Salmon Sidewalk Summative Evaluation Report

Prepared for

OMSI™
Everyday Encounters with Science

by

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Executive Summary

A summative evaluation was conducted on OMSI's new outdoor exhibit, *Salmon Sidewalk*. *Salmon Sidewalk* was funded by the National Oceanic and Atmospheric Administration (NOAA). This exhibit is one way that OMSI aims to reach beyond museum walls to help the public better understand local environmental issues and their role in them. Through a sidewalk and kiosk display, the exhibit is intended to communicate primary and secondary messages to impact public understanding about salmon. Primarily, the exhibit aims to communicate that the salmon life cycle is interesting and dynamic. Secondarily, the exhibit aims to communicate that human behaviors impact the salmon life cycle, and present salmon as a local issue.

Evaluation efforts aimed to:

- Identify the features of the exhibit that attracted people and whether these were enough to sustain visitor attention
- Determine whether people grasped the primary and secondary messages communicated in the exhibit
- Assess whether people learned new information pertaining to the primary and secondary messages the exhibit aimed to communicate
- Assess whether people grasped the connection between the two elements of the exhibit

In order to assess these research questions, three data collectors tracked family groups containing children over the age of six as they interacted with the exhibit. Following this, the data collectors conducted exit interviews with the families to gain insight into their general impressions and thoughts about the exhibit. A total of 31 family groups were tracked and interviewed in this study.

A majority of the interviewed family participants were able to understand the main idea of the exhibit and were able to grasp the primary and secondary messages that the exhibit aimed to communicate. However, while the colors, brightness, and lights of the sidewalk attracted people to the exhibit, the kiosk generally failed to attract people. Because people were unable to see and interact with the kiosk component of the exhibit they were not able

to fully understand the detailed content contained within the exhibit. Further, they were unable to grasp the connection between the sidewalk and the kiosk as a result of not being aware of the kiosk. Of those participants who did see and interact with the kiosk and sidewalk exhibit components, most were able to grasp the connection, learn new information, and grasp the primary and secondary messages of the exhibit overall.

These findings indicate that the exhibit does a good job of communicating the overarching messages and information it aims to communicate. However, changing the location of the kiosk or providing more signage orienting people from OMSI and the esplanade toward the kiosk may be a fruitful way to increase exhibit visitor engagement and understanding of the more detailed content and information included in the exhibit.

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INTRODUCTION

An important mission of the Oregon Museum of Science and Industry (OMSI) is to extend its reach beyond museum walls and motivate the public to better understand local environmental issues and their role in impacting the environment. OMSI's strategic initiatives explicitly name Energy and the Environment (E&E) as an area where education and information are needed in order to motivate local citizens to act in a more environmentally responsible way. *Salmon Sidewalk*, OMSI's new outdoor exhibit highlighting the life cycle of local salmon, is one of the many ways the museum aims to advance public environmental education.

In partnership with the National Oceanic and Atmospheric Administration (NOAA), OMSI has developed this exhibit with the intent of teaching and inspiring outside citizens as well as museum visitors to learn about one aspect of the local wildlife and how their own behaviors and actions may impact this aspect. This effort consisted of making use of a readily available space (i.e., a rounded sidewalk directly outside the museum) to deliver a content-rich environmental message. The exhibit consists of a circular sidewalk display showing the life cycle of salmon, with a kiosk element that describes the life cycle in more detail and allows exhibit visitors to explore how their own actions might impact the salmon in various stages of their life cycle. Further, the sidewalk is wired with LED lights that blink rapidly as an initial attractor and change depending on which buttons are pushed on the kiosk. These buttons allow exhibit visitors to see each individual life cycle stage light up and to explore whether certain actions help (indicated by blue lights) or hurt (indicated by yellow lights) the salmon and where in the life cycle these actions have the most impact. The exhibit aims to communicate both primary and secondary messages. Primary messages include the "big picture" idea of the interesting and dynamic characteristics of the salmon life cycle. Secondary messages include the more detailed content included in the exhibit; for instance, the information pertaining to human impact on the life cycle. Please see Appendix C for a photographic representation of the current exhibit.

Summative evaluation was conducted on the exhibit for two and a half weeks between August 8, 2012, and August 24, 2012. Evaluation efforts were specifically targeted toward families containing children over the age of 6, as this was the target audience of the exhibit. Three data collectors tracked these families as they interacted with the exhibit, after which they conducted short exit interviews to get a sense of people's impressions and thoughts regarding the look and content of the exhibit.

Summative evaluation efforts were designed to assess the following key research questions:

- What are some of the features of the exhibit that initially attract visitors, and are they sufficient to sustain visitors' interest?
- Do people grasp the primary and secondary messages that the exhibit aims to promote (for instance, that the exhibit represents a local issue, or that their own behaviors impact salmon)?
- After interacting with the exhibit, did people learn new information pertaining to those primary and secondary messages?
- Do people grasp the connection between the kiosk and the sidewalk as they move through the exhibit? Do they grasp the meaning of the lights?

Study instruments (tracking sheets and interview scripts) and methods were developed with these research questions in mind. Please see Appendices A and B for copies of each of the study instruments.

METHODS

Three staff members from OMSI's Evaluation & Visitor Studies division conducted this study. One lead data collector created and developed study instruments with input from the project team. The lead also developed the evaluation study methods in conjunction with the project team and the Evaluation division manager. The exhibit was officially opened to the public on Monday, August 6, 2012; data collector training and pilot testing took place on Tuesday, August 7, and data collection officially began on Wednesday, August 8.

The lead data collector designed the evaluation study to encompass timing and tracking elements as well as exhibit visitor interviews. Because the target demographic for evaluation efforts consisted of families with at least one child estimated by the research team to be over the age of 6, it was determined that families fitting this description would be timed and tracked in terms of their interaction with the exhibit. After the family appeared to be finished interacting with the exhibit, they would be approached for a post-use interview. Data collectors were instructed to select one family member, at will, to approach for a post-use interview. If the approached family member declined to be interviewed at that point, the family unit would not be included in the overall analysis, as their lack of consent to be interviewed would be taken as lack of consent to participate in the evaluation study. Thus, each family unit would have two instruments containing their data: a timing and tracking sheet, in which data collectors would record their interaction with the exhibit, and a post-use interview, in which participating family groups would be able to share their thoughts and impressions.

Data collection, which lasted for two and a half weeks, began on Wednesday, August 8, and concluded on Friday, August 24. Signs were placed near the exhibit indicating to museum visitors that evaluation data collection was taking place. The three data collectors alternated days, spending as many mornings and afternoons outside at the exhibit as their schedules allowed during that time period (up to 6 hours per week). Due to low response rates, data collectors also came in on weekends whenever possible. Data were collected over a total of 10 days during the two and a half weeks for a total of 31 complete tracking

and interview sets. Please see Table 1 below for an account of how many interviews were obtained on each day of data collection.

Table 1. Data collection dates

Date	Day of Week	No. Interviews
8.8.12	W	2
8.10.12	F	2
8.12.12	Su	3
8.13.12	M	3
8.16.12	Th	4
8.18.12	Sa	4
8.19.12	Su	6
8.21.12	Tu	4
8.22.12	W	1
8.24.12	F	2
Total		**31**

Tracking and interview data were analyzed during the week of August 27. Descriptive statistics, such as means and percentages, were used to analyze timing and tracking data. Qualitative interview responses were coded by a trained data analyst; a second data analyst reviewed the coding system prior to the conducting of any interview analyses. These codes were then applied to the interview data and examined in terms of frequency of responses.

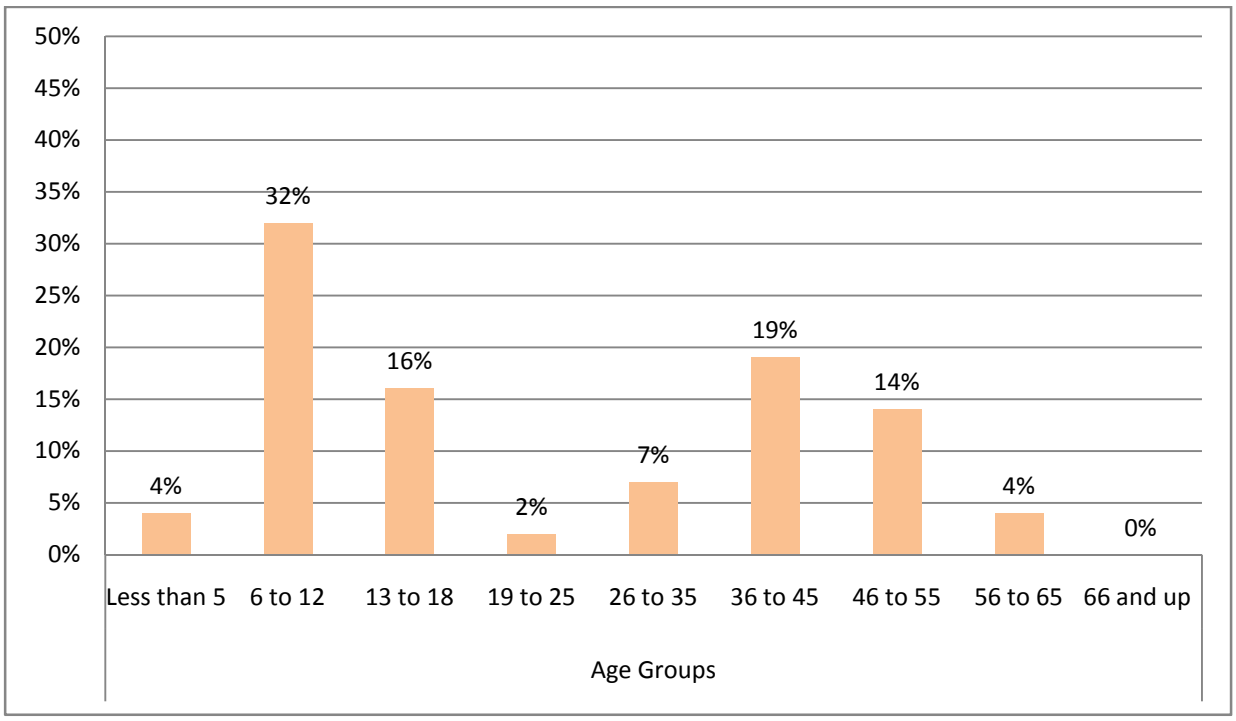
STUDY PARTICIPANT DEMOGRAPHICS

Family groups fitting into the target demographic (i.e., families with at least one child appearing to be over the age of 6) were timed and tracked by the data collectors (please see further details of this process in the section below). The unit of analysis for the timing and tracking was the entire family, such that when one family member interacted with some aspect of the exhibit, the entire family was considered to have interacted with that aspect of the exhibit. When they appeared to be finished interacting with the exhibit (i.e., when the last family member left the exhibit), the data collectors approached the family unit for a post-use interview. The unit of analysis for the interviews was the individual, such that one family member was selected at will by the respective data collector to participate in the interview. Families that did not consent to be interviewed were removed from the analysis entirely, as their lack of consent to be interviewed was taken as a lack of consent to participate in the study. Reasons for not wanting to participate included being in a hurry (many families were on their way to other activities such as the submarine tour) and being too hot.

At the end of the data collection period, a total of 31 families in the target demographic had been tracked through the exhibit and interviewed after their interaction with the exhibit. The 31 families interviewed contained a total of 113 people. Of these, 47% (53) were males and 53% (60) were females. Family sizes ranged from 2 to 7 people.

Data collectors were instructed to estimate participant age. Based on these estimates, many age groups were represented in the sample. The most common age group throughout members of the 31 family units was 6–12 (32%, 36), followed by the 36–45 age group (19%, 21). Other represented age groups included family members 13–18 (16%, 18), 46–55 (14%, 16), and 26–35 (7%, 8). Considerably fewer participants fell into the 56–65 range (N = 5, 4%), the less than 5 range (N = 5, 4%), and the 19 to 25 range (N = 2, 2%). There were no participants over the age of 66. Figure 1 below shows a comparison of age groups and the frequency of their representation in the study.

Figure 1: Comparison of age groups represented in study sample



TIMING AND TRACKING

Participating families were timed and tracked as they interacted with the various elements of the exhibit. As previously mentioned, data collectors treated family groups as one unit, starting at the time when one family member began interacting with the exhibit and stopping at the time when the last family member left the exhibit. They were also asked to indicate whether the family unit had come to the exhibit from inside OMSI or from the esplanade. Of the 31 participating families, 63% (19) entered the exhibit from OMSI, while 37% (11) entered the exhibit from the esplanade. One family unit was not marked in terms of their entrance point into the exhibit so they were not included in the entrance point analysis.

Timing and tracking analyses revealed that participating families spent an average of 2 minutes and 22 seconds (*SD* = 1:15) interacting with the various elements of the exhibit. The recorded times ranged from 0 minutes and 39 seconds to 4 minutes and 12 seconds. The largest portion of the participants (N = 10, 34%) spent between 1 and 2 minutes with the exhibit. Entrance and exit times were not recorded for two participating families and thus they were not included in the exhibit timing analysis.

Data collectors also checked off various activities indicating exhibit interactions that were decided upon by the project team prior to evaluation data collection. When any of the family members interacted with the exhibit in any of the predetermined ways, that particular activity was considered "checked"; as such, the number of *times* the behaviors were performed was not recorded, but the *presence or absence* of the behaviors by the family unit was recorded. The behaviors indicating exhibit interaction were grouped according to interaction with the kiosk element, interaction with the sidewalk element, and interaction with the exhibit lights. Specifically, data collectors noted whether anyone in the family unit interacted with the kiosk by appearing to look at the content, discuss the content with others, read the content in more depth, or push the kiosk buttons. It was also noted whether anyone in the family unit interacted with the sidewalk by appearing to look at the content, discuss the content with others, or read the content in more depth. Finally, it was noted whether anyone in the family unit appeared to notice the exhibit lights, notice

the connection between the sidewalk lights and the kiosk lights, or visibly notice the connection between the content on the kiosk, the kiosk lights, and the sidewalk lights. These particular behaviors were chosen because they represent the behaviors identified by the Philadelphia-Camden Informal Science Education Collaborative (1998), in which initial interaction, discussion with others about the exhibit, and reading about the exhibit correspond with deeper levels of learning.

These behaviors were marked as completed or not completed based on the perceptions of the data collectors; if the data collectors observed what they determined to be one of the above behaviors, those behaviors were considered "checked" for a tracked family unit. Using this method, frequencies of each behavior as performed by the participating families were calculated across the tracked family units. These frequencies can be seen in Table 2 below. Please see the timing and tracking instrument used in data collection in Appendix A.

Table 2. Engagement activities performed by study participants

Kiosk				Sidewalk			Lights		
Looked	Discussed	Read	Interacted	Looked	Discussed	Read	Noticed	Noticed connections between lights	Noticed connections between content
52%	19%	35%	35%	97%	35%	77%	58%	19%	10%
									n = 31

Note: Family units generally engaged in more than one behavior; the frequencies do not add up to 100%

Among all 31 families tracked through the exhibit, the most popular activity was looking at the sidewalk content, with 97% (N = 30) of the families engaging in this behavior. The second most popular activity among this sample was reading the sidewalk content in more depth (N = 24, 77%), followed by noticing the exhibit lights (N = 18, 58%) and looking at the kiosk content (N = 16, 52%). Participants also read kiosk content (N = 11, 35%), pushed the kiosk buttons (N = 11, 35%), and discussed sidewalk content with one another (N = 11, 35%). Considerably fewer participating families discussed the kiosk content (N = 6, 19%) and noticed the connection between the sidewalk and kiosk lights (N = 6, 19%). The fewest number of participating families visibly noticed the connection

between the kiosk content and lights and the sidewalk lights (N = 3, 10%). However, these results may be at least partially due to the subjective nature of the data collection; it may have been more difficult for data collectors to visibly ascertain whether content connection was achieved by the family participants. However, based on the available analyses it appears that interactions and activities centered around the sidewalk element of the exhibit were the most commonly performed by the participating families.

INTERVIEWS

In order to get a more complete picture of participant thoughts, cognitions, and impressions as they interacted with the exhibit, timed and tracked families were approached for post-use interviews once they appeared finished with their exhibit visit. As previously mentioned, the unit of analysis for the interviews was the individual, such that one family member in each of the tracked families was targeted, at will, at the discretion of the respective data collector. It was common for multiple family members to speak during the interview. When this happened, data collectors made a note of who was speaking and when. The resulting interviewee pool contained males and females ranging in age from 10 to 60 years old. The average age of the interviewed participants was 38.6 years old (*SD* = 15.6 years). Of the interviewed participants 52% were female; the other 48% were male. The interviews were relatively short (five minutes or less in length) and thus no incentives were offered for participation. Please see a copy of the post-use interview instrument in Appendix B.

INITIAL ATTRACTORS

After being timed and tracked through the exhibit, members of participating family units were approached and first asked to describe some of the elements that initially drew them to the exhibit. Participants were asked whether they had seen both elements of the exhibit and what it was that made them want to look at each initially. Reponses were categorized by whether the participant indicated their attraction to the exhibit as a whole, to the sidewalk element exclusively, or to the kiosk element exclusively.

When participants indicated that they were attracted to the exhibit as a whole, their responses were further categorized as follows: having history with the exhibit (having seen it being built, having heard about it, etc.), being on their way to somewhere else (e.g., the submarine tour), the outdoor location of the exhibit, and "other." Participants were most attracted to the exhibit in general because of their history with it (N = 5, 16%), because they were on their way to somewhere or something else (leaving the museum, going to see the submarine, etc.; N = 3, 10%), and because of the exhibit's outdoor placement (N = 1,

3%). Many responses fell into the category of "other" (N = 5, 16%). "Other" category responses included their kids wanting to look at the exhibit, enjoying looking at OMSI exhibits in general, and that the salmon themselves were an attractor.

When participants indicated that they were attracted to the sidewalk in particular, their responses were further categorized as follows: it looked like a learning opportunity, the general look of the exhibit (e.g., colors, layout, presentation, etc.), the exhibit lights, the fact that it was new or different, wanting to see more after seeing the kiosk, "other," and did not see sidewalk/don't know. Participants were most attracted to the sidewalk element of the exhibit because of the general look (brightness, colors, attractiveness, layout; N = 9, 29%) and because of the lights (N = 6, 19%). Participants were also attracted to the sidewalk because they wanted to see more after having seen the kiosk (N = 4, 15%), because it looked like a learning opportunity (N = 3, 10%), and because it was new and different (N = 3, 10%). Six percent of participants (N = 2) gave responses that fell into the category of "other." "Other" responses included being attracted to the sidewalk because their kids wanted to see it. None of the participants indicated that they had not seen the sidewalk or didn't know why they were attracted to it.

When participants indicated that they were attracted to the kiosk in particular, their responses were further categorized as follows: it was visible from the museum, it looked like a learning opportunity, the interactive buttons, wanting to see more after having seen the sidewalk, "other," and did not see kiosk/don't know. A majority of participants did not see the kiosk (N = 18, 58%). This is a stark contrast to the sidewalk, which all of the participants had seen. Participants who did see the kiosk reported being attracted to the kiosk element of the exhibit because it looked like a learning opportunity (N = 3, 10%), because they wanted to see more after having seen the sidewalk (N = 2, 6%), because they saw it from the museum (N = 1, 3%), and because of the interactive buttons (N = 1, 3%). Several participant responses fell into the category of "other" (N = 4, 13%). "Other" responses included such things as visiting the kiosk because the respondents' children wanted to see it or just wanting to see what it was. Table 3 below shows response frequencies for each of the attractor elements pertaining to the overall exhibit, the sidewalk, and the kiosk.

Table 3. Initial attractors

General	**History with exhibit**	16%
	En route to somewhere	10%
	Outdoor placement	3%
	Other	5%
Sidewalk	**Learning opportunity**	10%
	General look of exhibit	29%
	Lights	19%
	New/Different	10%
	Wanted to see after kiosk	13%
	Other	6%
	Did not see/Don't know	0%
Kiosk	**Saw from museum**	3%
	Learning opportunity	10%
	Interactive buttons	3%
	Wanted to see after sidewalk	6%
	Other	13%
n = 31	**Did not see/Don't know**	58%

Note: Family units generally indicated more than one attractor; the frequencies do not add up to 100%

PERCEPTIONS OF THE CONNECTION BETWEEN ELEMENTS

Although family participants were tracked as they interacted with the exhibit, they were also explicitly asked to indicate whether they had noticed the connection between the buttons and lights on the kiosk and the content and lights on the sidewalk. Of the 31 family participants, 61% (N = 19) had not interacted with the kiosk and thus could not answer questions about the connection between the exhibit elements (please note, while 58% of the families indicated not seeing the kiosk when asked about exhibit attractors, one family unit had seen the kiosk but had not been able to interact with it due to other museum visitors using the kiosk).

Of the people who did interact with both elements of the exhibit (N = 12, 39%), 67% of them (N = 8) did notice the connection between the two, while 33% of them (N = 4) failed to notice the connection. Reasons given for the failure included the sun being too bright to clearly see the sidewalk lights, the poor viewing angle of the sidewalk from the kiosk, and the confusing nature of the order of the exhibit lights.

Because the current placement of the kiosk faces OMSI, it is possible that participants coming in from the esplanade did not have a chance to see the kiosk and thus were unable to interact with both elements of the exhibit. However, further analyses revealed that only 42% (N = 8) of the people who did not interact with the kiosk came from the esplanade, indicating that the OMSI-focused kiosk placement is not entirely at fault for the lack of participant kiosk engagement.

PERCEPTIONS OF THE EXHIBIT'S MAIN MESSAGE

All participants were asked to recount what they would tell someone the exhibit was about, in their own words. Because the exhibit was primarily intended to communicate the interesting and dynamic nature of the salmon life cycle, participant responses reflecting at least partial understanding of this message were considered "correct."

Participant responses were categorized as follows: the salmon life cycle, salmon/fish in general, salmon behaviors and habits (for instance, food preferences), salmon habitat

(where they live), salmon needs, salmon migration, our own impact on the salmon, and "other." The frequency of their responses can be seen in Table 4 below.

Table 4. Participant understanding of exhibit main message

Salmon Life Cycle	Salmon/Fish	Salmon Behaviors	Salmon Habitat	Salmon Needs	Salmon Migration	Our (Human) Impact	Other
35%	32%	6%	6%	10%	13%	13%	13%
							n = 31

Note: Family units sometimes indicated more than one main message; the frequencies do not add up to 100%

The most common response given was that the exhibit's main message revolved around the salmon life cycle (N = 11, 35%). The second most common response was that the exhibit was about salmon or fish in general (N = 10, 32%). Salmon migration and our (human) impact on salmon were the third most common responses (Ns = 4, 13%).

Participants also indicated that the exhibit was about salmon needs (N = 3, 10%), salmon habits and behaviors (N = 2, 6%), and salmon habitat (N = 2%).

Several participants gave responses that fell into the "other" category (N = 4, 13%). "Other" category responses included "salmon repopulation," "salmon predators," "river awareness," and only one completely unrelated response, "the submarine." Thus, 97% of the participants (N = 30) correctly identified that the main topic of the exhibit was some aspect of salmon life.

NEW INFORMATION ATTAINED FROM INTERACTION WITH THE EXHIBIT

Participants were asked what information they had learned or gained after interacting with some or all elements of the exhibit. Their responses were categorized as follows: technical terms, salmon needs, salmon habits and behaviors, and our own impact on the salmon. The frequency of their responses can be seen in Table 5 below.

Table 5. New information attained from exhibit

Technical Terms	Salmon Needs	Salmon Behaviors	We Impact Salmon	Nothing Learned/ Don't Know
3%	19%	13%	6%	65%
				n = 31

Note: Family units sometimes indicated more than one thing learned; the frequencies do not add up to 100%

The most common response indicated that participants had learned about specific things that salmon need during their migratory journey (N = 6, 19%), followed by responses indicating that participants had learned about salmon behaviors and habits (for instance, their food choices; N = 4, 13%). Considerably fewer participants indicated that they had learned about how their own behaviors impact salmon (N = 2, 6%), or that they had learned technical terms such as "parr" (N = 1, 3%).

A majority of respondents indicated that they did not know what they had learned or that they had learned nothing at all (N = 20, 65%). However, some of these respondents remained positive about the experience, stating "I am a teacher, so I already knew these things," "My father is a fish biologist," and "I learned more about what I already knew." As such, while the learning of new information did not occur for these individuals, reinforcement of previously learned material did occur.

Some respondents had not had a chance to interact with the entire exhibit (see Timing and Tracking results above) and thus may have missed seeing some of the exhibit content that may have promoted learning of new information. Because of this, further analyses were conducted to determine whether lack of learning could be attributed to participants' failure to interact with both elements of the exhibit. Participants in each category (those who had interacted with both the sidewalk and kiosk elements and those who had not) reported not having learned from the exhibit, but participants who had not interacted with both exhibit elements were more likely to give this response. Of the participants who reported not learning anything or not being able to articulate what they'd learned (N = 20,

65%), 70% (N = 14) had not interacted with both the sidewalk and kiosk elements of the exhibit. Of the participants who were able to articulate something they had learned, only 36% (N = 4) had not interacted with both the sidewalk and kiosk elements of the exhibit. These analyses suggest that interacting with both components of the exhibit tended to promote learning of new information among the interviewed participants, but that this type of extended interaction was not always necessary.

MOST MEMORABLE ASPECTS OF THE EXHIBIT

Participants were asked to indicate what they would be most likely to remember about the exhibit. Their responses were categorized as follows: the general look of the exhibit (the colors, the layout, etc.), the details of the exhibit (particular pictures or features), the lights, the content learned, and "other." The frequency of their responses can be seen in Table 6 below.

Table 6. Most memorable exhibit features

General Look	Details	Lights	Content Learned	Other	Not Memorable/ Don't Know
42%	6%	35%	6%	16%	13%
					n = 31

Note: Family units sometimes indicated more than one memorable thing; the frequencies do not add up to 100%

The most common response was the general look of the exhibit, comprising such features as the colors, the circular layout, and the attractiveness of the exhibit (N = 13, 42%). The second most commonly listed memorable feature named was the lights (N = 11, 35%), followed by the category of "other" (comprising comments such as "I'll remember that it was confusing," "I'll remember the dynamic nature of the exhibit," and "I'll remember you asking me about it," N = 5, 16%). A total of 4 participants (13%) responded that they did not know what they would remember about the exhibit.

RATINGS OF EXHIBIT'S COMMUNICATION OF KEY MESSAGES

Participants were asked to quantitatively indicate how clearly the exhibit communicated four key messages that were decided on by the project team prior to data collection. The messages were as follows: "The salmon life cycle is interesting and complex," "There are some key things that salmon need to survive their journey," Our own behaviors impact the salmon's journey," and "This exhibit represents a local issue."

Participants were read each of these messages and were asked to indicate how clearly the exhibit communicated them on a scale of one to five. The scale anchors were briefly explained to each participant:

- 1: poor communication (i.e., "I did not get this impression at all from the exhibit").
- 2: fairly poor communication (i.e., "This message was present but not very clear").
- 3: neutral communication (i.e., "The exhibit didn't do poorly or well at communicating this message").
- 4: good communication (i.e., "The message was present and relatively clear").
- 5: excellent communication (i.e., "This message was completely clear and obvious from the exhibit").
- Participants were also encouraged to say "I don't know" if they had not interacted enough with the exhibit to get a sense of how well any of the messages were communicated.

The message regarding the complexity of the salmon life cycle received the lowest average rating, $M = 3.9$, $SD = 1.06$. Scores for this message ranged from 1 to 5. The most common rating given to this message was a 4. One participant responded "I don't know," indicating that they had not seen anything suggesting the complexity of the salmon life cycle while interacting with the exhibit.

The message regarding the salmons' needs for their journey received an average score of 4.1, $SD = 1.03$. Scores for this message ranged from 1 to 5. The most common rating given

to this message was a 5. One participant responded "I don't know," indicating that they had not seen anything suggesting the salmons' need for key things in order to survive while interacting with the exhibit.

The message regarding our impact on the salmon received an average score of 3.98, *SD* = 1.14. Scores for this message ranged from 1 to 5. The most common rating given to this message was a 5. Five participants responded "I don't know," indicating that they had not seen anything suggesting the impact of human behavior on salmon while interacting with the exhibit, which likely came from their lack of interaction with the kiosk (this information was largely contained in the kiosk element of the exhibit).

The message regarding the exhibit's representation of a local issue received the highest average ranking, *M* = 4.21, *SD* = 1.07. Scores for this message ranged from 1 to 5. The most common rating given to this message was a 5. Three participants responded "I don't know," indicating that they had not seen anything suggesting the representation of a local issue while interacting with the exhibit.

The means, standard deviations, and ranges of the scores for all four messages can be seen in Table 7 below.

Table 7. Main message communication ratings

	Average Rating	Std. Dev.	Lowest Rating	Highest Rating	# Don't Know
This exhibit represents a local issue	4.21	1.07	1	5	3
There are key things the salmon need to survive their journey	4.10	1.03	1	5	1
Our own behaviors impact the salmons' journey	3.98	1.14	1	5	5
The salmon life cycle is interesting and complex	3.90	1.06	1	5	1
					n = 31

BEST LIKED ATTRIBUTES OF THE EXHIBIT

Participants were asked to indicate what they liked the most about the exhibit after interacting with it. Their responses were categorized as follows: the general look of the exhibit, detailed aspects of the exhibit, the lights, the circular display, the interactive nature of the exhibit, the kiosk, qualities of the information presented, and "other." The frequency of their responses can be seen in Table 8 below.

Table 8. Best liked exhibit features

General Look	Details	Lights	Circular Display	Interactive Nature	Kiosk	Info	Other
32%	13%	32%	10%	19%	3%	3%	19%
							n = 31

Note: Interviewees sometimes indicated more than one best liked feature; the frequencies do not add up to 100%

The general look of the exhibit (colors, display, etc.) and the lights were the most frequently cited exhibit features (Ns for each = 10, 32%). The second most commonly mentioned exhibit attribute was the interactive nature of the exhibit (being able to push the buttons, being able to walk around and learn, etc.; N = 6, 19%). Participants also tended to like some of the finer details of the exhibit, such as specific images (N = 4, 13%), the circular design of the exhibit used to represent a cycle (N = 3, 10%), the kiosk (N = 1, 3%), and qualities of the information presented (e.g., that it is easy to read and appropriate for all ages; N = 1, 3%). Many participants indicated liking exhibit attributes that fell into the "other" category (N = 6, 19%). "Other" category responses included liking the entire exhibit ("everything!") and the fact that the exhibit was about salmon.

FEATURES INDICATED AS NEEDING IMPROVEMENT

Participants were asked what aspects of the exhibit they would change if given the chance. These responses were categorized as follows: adding an additional attractor on the esplanade side, the location of the kiosk, enhancing clarity regarding the connection between the exhibit elements, greater use of all the available space, enhancing clarity

regarding some of the important messages, and "other." The frequency of participant responses can be seen in Table 9 below.

Table 9. Features participants would change

Adding Esp. Attractor	Kiosk Location	Enhancing Connection	Better Using Space	Enhancing Messages	Other
13%	13%	13%	10%	6%	26%
					n = 31

Note: Interviewees sometimes indicated more than one feature they would change; the frequencies do not add up to 100%

Numerous respondents indicated that they would prefer an added attractor, particularly on the esplanade side (N = 4, 13%), a changing of the placement of the kiosk (N = 4, 13%), and a clearer and more explicit connection between the kiosk and the sidewalk (N = 4, 13%). Participants also tended to dislike the fact that the complete space was not used (several participants especially indicated the middle lawn as a place that some feature may be added; N = 3, 10%) and the lack of clarity in the exhibit's important messages (for instance, the idea that the exhibit represents a local issue; N = 2, 6%).

Many participants cited exhibit features that fell into the "other" category (N = 8, 26%). This category contained many detailed critiques, including the fact that the exhibit fails to keep kids' attention, that it needs more signs orienting people to the layout and sequence, and that there needs to be some sort of awning for shade in order for the lights to be more clear. Other responses in this category indicated that some participants "didn't like that it was on the ground" and that they "wish it was more interactive; it would be cool to be able to interact with the sidewalk by walking on it."

OTHER FEEDBACK AND SUGGESTIONS

Data collectors noted any positive or negative feedback they received regarding the exhibit. At times, this feedback came from study participants, spoken at various points throughout the post-use interview. At other times, this feedback came unsolicited from members of the general public (OMSI visitors not in the target demographic and esplanade

passersby) as a result of seeing the evaluation signage near the exhibit. In both cases data collectors recorded their best guess on the age and gender of who was speaking and what was said.

INTERVIEWS. Of the people interviewed, several said positive things about various aspects of the exhibit. One woman (approximately 40 years old) remarked, "This is a great use of the space and a really great and different way of showing information." A man (approximately 40 years old) said, "My son thought it was very interesting." Another man (approximately 35 years old) simply said, "It's beautiful" and remarked that he would like to come back at night to see the lights.

The most common negative feedback given during the interviews was the lack of clarity or orientation about how to view the exhibit. While the kiosk provided some orientation to the start and finish of the salmon life cycle, many people did not see the kiosk and thus did not understand how the exhibit was organized. Suggestions along this line focused on adding more attractors or signs around the exhibit, clarifying the role of the kiosk and the nature of the exhibit in general. One woman (approximately 40 years old) remarked, "It just needs something *more* to draw people in, maybe a second kiosk or some attractor somewhere… to make people realize there's more to it than just the sidewalk." Another woman (approximately 55 years old) commented, "You need more signs inside OMSI telling people that this is out here." One man (approximately 40 years old) coming from the esplanade said, "I didn't notice the kiosk. You need something on the other side for people from the esplanade to orient them to what this is. I didn't really know what it was about." Other comments along this line included "You should have something more in the center to attract attention from the esplanade" (female, approximate age 45) and "You should have a sign orienting people to the kiosk if that's what explains [the exhibit]" (male, approximate age 38).

Possibly as an extension of not knowing where to start with the exhibit, study participants experienced some confusion with the kiosk-sidewalk connection. One man (approximate age 45) remarked, "The kiosk should say something more explicit about the connection—you can't really clearly see the sidewalk lights from the kiosk." One boy

(approximate age 12) commented, "You need shade so we can see the lights better… it was confusing how the buttons connected because I couldn't see."

A final theme in the interview suggestions centered on the exhibit content. One woman (approximate age 35) remarked, "There is a lack of inclusion of information about how dams impact salmon survival… it's not obvious that this is a local issue literally right in front of our faces, so this needs more explicit mention." One man (approximate age 35) commented, "[There should be] more emphasis on the local issue and how we affect it." Another man (approximate age 38) suggested that we "…complete the circle, add more stones, and describe more about the complexities."

UNSOLICTED FEEDBACK. As previously mentioned, upon seeing the evaluation signage near the exhibit several members of the public approached data collectors with their thoughts and ideas. One man over the age of 66 commented, "This is such a great use of the space. You didn't lose any functionality in terms of the sidewalk… I think it's great that it's a circle meant to show a cycle." Another man (approximately 40 years old) said, "This is so cool… I'd like to come back and bring my kids." A woman with two children under the age of 4 (approximately 30 years old) said "[My kids] liked the flashing lights; they were pretending to be salmon and swimming in the ocean. It's awesome… really great." One man (approximate age 50) simply said, "I liked this new exhibit."

Unsolicited negative feedback or suggestions for improvement mirrored those mentioned during the interviews. One man (over 66 years old) suggested, "It might be a good idea to have a secondary thing other than the kiosk that shows where the cycle starts. Some sort of attractor on the other side… some additional explanatory information on the esplanade side would help. Something that emphasizes the simplicity of the exhibit; this requires very little time investment but in just a few minutes you can learn a whole bunch about salmon." He offered one idea, which was to add a sign containing a vertical representation of the sidewalk cycle on the esplanade side. Another unsolicited suggestion came from a member of the public whose demographic information was not recorded, who simply said, "Put the kiosk in the middle so you can see the sidewalk lights better."

DISCUSSION

Summative evaluation efforts aimed to assess the exhibit attributes that most attracted visitors, whether visitors had learned as a result of their interaction with the exhibit, whether visitors grasped the connection between the exhibit elements, and whether visitors grasped the primary and secondary messages promoted by the exhibit. The 31 families tracked and interviewed in the current evaluation study afforded some insight into the answers for these research questions.

What are the main exhibit attractors? Do they sustain visitors' interest?

Analyses suggested that participants were predominately drawn to the exhibit because of the general look of the exhibit (the brightness, the layout) and because of the twinkling lights. Participants also noticed the exhibit because of their own history with the exhibit (for instance, having seen the building process) and because it was something new and different near the museum. Asking participants what they would be most likely to remember about the exhibit afforded some insight into the lasting power of the attractors. These analyses suggested that the general look of the exhibit (brightness, colors, layout) and the twinkling lights were the most likely to be remembered. Thus, the immediately visible elements of the exhibit (the look of the sidewalk and the lights) appear to be the strongest attractors, and they have a moderate ability to hold visitors' interest long enough for them to adequately engage with the exhibit. Further, these elements (color, brightness, layout, lights) were noted as being the most commonly liked features of the exhibit. Based on study participant analyses, it seems that the brightness, colors, and lights of the exhibit played a big part in getting people to initially engage.

One notable finding that came out of these analyses was that these attractors largely pertained to the sidewalk elements. The brightness and lights of the sidewalk were so attractive that people often did not realize a kiosk was included in the exhibit. While none of the study participants reported not seeing or missing the sidewalk, 58% of the study participants had not seen the exhibit kiosk. These points are supported by study participant interview responses, which showed that the elements of the exhibit most likely

to be identified as being in need of change were the lack of an attractor on the esplanade side and the current location of the kiosk. However, the lack of visibility of the kiosk cannot fully be explained by the OMSI-centric location of the kiosk; only 42% (N = 8) of the study participants who had not been able to interact with the kiosk (and only 39% (N = 7) of people who had not seen the kiosk at all) came into the exhibit from the esplanade side.

Did people grasp the primary and secondary messages communicated by the exhibit?

When asked to describe what the exhibit was about in their own words, many study participants correctly cited that it was about "the salmon life cycle." A majority of participants cited other elements that appeared in the exhibit (for instance, salmon migration, our impact on local salmon, etc.), and these were also correct in describing the overarching topic of the exhibit. Based on this analysis, it seems that most of the study participants (97%) grasped what the exhibit was primarily about.

Study participants were further asked to rate the exhibit's clarity in communicating four major messages which represented important secondary lessons inherent in the exhibit. Given the aggregated ratings associated with each message, these messages were generally well communicated. The lowest average scores were given to the message promoting the complexity of the salmon life cycle and the message promoting the idea that our own behaviors influence the salmon. This may have been an artifact of people not fully understanding the sequence of the exhibit or not interacting with the kiosk which contained much of this information. The message promoting the idea that this exhibit represents a local issue received the highest rating, indicating that despite participant complaints that this message was not explicit enough, people generally understood that the salmon were the focus of the exhibit because they are an integral part of the local wildlife. One thing to note, however, is that ratings for all four messages ranged from 1 (the lowest score indicating very poor communication) to 5 (the highest score indicating excellent communication). This indicates that some small sample of the study participants did not feel that the messages were communicated by the exhibit at all. While this may be an indication that those participants did not interact with the entire exhibit and thus were not able to see where these messages were promoted, future researchers may want to delve

into the reasons these people did not perceive these four messages as being present in the exhibit elements.

Did people learn or attain new information pertaining to the primary and secondary messages present as a result of interacting with the exhibit?

While some participants indicated that they learned from the exhibit content (technical terms, salmon needs, salmon behaviors and habits, and finding out ways our own behaviors impact the salmon were among the top categories cited as new information for the study participants), a majority of the participants indicated that they had not learned anything new, or that they had learned but couldn't remember or articulate what they had learned. Many of the interview respondents were adults and thus the data collectors could not account for whether their children had learned anything from the exhibit. Further, the pool of interview respondents contained people from various occupations (teachers, biologists, etc.) that allowed them to already be well informed about the salmon life cycle. It is possible that in the Pacific Northwest, salmon are such a prominent part of the local wildlife that their life cycle is frequently taught in schools and thus this exhibit only reiterated what is already generally known by the public. Study participants remained optimistic about the exhibit content, with one man stating, "I learned more about what I already knew." As such, even when the learning of *new* information was not possible, the *reinforcement* of existing knowledge regarding the salmon life cycle did occur.

Asking study participants for specific feedback and suggestions for improvement regarding the exhibit yielded some interesting insight into why it may be that more learning did not occur. Qualitative survey responses indicated that people were generally confused about the order and sequence of the exhibit, particularly when they hadn't engaged with the kiosk which contained a lot of explanatory information. It may be that a better understanding of what the exhibit represents and how it is organized may have resulted in more people interacting with the exhibit in a more systematic way. Put another way, understanding the order of the life cycle stages may have caused more people to read the plaques representing the stages in the correct order, and this may have resulted in a greater amount of content retained.

While only some participants mentioned learning from detailed portions of the exhibit content (e.g., "I didn't know baby salmon were called parr"), a majority of participants did understand the overall topic of the exhibit and did grasp the key primary and secondary messages the exhibit aimed to communicate (see, for example, above sections on participant understanding of the main idea and participant message ratings). Thus, these results suggest that while a deeper interaction with both the sidewalk and kiosk components of the exhibit may promote the learning of detailed content, interaction with any part of the exhibit promotes the understanding and comprehension of the overarching messages the exhibit aims to communicate.

Did people grasp the connection between the kiosk and the sidewalk lights?

Because of the alarmingly small number of study participants who did see and interact with the kiosk, it is difficult to say whether people were able to grasp the connection between the exhibit elements. Of those who did interact with both the kiosk and the sidewalk, a majority (67%) did see a connection between the buttons they pushed on the kiosk and the lights that displayed on the sidewalk. However, the remaining 33% were unable to see this connection even when they did engage with both components of the exhibit. People commonly cited the brightness of the sun (it was difficult to see the sidewalk lights) and the poor viewing angle from the kiosk as the primary reasons they may not have noticed the connection. To people who interacted only with the sidewalk component of the exhibit, the lights served as nothing more than a twinkling attraction, and thus they likely missed what the lights were supposed to represent.

CONCLUSIONS AND RECOMMENDATIONS

Overall, the analyses suggested that despite the lack of participant interaction with the kiosk element of the exhibit, evaluation study participants generally understood the topic of the exhibit and grasped the primary and secondary messages that OMSI and NOAA aimed to communicate with *Salmon Sidewalk.* Participants of all ages were attracted by the colors, lights, and display of the exhibit. They also tended to like the look of the sidewalk and found the lights, colors, and layout to be particularly memorable. Numerous participants and members of the general public praised the exhibit, citing it as a good use of available space and praising the circular way of showing cyclical content.

On the more detailed content side, the analyses suggested that a lack of orienting attractors and clarity regarding exhibit organization may have held some people back from truly experiencing everything that *Salmon Sidewalk* has to offer. Study participants coming from the esplanade and from OMSI generally failed to see the exhibit kiosk and thus missed a huge portion of the exhibit content and message. Participants missing this kiosk element also failed to see the connection between the exhibit components and were unclear on the organization and orientation of the exhibit overall. This confusion may have led to a lack of new information and engagement for exhibit visitors. It appears that people did not see the kiosk because of its location in relation to the rest of the exhibit and because of the lack of signs and advertising that the kiosk was there. Even when participants did see and interact with the kiosk, some had trouble grasping its connection to the sidewalk because of the poor viewing angle.

A possible recommendation that may be fairly costly would be to move the location of the kiosk. Some participants suggested it be moved to the grassy center circle, while others suggested that two kiosks might be needed at opposite sides of the display. However, some sort of marketing signs orienting people toward the kiosk in its current location may be enough to overcome this barrier. Many participants and passersby suggested that some attractor is needed from the esplanade side, as exhibit visitors entering from that end have no way of seeing the kiosk or understanding what the brightly colored display in front of them is truly about. It may be that these two efforts can be combined; a sign attracting

people from the esplanade side that also orients people toward the kiosk can potentially drive an increase in the number of people of all ages who engage with and learn from the exhibit.

As previously mentioned, adding another attractor was one of the most common study participant suggestions recorded by the data collectors. Participants cited a number of very specific ideas, ranging from a fountain or waterfall structure with metal salmon heads protruding to a vertical representation of the sidewalk diagram. One area indicated by several of the study participants that could benefit from more use was the middle grassy circle in the center of the exhibit (as mentioned above, some participants felt that was a better location for the kiosk component). Although extending the exhibit into this space may not be possible, it is notable that participants generally saw this as an empty space that could be developed. Other interview comments indicated that there are other empty spaces surrounding the exhibit that may be more possible for the project team to use. The empty brick walls of the turbine hall, for instance, may be a place for added attractors or explanatory information. Such additions could be easily viewed by both OMSI visitors and outside citizens, drawing attention to the *Salmon Sidewalk* exhibit and improving peoples' understanding and awareness of the information that a quick visit to the exhibit will provide.

Despite these suggestions, it seems that most of the participants, whether they grasped the connection between the kiosk and sidewalk elements or not, correctly identified the overall topic of the exhibit and tended to grasp the primary and secondary messages of the exhibit readily. Because this important milestone was met, it is left to the project team to decide whether or not the cost of additional attractors and signage is worth the payoff of exhibit visitors grasping the more detailed content that the kiosk and kiosk-sidewalk connection offers.

LIMITATIONS AND FUTURE DIRECTIONS

Although the summative evaluation study revealed some interesting findings regarding peoples' interaction with *Salmon Sidewalk*, it had some limitations that may be addressed by future research.

Data collection was a generally slow process, and the availability of people within the target demographic was low. It seemed that people with much younger children were more likely to interact with the exhibit, particularly when the children were drawn by the bright colors and the lights. Data collection took place during the summer when OMSI visitor rates are lower in general, and at times it was difficult to obtain interviews. This was further complicated by the heat wave that struck midway through the data collection period; in the second week of data collection, temperatures were so hot that the metal kiosk buttons burned to touch and families rarely wanted to spend any more time outside than they had to. These issues were partly remedied by data collection on the weekends, when OMSI visitor rates and general public visitor rates were higher overall. Given the low OMSI visitor rates in the summer and several participants' complaints that the sunlight made the lights hard to see, it would be interesting to assess people's reactions and thoughts about the exhibit when the sun is less bright. If the lights are more easily seen, as they will be in the fall and winter, it may be that the connection between the kiosk and the sidewalk lights will be more easily grasped. Further, larger sample sizes will allow us to strengthen some of the connections outlined in this report.

Throughout the summative evaluation process, family units were treated as homogenous, with only one family member being interviewed per unit. In the future it may be interesting to delve more deeply into differences *within* families in terms of learning and perceptions around *Salmon Sidewalk* content. Along these lines, timing and tracking sheets may be developed that better reflect which family members are drawn to specific behaviors and means of interacting with the various exhibit elements. Such knowledge would provide us with added insight as we seek to understand how exhibit messages are being communicated and to whom.

REFERENCES

Philadelphia-Camden Informal Science Education Coalition (PISEC). (1998). Family learning in museums: The PISEC perspective. *PISEC, The Franklin Institute.*

APPENDICES

Appendix A. Timing & Tracking Sheet

Appendix B. Post-Use Interview

Appendix C. Photographs of Exhibit

APPENDIX A. TIMING & TRACKING SHEET

Date: _____ Day of Week: _____ Time: __AM_/__PM___ Observer Initials _____ Tracking # _____

Group Demographics:

in group: _____

Notes:

Approx. Age Ranges Represented:

- ☐ 5 and under
- ☐ 6-12
- ☐ 13-18
- ☐ 19-25
- ☐ 26-35
- ☐ 36-45
- ☐ 46-55
- ☐ 56-65
- ☐ 66 and over

☐ Male(s)

☐ Female(s)

☐ Entered from OMSI side

☐ Entered from esplanade

Time		**Kiosk** (Check all that apply)				**Sidewalk** (Check all that apply)			**Lights** (Check all that apply)		
Entrance Time	Exit Time	Looked at Kiosk Content	Discussed Kiosk Content	Read Kiosk Content	Pushed Kiosk Buttons	Looked at Sidewalk Content	Discussed Sidewalk Content	Read Sidewalk Content	Noticed lights	Noticed connect-ion	Noticed content connection
Notes											

APPENDIX B. POST-USE INTERVIEW

Approach

Approach individuals after you've tracked their interaction with the exhibit (either the sidewalk or the kiosk components). Target individuals who appear to be in family groups with at least one child age 6 and up. Within this frame, also try to target a wide variety of individuals.

Hi, my name is _____, and I'm with OMSI. This is our new outdoor exhibit about salmon and we want to see what people think about it. I saw you checking it out, do you mind if I ask you a few questions about it?

If yes: Great, thank you.
If no: Thank you for your time! Have a nice day.

Usage questions

So, I noticed you were looking at the (*insert component you observed here, sidewalk or kiosk)*. What made you want to check that out?

Did you also look at the (*Insert other component here)*?
What made you want to check that out?

When you pushed the buttons on the kiosk, what happened?

Content/Message Questions

What would you tell someone this exhibit is about, in your own words?
(If one word or overly simple answer): What about (*insert word here*)?

Did you learn anything new from this exhibit?
(*If yes*): Can you tell me about some of the things you learned?

What do you think you'll remember the most?

There were a couple of key messages we were trying to get across with this exhibit, and we want to know how well this exhibit communicated those messages. On a scale of 1 to 5 (*provide further description of the scale, and circle the response they give),* how well would you say the exhibit communicated the following? Please feel free to say "I don't know" if you didn't see any of the elements that might have pertained to any of the messages.

Message 1: The salmon life cycle is interesting and complex.

1	2	3	4	5	Don't know
Poor Communication	**Fairly Poor Communication**	**Neutral**	**Good Communication**	**Excellent Communic-ation**	**N/A**
I did not get this impression at all from the exhibit	This message was present but not very clear	The exhibit didn't do poorly or well at communicating this message	The message was present and relatively clear	This message was completely clear and obvious from the exhibit	N/A

Message 2: There are some key things that salmon need to survive their journey.

1	2	3	4	5	Don't know
Poor Communication	**Fairly Poor Communication**	**Neutral**	**Good Communication**	**Excellent Communic-ation**	**N/A**
I did not get this impression at all from the exhibit	This message was present but not very clear	The exhibit didn't do poorly or well at communicating this message	The message was present and relatively clear	This message was completely clear and obvious from the exhibit	N/A

Message 3: Our own behaviors impact the salmons' journey.

1	2	3	4	5	Don't know
Poor Communication	**Fairly Poor Communication**	**Neutral**	**Good Communication**	**Excellent Communic-ation**	**N/A**
I did not get this impression at all from the exhibit	This message was present but not very clear	The exhibit didn't do poorly or well at communicating this message	The message was present and relatively clear	This message was completely clear and obvious from the exhibit	N/A

Message 4: This exhibit represents a local issue.

1	2	3	4	5	Don't know
Poor Communication	**Fairly Poor Communication**	**Neutral**	**Good Communication**	**Excellent Communic-ation**	**N/A**
I did not get this impression at all from the exhibit	This message was present but not very clear	The exhibit didn't do poorly or well at communicating this message	The message was present and relatively clear	This message was completely clear and obvious from the exhibit	N/A

Affective Response Questions

What parts of the exhibit did you like the most?

What parts of the exhibit do you think could be done better?

Is there anything else you'd like to share about your experience?

Thanks very much for your time, and have a great day!

Demographics: M / F Approx Age: _____

APPENDIX C. PHOTOGRAPHS OF EXHIBIT