is (n=20, 16%)

- hears on NPR recently that ocean floor was so expansive and that so little had been mapped
- how important the ocean is, how much we take it for granted
- how little we really know
- how much ocean we have unexplored
- how much we don't know about it
- introduce a world you don't normally see
- ocean is a rich resource
- ocean is important
- ocean is important to ecology
- that we really count on water/how important the ocean is
- the ocean is expansive, precious
- there is a lot we don't know about
- there is a whole world under the ocean
- there is still a whole bunch of stuff we don't about the ocean we don't know
- there's a lot more in the water than we thought
- there's a lot of stuff in ocean that we still haven't seen yet
- there's more than meets the ye when you look at ocean- looks dirty at first, but then study it
- we have yet to finish exploring
- we know less about what's in the ocean than on earth
- we know so little about it

There is a lot I don't know, things I forgot I knew (n=13, 10%)

- [don't know] there's a lot I don't know about
- how little I know about the ocean
- how little I know or how much I've forgotten
- how stupid I am! Well educated, but very stupid.
- how unknown (the ocean) is to me (esp. the twilight zone)
- I had read about the coelacanth
- I knew things about sea life - I forgot I knew
- need to learn more about ocean
- so much to explore; I want to go down in a submersible
- the deep sea is a mystery to me
- there were so many things I hadn't seen before, would like to see more about luminosity. The movie was great
- there's so much more I have to learn
- there's some really big animals in ocean, and a lot I didn't know existed

How we need to care for the ocean (n=16, 13%)

- a lot of the world we don't know and need to protect and learn about
- how we need to take care of the ocean and the environment better
- it's important to take care of our ecological systems
- some of the animals in deep ocean need to be protected
- that we need to protect this earth
- to be more conscious about our planet, ocean is in danger,
- we have a responsibility to the ocean
- we have to take care of it
- we must protect the ocean, it's so beautiful
- we need to care for the ocean
- we need to keep ocean safe and secure
- we need to save the ocean
- we need to take better care of our oceans
- we need to take care of our oceans
- we need to treat our planet better, too many extinct things
- you need to take care of the environment more

Individual impacts, human and environment connection (n=7, 6 %)

- everything I do can help or destroy the ocean or what's in it
- how closely our activities are tied to weather and ocean, our impact
- human beings and the environment are interdependent

- life is all connected
- we all live together
- we are not the only creatures on the earth
- we share our planet with so many creatures that live in the ocean we didn't know about

Personal connection (n=41,33 %)

Of learning about marine life, working in a field related to marine biology (n=10, 8%)

- how much fun working at my job was (retired now); doing that for a living (exploring deep ocean); the discovery aspect, the field trips. Not so much the engineering aspect (he's a retired mechanical engineer)... amazing stuff; can't see enough of this stuff: have read about it in books, seen videos, but it's still fascinating (gave example the hydrothermal vents and the sunfish model)
- I love going to aquariums and learning about marine life - I prefer this to dinosaurs any day
- I used to love watching Cousteau, should go back to paying attention to it [the ocean]
- I used to want to be a marine biologist
- I watch too much television because I know more than average person might know
- of a couple classes I took in college
- there is always something to learn
- there's many fields of oceanic marine science
- there's still a lot of underwater research going on
- you're never too old to learn

How much I enjoy the ocean, reminds of home (n=8, 6%)

- besides home, I don't know [live by the ocean in S.C.]
- I enjoy the ocean, - we live in California and these scenes are familiar to us
- I like the ocean
- I love the ocean (n=2)
- it's exciting to go to the ocean now I know more about it
- just other experiences I had with the ocean and museums (going to SeaWorld and touching starfish)
- this is why I fell in love with the ocean, there are so many beautiful things in it

Of coming to museums, aquariums need to come back (n=5, 6%)

- I enjoy going to museums
- just other experiences I had with the ocean and museums (going to SeaWorld and touching starfish)
- museums can be educational and enjoyable
- need to come down here more often
- of the aquarium in Tampa Bay
- of the museum in NY
- other things we've seen throughout the world (aquarium experiences like that)
- Smithsonian Institution is a great place to go in and it's free
- the Smithsonian is always a great place to come to

My family, going on vacation, snorkeling (n=7, 6%)

- I want to go away with my husband!
- I want to go back and go scuba diving
- of when I snorkeled and my sign (pieces)
- this is a good family activity
- we need to go to the beach!
- we're going to the beach this summer
- when I went snorkeling in the keys

My children, to teach them, they would enjoy coming here (n=5, 4%)

- children grow up so fast.
- her kids are going to love this (they are coming to visit next month)
- my kids really enjoy fish, the ocean and stuff like this
- need to keep teaching my kids
- Son is just 3, but should be a regular visitor so that in 2-3 years he'll really understand or be ready to learn from this

When I used to come here as a child, other childhood memory (n=3, 3%)

- I had so much fun coming here on field trips as a kid
- of my childhood memory of fishing with squid (as bait)
- Remember when she came here (museum) as a child

Comments about the ocean (n=28, 23%)

How diverse life in the ocean is, how important life in the ocean is (n=16, 13%)

- a lot of life depends on and came from the ocean
- all the biodiversity there is in there
- creatures (living) so deep in the dark
- how full of life the ocean actually is
- lots of creatures
- ocean is vast with life
- ocean life is interesting and educational
- the beauty of life, in the ocean
- the biodiversity in ocean is enormous
- the different species found
- the importance of biodiversity in our oceans
- there are creatures in ocean that are really big and can eat you
- there are prehistoric fish
- there are so many types of life in the ocean
- there's a lot of life in sea that we usually don't see- especially in deep parts
- there's so many species in the ocean

How vast, large the ocean is (n=10, 8%)

- expanse of the ocean
- how big it was
- how huge it is
- how huge the ocean is
- Ocean is most of the world, people don't pay attention to it
- the earth is predominantly an ocean's world
- the ocean is a big place, really, larger than all land masses
- the ocean is expansive, precious
- the ocean is so big
- the ocean was so big

How little we are (n=4, 3%)

- how insignificant we are
- of how small we are in the grand scheme of things... a small part of the earth
- of our small comparison to figures like this (pointed at the number of years in millions) the massive power of the world
- we're a tiny fish in a big pond

Ocean stewardship issue (n=2, 2%)

- of the oceans role in global climate
- plight of the right whales - lives in Virginia Beach and hears about this a lot

Other comments (n23=,17 %)

Miscellaneous comments (n=8, 6%)

- 1. how beautiful/complicated life on earth is 2. how went from single cell to multiple cell organisms - sea creatures
- I better be careful when I'm swimming
- I thought world was 250 million years, but trilobites have been around 4,600 million [that's the # he quoted to me- four thousand six hundred million]
- 1. not as much absorbing, but being a tour guide to my kid. 2. Ocean currents. 3. A lot of people don't believe in evolution
- overall NHM is great, it's a great marine exhibit; complements to the museum
- that we have two big oceans- Pacific and Atlantic
- there is a larger "something" at play, that there is so much we still can learn
- whales did start out as land animals

How important God and God creatures are (n=4, 3%)

- god is a great god
- how God created different ecosystems, created life, keeps giving us life
- how important all of god's creatures are
- we're Christians. We believe God created all. (reminded that) God's creativity is infinite

Reaction to certain species, cool, creepy (n=3, 2%)

- cephalopod are cool
- how scared I am of water creatures and want to know more about them even though I am scared of them
- jellyfish are creepy

Can't think of anything, not here long enough (n=4, 3%)

- can't think of anything (n=2)
- haven't been here long enough, he (child) moves too fast!
- no, can't say

Appendix 22: Comparison of time spent between those visitors who heard/saw messages in Sant Ocean Hall

Messages	N	Mean	Median	Std. Dev.	Min	Max
How the ocean and its life forms have changed and evolved over time[a]						
Remember message	54	32:24	25:22	23:14	04:42	01:30:00
Does not remember message	19	22:59	13:52	21:54	03:00	01:25:00
How the ocean affects life on the Planet						
Remember message	50	33:07	28:07	24:21	03:00	01:25:00
Does not remember message	23	21:55	18:15	18:12	06:44	01:30:00
How the ocean is one big system, with all parts connected to each other						
Remember message	50	32:53	28:07	24:17	03:59	01:30:00
Does not remember message	21	21:15	17:26	14:30	03:00	01:47
How to protect or conserve the ocean[b]						
Remember message	31	35:50	33:45	23:36	03:59	01:21:19
Does not remember message	38	22:24	18:40	18:37	03:00	01:30:00
How diverse the ocean is, in the animals and the places they live						
Remember message	67	29:51	19:39	22:52	03:00	01:30:00
Does not remember message	6	19:23	18:04	10:05	07:58	31:57
How much of the ocean remains unexplored[c]						
Remember message	41	36:27	29:15	23:49	06:00	01:30:00
Does not remember message	30	19:18	14:07	16:11	03:00	01:21:19

a Significant statistical differences between groups (Mann Whitney U=347.0, p<0.05)
b Significant statistical differences between groups (Mann Whitney U=386.0, p<0.05)
c Significant statistical differences between groups (Mann Whitney U=326.0, p<0.05)

Appendix 23: Comparison of number of messages remembered between group types

Number of Areas Visited[a,b]	N	Mean	Median	Std. Dev.	Min	Max
Total	124	3.6	4.0	1.57	0	6
Adults with no children 12 & younger	48	4.0	4.0	1.36	1	6
Adults with children 12 & younger	75	3.3	3.0	1.64	0	6

a The group of adults *with* children under the age of 12 included two groups that had both, children younger than 12 and older than 13. The group *with no* children under the age of 12 included five adults visiting alone
b Significant statistical differences between groups (Mann Whitney U=1395.0, p<0.05)

Appendix 24: Comparison of number of areas visited between those visitors who heard/saw messages in Sant Ocean Hall

Messages	N	Mean	Median	Std. Dev.	Min	Max
How the ocean and its life forms have changed and evolved over time						
Remember message	54	13.1	12.5	5.85	4	26
Does not remember message	19	11.3	10.0	7.00	3	29
How the ocean affects life on the Planet						
Remember message	50	13.5	13.0	6.35	3	29
Does not remember message	23	11.0	9.0	5.55	4	24
How the ocean is one big system, with all parts connected to each other						
Remember message	50	13.0	12.5	6.28	4	29
Does not remember message	21	11.7	10.0	6.18	3	23
How to protect or conserve the ocean[a]						
Remember message	31	14.1	14.0	5.77	4	26
Does not remember message	38	10.7	9.5	5.55	3	25
How diverse the ocean is, in the animals and the places they live						
Remember message	67	12.9	12.0	6.24	3	29
Does not remember message	6	9.5	8.0	4.37	5	17
How much of the ocean remains unexplored[b]						
Remember message	41	13.8	13.0	6.19	4	29
Does not remember message	30	10.7	9.5	5.64	3	26

a Significant statistical differences between groups (Mann Whitney U=379.0, $p<0.05$)
b Significant statistical differences between groups (Mann Whitney U=433.5, $p<0.05$)

Appendix 25: Ocean Today instrument

Smithsonian
National Museum of Natural History

***Ocean Hall* Evaluation Ocean Today**

Date: _____

Researcher / Visitor ID: _____

Time at exhibit: _____

Which component(s) did they attend to/use:

- ☐ **Intro panels**
- ☐ **Quote in middle**
- ☐ **Ticker**
- ☐ **Big overhead video(s)**
- ☐ **Video (touch screen):** Number watched _____

  Who used it: ☐ Adult(s) only ☐ Child(ren) only ☐ Adult(s) and child(ren)

Comments on observed behavior:

---

1. **What do you think this exhibit is about?** *[Probe: What do you think it is trying to show?]*

2. **How do you think this exhibit relates to the rest of Ocean Hall?**

3. **Please complete the following sentence about this exhibit, "I never realized that…."**

4. **Which of the programs did you find most interesting, and why?**

5. What could be changed to make it more interesting or engaging?

6. What do you specifically remember seeing or hearing about how scientists are studying the ocean?

7. Do you remember seeing or hearing anything about threats to the ocean due to human impact or caused by humans? Yes No

8a. If Yes, What specifically do you remember?

8. Did you realize that this information is regularly updated? Yes No

8a. If Yes, how did you know that?

8b. If Yes, how often do you think it is updated?

NOW JUST TWO QUICK QUESTIONS ABOUT YOU AND YOUR GROUP.

9. Please indicate the ages of the people in your group:

0-6 years old	_____	people	☐ None	Which grade(s) are they in: _____
7-12 years old	_____	people	☐ None	Which grade(s) are they in: _____
13-17 years old	_____	people	☐ None	
Over 18 years old	_____	people	☐ None	

10. Is this your first time to Ocean Hall? Yes No

Thank you very much for your time.

11. Gender: # of males ____
# of females ____

Appendix 26: LOOP Interactives: Who Cares For the Ocean instrument

Smithsonian
National Museum of Natural History

***Ocean Hall* Evaluation LOOP Interactives – Who Cares for the Ocean**

Date: _____

Researcher / Visitor ID: _____

Time at exhibit: _____

Which component(s) did they attend to/use:

- ☐ **Intro panel**
- ☐ **Six text panels**
- ☐ **Audio handheld device**
- ☐ **Big overhead screen**
- ☐ **Labels below overhead videos**
- ☐ **Confronting Climate Change:** Who used it: ☐ Adult(s) only ☐ Child(ren) only ☐ Adult(s) and child(ren)
  Use: ☐ All way through ☐ Most of it ☐ Some of it
- ☐ **Managing Marine Fisheries:** Who used it: ☐ Adult(s) only ☐ Child(ren) only ☐ Adult(s) and child(ren)
  Use: ☐ All way through ☐ Most of it ☐ Some of it

Comments on observed behavior:

---

1. **What did you like about this exhibit?**

2. **What do you think this exhibit is about?** *[Probe: What do you think it is trying to show?]*

3. **Was there anything in the interactives that really stuck out or was memorable to you?**

4. **How do you think this exhibit relates to the rest of Ocean Hall?**

***Ocean Hall* Evaluation LOOP Interactives –**
Who Cares for the Ocean

5. **What could be changed to make it more interesting or engaging?**

6. **What do you remember seeing or hearing about how scientists are protecting the ocean?**

7. **How about things that you can do yourself to protect the ocean?**

8. **Do you remember seeing or hearing anything about threats to the ocean due to human impact or caused by humans? Yes No**

   8a. If Yes, What specifically do you remember?

NOW JUST TWO QUICK QUESTIONS ABOUT YOU AND YOUR GROUP.

9. **Please indicate the ages of the people in your group:**

0-6 years old	_____	people	☐ None	Which grade(s) are they in: _____
7-12 years old	_____	people	☐ None	Which grade(s) are they in: _____
13-17 years old	_____	people	☐ None	
Over 18 years old	_____	people	☐ None	

10. **Is this your first time to Ocean Hall?** Yes No

Thank you very much for your time.

11. **Gender: # of males ____**
# of females ____

Appendix 27: LOOP Interactives: Ocean as Laboratory instrument

Smithsonian
National Museum of Natural History

***Ocean Hall* Evaluation LOOP Interactives –**
The Ocean as a Laboratory

Date: _____

Researcher /
Visitor ID: _____

Time at exhibit: _____

Which component(s) did they attend to/use:
- ☐ **Intro panel**
- ☐ **World map with scientists**
- ☐ **Audio handheld device**
- ☐ **Big overhead video**
- ☐ **Labels below overhead videos**
- ☐ **Video (touch screen):** Number watched _____

  Who used it: ☐ Adult(s) only ☐ Child(ren) only ☐ Adult(s) and child(ren)

Comments on observed behavior:

---

1. **What did you like about this exhibit?**

2. **What do you think this exhibit is about?** *[Probe: What do you think it is trying to show?]*

3. **What could be changed to make it more interesting or engaging?**

4. **Was there anything in the videos that really stuck out or was memorable to you?**

***Ocean Hall* Evaluation LOOP Interactives –**
The Ocean as a Laboratory

5. How do you think this exhibit relates to the rest of Ocean Hall?

6. Did you ever wish you could have stopped the videos, or skipped to a different one? Yes No

7. When you start, you can't see all the possible videos you could choose from right away. Would it have been helpful to see them at once when you start, or does that not really matter?

- ☐ **Would have been helpful**
- ☐ **Doesn't matter**

8. Do you remember seeing or hearing anything about what scientists are studying about the ocean?

Yes No

8a. If Yes, What specifically do you remember?

8b. What do you remember seeing or hearing about threats to the ocean?

NOW JUST TWO QUICK QUESTIONS ABOUT YOU AND YOUR GROUP.

9. Please indicate the ages of the people in your group:

0-6 years old	_____	people	☐ None	Which grade(s) are they in: _____
7-12 years old	_____	people	☐ None	Which grade(s) are they in: _____
13-17 years old	_____	people	☐ None	
Over 18 years old	_____	people	☐ None	

10. Is this your first time to Ocean Hall? Yes No

Thank you very much for your time.

11. Gender: # of males ____
# of females ____

Appendix 28: Tree of Life Instrument

Smithsonian
National Museum of Natural History

***Ocean Hall* Evaluation Tree of Life – Interview**

Date: _____

Researcher /
Visitor ID: _____

1. **What do you think this graphic panel is about?** *[Probe: What do you think it is trying to show?]*

2. **How does this panel relate to the rest of these three cases area?** *[POINT TO DIVERSITY DISPLAYS]*

3. **Looking at this part right here** *[POINT TO MODEL]*, **what do you think scientists might use this for?**
   [Probe: why might it be important to them?]

4. **Have you seen these kinds of diagrams before? Yes No**

   4a. If Yes, Where have you seen them?

5. [POINTING TO ONE "BRANCH"] **How do you think the things in this group are related?**
   [Probe: What do they have in common?]

6. **What do you think these two groups over here represent?** *[Probe: How are they related to this part – POINT TO MAIN PART OF GRAPHIC]*

7. **Do you think this panel is geared more towards adults, or adults and kids?**

Smithsonian
National Museum of Natural History

***Ocean Hall* Evaluation Tree of Life – Interview**

NOW JUST TWO QUICK QUESTIONS ABOUT YOU AND YOUR GROUP.

7. <u>Not including yourself</u>, please indicate how many people you are visiting the museum with today, in each category.

0-6 years old	_____	people	☐ None	Which grade(s) are they in: _____
7-12 years old	_____	people	☐ None	Which grade(s) are they in: _____
13-17 years old	_____	people	☐ None	
Over 18 years old	_____	people	☐ None	

8. What year were you born? _____

Thank you very much for your time.

9. Gender Male Female

Appendix 29: Collections Instrument

Smithsonian
National Museum of Natural History

***Ocean Hall* Evaluation - Collections**

Date: _____

Researcher / Visitor ID: _____

Time at exhibit: _____

Which component(s) did they attend to/use:
- ☐ **Intro panels/labels**
- ☐ **Video**
- ☐ **Giant Squid**
- ☐ **Large objects above eye level**
- ☐ **Coelacanth**
- ☐ **Specimens – skeletons or jars**
- ☐ **Larval specimens**
- ☐ **Drawers:** Number pulled out _____ Number "bird drawers" pulled out _____
  Who used them: ☐ Adult(s) only ☐ Child(ren) only ☐ Adult(s) and child(ren)

Frequency of label reading:
☐ **All/almost all** ☐ **Most/Many** ☐ **Some** ☐ **A few** ☐ **Hardly any/none**

Comments on observed behavior:

---

1. **What do you think this whole exhibit is about [point]?** *[Probe: What do you think it is trying to show?]*

2. **Please complete the following sentence about the whole exhibit, "I never realized that...."**

3. **Why do you think this whole exhibit was included in Ocean Hall?**

Smithsonian
National Museum of Natural History

***Ocean Hall* Evaluation - Collections**

4. Who do you think collected these animals or specimens?

5. Did you realize that the Smithsonian has the biggest marine collection in the world? Yes No

5a. What do you think they use this collection for?

5b. Who, specifically, do you think uses this collection? [*Probe: Anyone else?]*

5c. Do you think they are still collecting animals today? Yes No Don't know

6. Besides the animals or specimens, what was the most interesting part to you, and why?

NOW JUST TWO QUICK QUESTIONS ABOUT YOU AND YOUR GROUP.

7. Please indicate the ages of the people in your group:

0-6 years old	_____	people	☐ None	Which grade(s) are they in: _____
7-12 years old	_____	people	☐ None	Which grade(s) are they in: _____
13-17 years old	_____	people	☐ None	
Over 18 years old	_____	people	☐ None	

8. Is this your first time to Ocean Hall? Yes No

Thank you very much for your time.

9. Gender: # of males ____
# of females ____

Appendix 30: Navigators instrument

Smithsonian
National Museum of Natural History

***Ocean Hall* Evaluation, Navigators**

Date: _____

Researcher / Visitor ID: _____

1. **In Ocean Hall the staff or volunteers are typically wearing blue vests. Did you talk to any staff or volunteers during your visit to Ocean Hall?** Yes No *If No, skip to Q6*

   1a. If Yes, where did you talk to them?

   1b. If Yes, did you initiate the conversation, or did they?

   □ Visitor initiated □ Navigator initiated

   1c. What did you talk about?

2. **In terms of your visit to Ocean Hall, did talking to someone enhance, detract from, or not make a difference in your experience?**

   □ Enhanced □ Detracted from □ Didn't make a difference

   2a. If Enhanced, How did it enhance your experience?

   2b. If Detracted From, How did it detract from your experience?

3. **Did you ask them any questions?** Yes No

   3a. If Yes, what did you ask them about?

   3b. If Yes, were your question(s) answered adequately? Yes No

4. **From talking to them, did you learn anything new or find yourself thinking differently about anything?** Yes No

   4a. If Yes, how so?

5. How could the interaction have been improved upon?

6. What kinds of information are you typically looking for when you talk to a volunteer or staff person in an exhibit?

NOW JUST TWO QUICK QUESTIONS ABOUT YOU AND YOUR GROUP.

7. Please indicate the ages of the people in your group:

0-6 years old	_____	people	☐ None	Which grade(s) are they in: _____
7-12 years old	_____	people	☐ None	Which grade(s) are they in: _____
13-17 years old	_____	people	☐ None	
Over 18 years old	_____	people	☐ None	

8. Is this your first time to Ocean Hall? Yes No

Thank you very much for your time.

9. Gender: # of males ____
# of females ____

Appendix 31: Family Guide instrument

Smithsonian
National Museum of Natural History

***Ocean Hall* Evaluation, Family Guide**

Date: _____

Researcher / Visitor ID: _____

1. [Show guide] Did you pick up one of these Sant Ocean Hall family guides? Yes No *If No, skip to Q3*

1a. If Yes, where did you get it?

1b. If Yes, how did you find out about it?

2. How did having this guide enhance your visit to the hall?

SKIP TO Q4

3. What would you say is the purpose of the guide? *[Probe: Why did they make it?]*

4. In general, how do you think the guide enhances the experience for families?

5. What do you like about the guide?

6. What new things do you think people learn or think about differently after using the guide?

7. How do you think the guide could be improved?

8. [Point out Ocean Friend Challenge] Do you think you would be likely to do any of the activities in the Ocean Friend Challenge? Yes No

8a. If Yes, Which ones do you think you'd do?

NOW JUST TWO QUICK QUESTIONS ABOUT YOU AND YOUR GROUP.

9. Please indicate the ages of the people in your group:

0-6 years old	_____	people	☐ None	Which grade(s) are they in: _____
7-12 years old	_____	people	☐ None	Which grade(s) are they in: _____
13-17 years old	_____	people	☐ None	
Over 18 years old	_____	people	☐ None	

10. Is this your first time to Ocean Hall? Yes No

11. Here is a guide. If you could use it and let us know how it works that would be great. [Hand paper]

Thank you very much for your time.

12. Gender: # of males ____
# of females ____