

**Impact Planning, Evaluation & Audience Research**

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## **Program Evaluation**

### ***Climate Change and the Oceans Initiative: From Awareness to Action***

## **Executive Summary**

**Prepared for the  
Monterey Bay Aquarium  
Monterey, California**

This report was prepared by the Monterey Bay Aquarium under award NA09SEC4690040 from the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Department of Commerce. The statements, findings, conclusions and recommendations are those of the author(s) and do not necessarily reflect the views of NOAA or the U.S. Department of Commerce.

# EXECUTIVE SUMMARY

This summary presents selected highlights from an evaluation study conducted on four interpretive programs created by the Monterey Bay Aquarium as part of the *Climate Change and the Oceans Initiative: From Awareness to Action*. Please consult the evaluation report for a detailed account of the findings and methods.

## INTRODUCTION

The Monterey Bay Aquarium contracted Randi Korn & Associates, Inc. (RK&A) to evaluate four programs to address climate change and the oceans. To increase awareness of the impact of climate change on the oceans, the Aquarium trained a group of staff members and volunteers to engage visitors in discussions on this issue while touring the Aquarium's *Hot Pink Flamingos: Stories of Hope in a Changing Sea* exhibition. The Aquarium also created two outdoor theatrical presentations, *Enough Stuff* and *Watt a Waste*, and an auditorium program *Whales to Windmills: Inventions Inspired by the Sea*. The following summary and discussion explore how well the Aquarium achieved its goals for these programs.

## WHAT DATA ARE THE FINDINGS BASED ON?

- ◆ The researchers conducted 269 observations of visitors and Aquarium guides in *Hot Pink Flamingos* over three days in August 2010 to estimate the total number and frequency of interactions that focused on climate change. Most of the discussions (82 percent) involved volunteer guides instead of staff members.
- ◆ The researchers took detailed notes while observing 100 discussions between visitors and guides in *Hot Pink Flamingos* over five days in July and August 2010. Thirty-two of these discussions mentioned content related to climate change. The researchers interviewed 22 of the visitors who took part in these discussions as the visitors exited the exhibition. Approximately two-thirds of the interviewees were female, and their median age was 52 years; approximately one-half were visiting with children. Nearly all were visiting *Hot Pink Flamingos* for the first time, and a few attended a climate change-related auditorium or outdoor theatrical program.
- ◆ The researchers conducted 28 telephone interviews with visitors who attended *Enough Stuff* with children during summer 2010. Approximately two-thirds of the interviewees were female, and their median age was 45 years. Three-quarters had visited *Hot Pink Flamingos*; one-third saw a show in the auditorium, although none saw *Whales to Windmills*. One had also seen *Watt a Waste*.
- ◆ The researchers conducted 27 telephone interviews with visitors who attended *Watt a Waste* with children during summer 2010. Almost three-quarters of the interviewees were female, and their median age was 42 years. More than two-thirds had visited *Hot Pink Flamingos*; one-third saw a show in the auditorium, and a few saw *Whales to Windmills*. A few had also seen *Enough Stuff*.
- ◆ The researchers conducted 29 telephone interviews with visitors to *Whales to Windmills* during summer 2010. Two-thirds were female, and their median age was 46 years; approximately two-thirds saw the auditorium program with children. More than two-thirds had visited *Hot Pink Flamingos* and a few had also attended *Enough Stuff* or *Watt a Waste*.

## DID THE AQUARIUM ACHIEVE ITS GOALS FOR THE GUIDE INTERPRETATION?

### GOAL: GUIDES ARE ABLE TO JUDGE AN INTERACTION WITH VISITORS TO KNOW WHEN IT'S APPROPRIATE TO INTRODUCE THE TOPIC OF CLIMATE CHANGE IN CONVERSATIONS.

RK&A evaluated the guide interpretation by observing guides in *Hot Pink Flamingos* and interviewing visitors about their contact with the guides. Both data sets found that about one-third of conversations occurring between guides and visitors addressed issues related to climate change. The observations also showed that guides spent considerable time in the exhibition without talking to visitors about climate change, and at times without talking to visitors at all. Data collectors also noted that in a few instances, when guides mentioned climate change topics, visitors ignored the guides.

### GOAL: GUIDES FEEL PREPARED TO TALK ABOUT A VARIETY OF ISSUES RELATED TO CLIMATE CHANGE.

The observed climate change conversations were often short and referenced only one aspect of climate change, usually rising temperatures or rising sea levels and the impact on sea turtles and coastal birds. Although these examples demonstrate how climate change is affecting marine animals, the guide-visitor conversations didn't explicitly relate climate change to the oceans' health. Data collectors also observed inconsistency in the responses the guides provided about the rising water-level line in the flamingos' exhibit. It seemed that some guides didn't know for sure what the blue line represented, or how to explain it to visitors. Of the visitors who spoke with a guide, few stated that they had learned anything new from their conversation. This finding certainly applies more to visitor goals, but it also speaks to the fact that some guides were unable to provide adequate explanations to visitors during their conversation. On-going training for guides will be necessary to ensure accuracy and consistency of exhibition messages.

### GOAL: GUIDES FEEL CONFIDENT ENGAGING WITH VISITORS OF ANY VIEWPOINT, INCLUDING SKEPTICS WHO MAY BE CONFRONTATIONAL.

While some aspects of the conversations could be improved, it's important to note that the guides initiated nearly all (96 percent) of the discussions about climate change. Without guides to specifically initiate discussion about climate change topics, visitors may not think about those issues. Visitors who spoke with a guide about climate change generally felt that the experience was positive; over two-thirds of the interviewees stated that the conversation was "great" and "informative." Almost one-third of interviewees said that the discussion made them feel "more aware" of climate change in general, and the climate change content in *Hot Pink Flamingos* in particular.

### GOAL: VISITORS WHO HAVE AN INTERACTION WITH A GUIDE SHOULD HAVE AN INCREASED UNDERSTANDING OF CLIMATE CHANGE AND ITS IMPACT ON THE OCEANS.

Prior research and evaluation has consistently shown that visitors to climate change exhibitions generally perceive themselves to be already knowledgeable and well informed about the issue<sup>1</sup>. The data from this evaluation consistently support these other findings. Throughout the interviews, most visitors were quick to state that they were "well educated about global warming" and "already knew" most of the main facts when asked to comment on their conversation with a guide. When visitors enter an exhibition with high levels of perceived knowledge, accomplishing educational goals becomes challenging.

Not surprisingly, one-half of interviewees said they didn't learn anything new from their conversation with a guide. The other one-half stated that some of the messages they heard from the guide were new; most of these messages were about the relationship between climate change and "sustainability." Visitors tended to think of their conversation with the guide as part of their experience in *Hot Pink Flamingos*. A few of these interviewees felt that components of the exhibition, rather than the discussion with the

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<sup>1</sup> Jones, J. "Climate Change Workshop: Insights from Visitor Research and Evaluation." Invited speaker, the California Academy of Sciences, June, 2010, San Francisco, CA.

guide, influenced their thoughts and feelings. For example, as one visitor stated, “The talk itself probably didn’t do anything, it was more the penguins being stranded.” Those visitors who said they learned something new from their conversation with a guide mentioned having an emotional reaction, including that they were “surprised” by what they’d learned, or the conversation had made them “more aware,” or the conversation left them feeling sadder and more worried than before.

When asked specifically about what they learned about climate change and the oceans, two-thirds of interviewees mentioned some fact about climate change and its effects on marine animals, habitats or coastal regions. In contrast, approximately one-third stated that they’d learned nothing about climate change and the oceans, either because the guide didn’t talk about the topic or because the interviewee felt that he or she already knew everything there was to know.

**GOAL: VISITORS WHO INTERACT WITH A GUIDE SHOULD HAVE AN INCREASED UNDERSTANDING OF THEIR CONNECTION TO THE CAUSES OF CLIMATE CHANGE AND AN ACTION THEY CAN TAKE TO MITIGATE IT.**

Most interviewees stated that talking with the guides didn’t increase their understanding of their connection to the causes of climate change or the actions they could take to mitigate it. More than two-thirds said they hadn’t learned anything from the conversation about ways to personally address climate change. Most explained that the guide didn’t suggest any actions or noted that they were already doing everything they could. One-third mentioned learning about taking a personal action to stop climate change. It’s important to note that many of these interviewees cited examples taken from the *Hot Pink Flamingos* exhibition and not from their conversation with the guide, which suggests that interviewees couldn’t clearly distinguish between their conversation with the guide and their exhibition experience. This isn’t unusual, since visitors often perceive their experiences as holistic, rather than comprised of individual components, and aren’t able to distinguish one experience in an exhibition from another.

Five interviewees stated that they’d learned concrete actions to help slow climate change based on their conversations with the guide. These actions included using power strips to limit power consumption, eating seasonally available fruits and vegetables, reusing water bottles, recycling and reducing car use by biking, walking or carpooling.

## DID THE AQUARIUM ACHIEVE ITS GOALS FOR THE THEATRICAL PRESENTATIONS?

### GOAL: VISITORS LEAVE WITH THE FEELING THAT SMALL ACTIONS THEY TAKE CAN MAKE A DIFFERENCE TOWARD SLOWING CLIMATE CHANGE.

#### **ENOUGH STUFF**

Interviewees were asked how they felt at the end of the program and whether they would take action. The majority of interviewees stated that the messages presented in *Enough Stuff* were important, especially for children, while also recognizing the complexities of climate change. Some stated that *Enough Stuff* emphasized that little actions can make a big difference and that the show spurred their thinking. Most interviewees mentioned that they were already taking action to address climate change, such as composting, recycling or saving energy. Only one visitor felt somewhat negatively about the program and stated that its message was “overkill.”

Each interviewee was asked to discuss how *Enough Stuff* related to climate change and the oceans. Most perceived some relationship. One-third of interviewees stated generally that climate change means that life for ocean animals will be more difficult. Another one-third stated that trash hurts the oceans, and approximately one-third stated that they were still confused about the relationship as presented in *Enough Stuff*, either because they found the program confusing or because the topic is so complex.

#### **WATT A WASTE**

Over one-half of interviewees stated that *Watt a Waste* presented an important message, and that the program prompted them to think. Almost one-half stated that the program was inspiring, and that they felt they could make a difference. Interestingly, a number of interviewees were focused on discussing how others need to be encouraged to change. For example, as one visitor stated, “I already feel that way, I just want more people to feel that way.” Most interviewees mentioned actions that they already do and ones that they plan to do to address the issues raised in the program. For example, approximately two-thirds stated that they could take personal action by turning off lights. A few others mentioned unplugging electronics, recycling, not buying Styrofoam or walking and biking more.

Interviewees were asked how the theatrical presentation *Watt a Waste* relates to climate change and the ocean. Approximately half were confused and unable to answer the question. The other half stated examples of how the program related to climate change and the ocean, including energy use leads to carbon pollution, global warming leads to warmer oceans and trash affects the oceans.

## DID THE AQUARIUM ACHIEVE ITS GOALS FOR THE AUDITORIUM PROGRAM?

### GOAL: THE PROGRAM GIVES VISITORS A HOPEFUL PERSPECTIVE ON CLIMATE CHANGE AND SHOWS THEM PEOPLE OF ALL AGES FROM AROUND THE WORLD TAKING CLIMATE ACTION.

All of the interviewees had positive, general impressions of *Whales to Windmills*. Almost half stated that the theme of innovation inspired by nature left the strongest impression. Other visitors mentioned that the program was educational, informative, interesting or fun.

### GOAL: THE PROGRAM TAPS INTO VISITORS' ETHICS AND VALUES.

The auditorium program made a strong connection with visitors' appreciation of nature in general and of marine animals specifically. All interviewees praised the program's focus on animals and many lauded the efforts of inventors to use nature as an inspiration for green energy.

## **GOAL: THE PROGRAM CONVEYS CLEAR MESSAGES ABOUT NEXT STEPS WE NEED TO TAKE AS INDIVIDUALS AND AS A SOCIETY TO MITIGATE CLIMATE CHANGE.**

Interviewees were somewhat confused about the connection between climate change and the content presented in the auditorium program. Half of the interviewees stated that they'd learned something new about climate change and the oceans from the program; however, their responses were general. For example, some said that all life is connected, one can take personal action and that innovative ideas come from the oceans. The other half didn't think the program was about climate change.

Interviewees were also unclear about the auditorium program's call to action. Interviewees were asked what personal actions, if any, they were inspired to take after watching the program. Approximately half of the interviewees mentioned activities they already do consistently. These actions most commonly involved sharing information with others as well as recycling and reusing materials. The other one-half of interviewees couldn't identify any actions they personally could take to address the issues raised in the program.

## **HOW MIGHT THE FINDINGS FROM THIS STUDY INFORM FUTURE WORK?**

### **GUIDE-VISITOR INTERACTIONS**

- ◆ Overall, speaking with a staff or volunteer guide was a positive experience for visitors; however, additional training may be necessary to ensure message consistency and content accuracy.
- ◆ The guide interpretation goals didn't specify a specific frequency of guide-visitor interactions that would indicate "success." In the future, staff members may want to consider establishing indicators of success as a context for determining if their goals have been achieved.
- ◆ Interviewees discussed certain details that were new to them, but overall, they perceived themselves to be already quite knowledgeable about climate change. The guides should find ways to acknowledge what visitors know about climate change and connect visitors' prior knowledge to the effects of climate change on the ocean.
- ◆ Interviewees' ideas of what "taking action" means is defined by their level of investment in a sustainable lifestyle and their political and religious beliefs. For example, some interviewees quickly gave a list of sustainable actions that they already do, while others responded that not littering was enough. Guides should find ways to acknowledge visitors' environmental efforts and emphasize the action of "doing one more thing" to address climate change.


## THEATRICAL PRESENTATIONS

- ◆ The presentations' focus on families and children is key to their success. Maintain the presentations' engaging theatrics and music.
- ◆ Interviewees only take away general messages from a 15-minute program; nuances and detailed information are generally lost, including detailed messages about the impact of climate change on the ocean or an individual's role in slowing climate change. Focus each program's message on one or two big ideas that children will be able to glean, as adults perceive the presentations to be for children.
- ◆ Focus the recommended actions on things children can do at home. Interviewees didn't feel that these presentations were geared to behavior change in adults, but they felt the presentations helped raise their children's awareness.
- ◆ There was some confusion about age appropriateness; perhaps staff members should explicitly identify a target age for the various programs and communicate this to visitors.

## AUDITORIUM PROGRAM

- ◆ Maintain the program's format and animal focus. Interviewees described the program as enjoyable, and many of them found the stories about innovation inspiring. Visitors were open to having longer or more presentations. Even after more than two weeks, half of the interviewees remembered specific examples.
- ◆ Interviewees were often confused about how the program related to climate change. However, making this connection more explicit could decrease visitors' positive opinions of the program. Staff members will need to consider whether focusing on green energy is a sufficient message.
- ◆ The connection between the topics mentioned in the program and taking personal action was unclear to visitors. While visitors found the program compelling, it didn't inspire them to make changes in their own lives. Motivating behavior change is difficult, especially for a complex issue like green energy. Program messages need to be more explicit with their charge and help visitors connect the actions of other communities with activities they could collectively undertake in their own cities or towns.





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## **FULL REPORT**

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\*Removed for proprietary purposes.

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# INTRODUCTION

The Monterey Bay Aquarium contracted Randi Korn & Associates, Inc. (RK&A) to evaluate four new initiatives to address climate change and the oceans. To increase awareness of the impact of climate change on the oceans, the Aquarium trained staff and volunteers to engage visitors in discussions on climate change in the *Hot Pink Flamingos: Stories of Hope in a Changing Sea* exhibition. The Aquarium also developed the *Enough Stuff* and *Watt a Waste* outdoor theatrical presentations and the *Whales to Windmills: Inventions Inspired by the Sea* auditorium program. This evaluation documents the effectiveness of the new initiatives against the Aquarium's goals and objectives.

The evaluation of the guide-visitor interactions examined:

- ◆ Guides' frequency of general and climate change discussion with visitors, including location of conversation;
- ◆ Visitors' overall experience;
- ◆ Visitors' perspectives and opinions about climate change;
- ◆ Visitors' creation of meaning from their experience;
- ◆ Visitors' understanding of the main message (strength of relationship between climate change and ocean health);
- ◆ Visitors' reaction to and value associated with the main message;
- ◆ Visitors' reaction to the Aquarium's presentation of climate change information; and
- ◆ Visitors' plans for future action to address climate change and possible barriers.
- ◆

The evaluation of the auditorium and the theatrical presentations examined visitors':

- ◆ Overall experience;
- ◆ Understanding of programs' messages;
- ◆ Affective and cognitive experiences, including learning about climate change and attitudinal changes;
- ◆ Reaction to the Aquarium's presentation of climate change information; and
- ◆ Plans for future action to address climate change and possible barriers.

## METHODOLOGY

### GUIDE-VISITOR GENERAL OBSERVATIONS

RK&A conducted three days of general observations of guide-visitor discussions to examine the frequency at which discussions about climate change occur (see Appendix B for the general observation form). Guides included both staff and volunteers who were present in the exhibition during scheduled shifts. The observations were unobtrusive—that is, they were conducted so that visitors were not aware that they were being observed; however, Aquarium guides were informed of the data collection schedule.

A data collector trained by RK&A shadowed guides in *Hot Pink Flamingos* and listened to the conversations among guides and visitors. The data collector was instructed to enter the exhibition and stop at the first guide she encountered. She then awaited the first visitor to interact with that guide.

When the interaction took place, she recorded data in the observation form. After that interaction was complete, the data collector moved through the exhibition, searching for the next volunteer to observe. Once she reached the exhibition exit, she re-entered and went in search of the next guide, thus altering entering the exhibition from the exit and entrance. Data were recorded for 30-minute shifts from 10:00 a.m. to 12:30 p.m. and 1:00 p.m. to 6:00 p.m. each day (15 shifts per day).

During the guide-visitor interaction, the data collector noted how many visitors interacted with guides, how many discussed climate change, whether visitors initiated climate change discussions and the location of the conversation. The Aquarium developed a description of what qualifies as a climate change topic (e.g., using the term “climate change” or “global warming;” or mentioning rising sea levels, ice caps melting, CO<sub>2</sub>, greenhouse gases) (see Appendix C).

### **INTERVIEWS AND OBSERVED GUIDE-VISITOR INTERACTIONS**

RK&A conducted five days of focused observations and interviews to examine the nature and effect of guide-visitor discussions (see Appendices D and E for the focused observation and interview forms). Guides included both staff and volunteers who were present in the exhibition during scheduled shifts. A data collector trained by RK&A shadowed guides in *Hot Pink Flamingos* and listened to the conversations among guides and visitors. For each visitor group that engaged in a discussion with the guide, the data collector took extensive notes about the conversation. The data collector used a list of words and phrases created by the Aquarium (see Appendix C) to define what conversations qualified as a climate change discussion.

If the guide-visitor interaction included climate change discussion, the data collector proceeded directly to the exhibition exit once the interaction was completed and awaited the observed visitor group. Upon exiting, the observed visitor group was asked to participate in an interview. Those who agreed were interviewed on-site. After an interview, refusal or after the guide left *Hot Pink Flamingos*, the data collector would re-enter the exhibition from the exit and begin the process again. The data collector would alternate between entering the exhibition at the exit or the entrance to ensure that no one area of the exhibition was over sampled.

### **TELEPHONE NUMBER COLLECTION AND IN-DEPTH TELEPHONE INTERVIEWS**

To understand visitor experience during the auditorium program and theatrical presentations, RK&A conducted in-depth telephone interviews with adult, English-speaking family groups (for the data collection forms and instruments see Appendices G and H [theatrical presentations] and Appendices J and K [auditorium program]). In-depth interviews encourage and motivate visitors to describe their experiences, express their opinions and share with the interviewer personal thoughts and reactions. In-depth interviews produce data rich in information because interviewees talk about personal experiences in their own words.

Trained data collectors intercepted adult, English-speaking visitors (18 years or older) on the outdoor deck before or after the presentation. Data collectors used a continuous random sampling method to ensure they didn't bias the sample. Data collectors asked visitors to provide their telephone number and agree to a telephone interview. If the visitor declined, the data collector logged the visitor's gender, estimated age and reason for refusal. If the visitor agreed, he or she filled out the telephone number collection form. Two to four weeks later, data collectors called visitors to conduct the telephone interview. All interviews were audio recorded and transcribed to facilitate analysis.

## **DATA ANALYSIS AND REPORTING METHOD**

### **QUANTITATIVE DATA**

The general observation data are quantitative and were analyzed in Excel. Descriptive statistics for the general observations are reported in tables. Percentages within tables may not always equal 100 owing to rounding. The findings within each topic are presented in descending order, starting with the most-frequently occurring.

### **QUALITATIVE DATA**

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

The interview data are presented in narrative. The interviewer's remarks appear in parentheses and interviewee's gender and age are indicated in brackets. Trends and themes in the data are presented from most- to least-frequently occurring.



# PRINCIPAL FINDINGS: GUIDE-VISITOR GENERAL OBSERVATIONS

RK&A conducted general observations of guide-visitor interactions in the *Hot Pink Flamingos* exhibition over three days in August 2010. RK&A observed 269 visitors interact with guides.

## EVALUATION OBJECTIVES

The evaluation of the general guide-visitor interactions examined:

- ◆ The frequency of general and climate change discussions among guides and visitors;
- ◆ Location of conversations; and
- ◆ Whether visitors initiated the climate change discussion.

## DATA COLLECTION PROTOCOL

RK&A conducted three days of general observations of guide-visitor discussions to examine the frequency at which discussions about climate change occur (see Appendix B for the general observation form). The observations were unobtrusive—that is, they were conducted so that visitors weren't aware that they were being observed; however, Aquarium guides (staff members and volunteers) were informed of the data collection schedule. A data collector trained by RK&A shadowed guides in *Hot Pink Flamingos* and listened to the conversations among guides and visitors. The data collector noted how many visitors interacted with guides, how many discussed climate change, whether visitors initiated climate change discussions and the location of the conversation. The Aquarium developed a list of key words and topics that qualified as climate change conversations (see Appendix C). Data were recorded for 30-minute shifts from 10:00 a.m. to 12:30 p.m. and 1:00 p.m. to 6:00 p.m. each day (15 shifts per day).

## EXHIBITION OVERVIEW

*Hot Pink Flamingos* is a 7,000-foot special exhibition (5,092 sq. ft. of public space) at the Aquarium that explores how climate change is affecting ocean life and recommends small changes we all can make in our personal lives to help the oceans as well as big changes we can make together to solve the climate crisis. The exhibition is divided into different sections, including the Introduction, Under Water (which features flamingos and other wading birds), Hope Electrified, Iceless Arctic, Acid Ocean (which features a coral reef), Faith and Action, Simmering Seas (which features spotted jellies and sea turtles), World of Change, Vanishing Feast (which features penguins) and Make Change. (See Appendix A for photos of these areas.)

## DESCRIPTION OF VISITORS

English-speaking adults (excluding adult school chaperones) were the target audience for this study. Over a three-day period, the data collector observed 269 visitors interact with guides in *Hot Pink Flamingos* (see Table 1).

**TABLE 1**  
**NUMBER OF VISITORS WHO INTERACTED WITH GUIDES**

DAY	N
August 22, 2010 (Sunday)	97
August 24, 2010 (Tuesday)	90
August 25, 2010 (Wednesday)	82

## GENERAL OBSERVATIONS

The data collector noted the type of guides—staff members or volunteers—present in the exhibition during each 30-minute shift (15 shifts per day, 45 shifts total over three days). During most of the shifts (82 percent), the guides were volunteers (see Table 2).

**TABLE 2**  
**EXHIBITION STAFFING LEVEL**

TYPE OF GUIDES PRESENT	NUMBER OF SHIFTS
Volunteers only	37
Staff and volunteers	3
Unstaffed	5

The data collector noted the exhibition location in which the guide-visitor interaction took place. Guide-visitor interactions occurred most often in the Under Water section, followed by Simmering Seas, Acid Ocean and Vanishing Feast—all sections with live animals (see Table 3).

**TABLE 3**

**CONVERSATION LOCATION**

EXHIBITION SECTION	NUMBER OF SHIFTS*
Under Water	25
Simmering Seas	16
Acid Ocean	10
Vanishing Feast	10
Hope Electrified	3
Iceless Arctic	1
Faith and Action	1
Introduction	0
World of Change	0
Make Change	0

\*During some shifts, visitors were observed interacting with guides in multiple exhibition areas.

Of the 269 visitors who interacted with guides, 30 percent engaged in a climate change discussion (see Table 4).

**TABLE 4**

**TYPE OF CONVERSATION**

TOPIC (n = 269)	%
Non-climate change	70.0
Climate change	29.7

Of the 80 visitors who had a climate change conversation with guides, four percent of visitors initiated the topic (see Table 5).

**TABLE 5**

**WHO INITIATES CLIMATE CHANGE CONVERSATION**

INITIATOR (n = 80)	%
Guide	96.3
Visitor	3.7



# PRINCIPAL FINDINGS: GUIDE-VISITOR FOCUSED OBSERVATIONS AND INTERVIEWS

RK&A conducted focused observations and interviews of guide-visitor interactions in the *Hot Pink Flamingos* exhibition over five days in July and August 2010. RK&A observed 100 conversations and interviewed 22 adult visitors—who engaged in a climate change discussion with a guide—as they exited the exhibition. Interviewees were asked to discuss their overall experiences, opinions of conversation with the guide (staff or volunteer) and understanding of relevant issues relating to climate change and the oceans.

## EVALUATION OBJECTIVES

The focused observations and interviews of the guide-visitor interactions examined:

- ◆ Guides' frequency of general and climate change discussion with visitors, including location of conversation;
- ◆ Visitors' overall experience;
- ◆ Visitors' perspectives and opinions about climate change;
- ◆ Visitors' creation of meaning from their experience;
- ◆ Visitors' understanding of the main message (strength of relationship between climate change and ocean health);
- ◆ Visitors' reaction to and value associated with the main message;
- ◆ Visitors' reaction to the Aquarium's presentation of climate change information; and
- ◆ Visitors' plans for future action to address climate change and possible barriers.

## DATA COLLECTION PROTOCOL

RK&A conducted five days of focused observation and interviews to examine the nature and effect of guide-visitor discussions (see Appendices D and E for the observation form and interview guide). A data collector trained by RK&A shadowed staff and volunteer guides in *Hot Pink Flamingos* and observed the conversations among guides and visitors. If the guide-visitor interaction included climate change discussion (see Appendix C for the Aquarium's list of qualifying terms and topics), the data collector proceeded directly to the exhibition exit once the interaction was completed and awaited the observed visitor group. Upon exiting, the observed visitor group was asked to participate in an interview. Those who agreed were interviewed on-site. Interviews were audio recorded with participant consent and transcribed to facilitate analysis.

## EXHIBITION OVERVIEW

*Hot Pink Flamingos* is a special exhibition at the Monterey Bay Aquarium. The 7,000-foot exhibition (5,092 sq. ft. of public space) provides the opportunity for visitors to discover how climate change is affecting ocean life and learn how small life changes can help the oceans. The exhibition features 10 sections: Introduction, Under Water (flamingos), Hope Electrified, Iceless Arctic, Acid Ocean (coral reef), Faith and Action, Simmering Seas (spotted jellies and sea turtles), World of Change, Vanishing Feast (penguins) and Make Change.

## DESCRIPTION OF VISITORS

### PARTICIPATION RATE

Over the five days of data collection, 100 visitor groups, comprised of 177 visitors, were observed interacting with guides in the *Hot Pink Flamingos* exhibition. The 32 visitor groups who were observed engaging in climate change conversations with guides were invited to participate in the interviews. Of those, eight refused to participate and two were disqualified, for a 73 percent participation rate. RK&A interviewed 22 visitor groups, comprised of 49 English-speaking adults, ages 18 years and older.

### INTERVIEWEE DEMOGRAPHICS

Approximately two-thirds of interviewees were female (62 percent) and one-third were male (38 percent). Interviewees ranged in ages from 20 to 77 with a median age of 52 years.

Most interviewees were visiting *Hot Pink Flamingos* for the first time (95 percent), and a few attended a climate change-related theatrical presentation or auditorium program. Approximately one-half of the visitor groups had visited the exhibition with children (55 percent).

### INTERVIEWEE VISITATION PATTERNS

All but one of the visitor groups were first-time visitors to *Hot Pink Flamingos* (95 percent). The majority of interviewees hadn't attended a presentation or auditorium program prior to being interviewed in the exhibition (91 percent). Five groups attended presentations in the auditorium, of which two interviewee groups attended the *Whales to Windmills* show. One interviewee group each attended a presentation, either *Watt a Waste* or *Enough Stuff*.

## FOCUSED OBSERVATIONS

### OVERALL TRENDS

Two-thirds of the 100 conversations observed between guides and visitors were about animal facts, life cycle and habitats and had no connection to climate change. One-third of the conversations dealt with climate change.

### CLIMATE CHANGE CONVERSATIONS

Of the 32 climate change conversations observed, almost one-half took place at *Simmering Seas* (45 percent); the other conversations occurred at *Under Water* (32 percent), *Vanishing Feast* (18 percent) or *Iceless Arctic* (5 percent).

Most of the climate change discussions related to the rising temperatures or rising water levels and the impact on sea turtles and coastal birds. A few discussions focused on ocean changes in general. A few other conversations were focused on oil spills' impact on penguins. Of the 22 climate change conversations, five included discussions of actions to take to reduce climate change. Those conversations occurred either at *Simmering Seas* or *Vanishing Feast*. Those actions discussed, in order of frequency, were riding bikes, reusing water bottles, unplugging electric appliances and eating locally.

The data collectors who conducted the observations noted that in a few instances, staff or volunteer guides mentioned climate change topics, though visitors didn't engage and either moved away or asked a different question. This didn't qualify as a climate change discussion, though it should be noted that guides possibly attempted to engage in more climate change conversations than data initially showed.

Another theme that came out of the observation of guide-visitor interactions was the common misunderstanding of the rising water level line in the flamingos' enclosure. Data collectors observed confusion on the part of visitors and inconsistency in the answers volunteers/staff provided. It seemed that some didn't know for sure what the blue line represented or how to explain it to visitors. This wasn't counted as a climate change discussion.

## INTERVIEWS

### BACKGROUND INFORMATION

Only those visitors who were observed engaging in a climate change conversation with a staff person or volunteer qualified for the interview. Visitors who agreed to an interview were then asked if they had spoken with a staff or volunteer while visiting the *Hot Pink Flamingos* exhibition. This additional screening step was important to ensure that the climate change conversation was memorable and interviewees were able to discuss it in depth. One visitor who was observed having a climate change discussion with a volunteer didn't believe that she had spoken to any representative of the Aquarium and the interview was terminated. It's possible that the visitor was so engaged with her family group that she didn't notice the volunteer was actually officially connected with the Aquarium.

### OVERALL RESPONSE TO THE EXHIBITION

Overall most interviewees responded positively to the *Hot Pink Flamingos* exhibition, stating that it was "good," "great" or "nice." Approximately one-third also mentioned that the opportunity to see animals was the major highlight of the exhibition; "I thought it was a really good exhibit. I was excited to see the turtles and the flamingos." Four interviewees mentioned that *Hot Pink Flamingos* provided important information; "it was very informational and educational. I think it gives the people some good ideas." Three liked the exhibition because it was appealing to children. As one interviewee said, "[*Hot Pink Flamingos* was] very interesting, very informative, colorful, [and the] children were engaged the whole time we walked through."

While generally positive about *Hot Pink Flamingos*, several interviewees made negative comments about specific aspects of the exhibition. Two stated that though they understood the importance of the message of *Hot Pink Flamingos*, it was a "little heavy-handed" and seemed that the Aquarium was "pushing" the message. Two others reacted negatively to the darkness of the exhibition and the bird enclosure, which looked like the birds were "in a cave." Finally, one interviewee stated that there wasn't enough information about certain aspects of the exhibition (see quotation below).

I wish there was more information that directly connected how the pink flamingos restore hope [to climate] change because I think that the Aquarium usually does a good job of spelling those things out, but it didn't quite do that. [male, 30, adult-only group]

### RESPONSE TO THE GUIDE

One-half of interviewees noted that the guides answered their questions and were informative (see first quotation on next page). One-fourth described the guides as pleasant, friendly and enthusiastic (see second quotation). Another one-fourth simply stated that the guide was "great" or "fine." Four interviewees mentioned—without prompting—that the discussion addressed issues of "global warming" or "climate change" (see third quotation).

When I was looking at the penguins, I was talking with my Mom and someone cut in and explained something that I had mispronounced. She told me all about the rescue of the South

[American] penguins. It was great. She wasn't too pushy. She had a lot of knowledge and it was great. [female, 36, adult-only group]

[The staff member/volunteer] was great. She was very friendly and answered questions and shared information that I didn't know before. [female, 53, alone]

(While visiting the *Hot Pink Flamingos* exhibition, did you happen to talk with an Aquarium volunteer or staff member?) We did, the gentleman at the sea turtle eggs. He was very informative. I had a nice conversation with him about what we can do for global warming. Unfortunately, I can't stop driving my car but we'll try.... (Overall, how was your experience talking with the volunteer or staff member?) It was very good, excellent. [female, 41, group of adults and children]

## EFFECT OF THE GUIDE ON THE EXHIBITION EXPERIENCE

Interviewees were asked in what ways, if any, did having an opportunity to talk with someone in the exhibition affect their experience in the *Hot Pink Flamingos* exhibition. Over two-thirds of the interviewees stated that the conversation was "great" and "informative" (see first quotation below). Almost one-third of interviewees felt that the discussion made them feel "more aware" of climate change and climate change presentation in the exhibition (see second and third quotations). Two interviewees said that the opportunity to talk with someone in the exhibition didn't affect their experience at all.

It was great having a person to talk to because when we were sitting before in front of the large tanks there were so many things that I was curious about. [Staff member/volunteer] was very nice and knowledgeable. [female, 65, adult-only group]

It makes me sad that we're wasting so much energy and causing global warming. It's sad to me. So it's changed my thinking like that. [male, 28, group of adults and children]

I feel like I learned something because I don't have to be convinced about global warming, you know, it's like preaching to the choir or something, but she was telling us things about global warming that were still of interest and educational even though I feel like I'm well educated about it. And she showed us an interactive exhibit that I wouldn't, the one about Louisiana, [that] I wouldn't have looked at it if she hadn't shown us but it was interesting. [female, 53; male, 53; group of adults and children]

## LEARNING AND DISCUSSION OF MESSAGES

### UNDERSTANDING OF MAIN MESSAGES

Interviewees were asked what messages or ideas, if any, they took away from the conversation with the volunteer or staff member. One-third stated that they had learned facts about the animals or habitats on display (see first quotation on next page). Approximately another one-third mentioned learning about taking personal action to stop climate change. It's important to note that many of these interviewees cited examples from the *Hot Pink Flamingos* exhibition and not the conversation with a guide. Interviewees didn't clearly distinguish between the conversation with the guide and the exhibition (see second quotation). Finally, one-third described the main take-away message from the guide conversation as either that volunteers care about animals or that there weren't any clear messages (see third quotation).



[I learned] more about some of the birds from one staff member talking about habitats and the information about the turtles too. I learned more about sea turtle habits and life cycles. [female, 57, alone]

It's not just from her but from the whole place. It's all about taking care of the world and protecting the environment and doing what you can to be energy efficient. I mean it's just very clear and [even] if I did a little tiny bit. I mean I already know a lot of that and so I almost feel kind of bombarded by that message but I know it's super important and I think it's very good you're doing that. [female, 65; female, 52; adults-only group]

I felt that he personally was very pleased that the penguins had survived. He seemed to really care about the animal he was discussing. And he wanted to make very sure that we knew about the penguins that were picked up in Brazil that you're taking care of in case we had missed that, which we had not but he wanted to make sure we had the complete story. [female, 76; male, 77; adults-only group]

## NEW CONTENT LEARNED

When asked directly, approximately one-half of the interviewees stated that the messages they heard from their conversation with the guide were new to them. Interviewees most often mentioned climate change and “sustainability” as new messages (see quotation below). A few stated that the new messages were all about animal facts.

[The volunteer] was explaining how the algae on the jelly fish was dependent on the sun and so it needs to go up and get the sun but also because our climate is warming up the water is warming up and that these jelly fish live in [fragile] climates and so they are very sensitive to climate change. [female, 56, group of adults and children]

The other one-half of interviewees said they already knew or had heard the messages before coming to the Aquarium. Throughout the interviews, most were quick to state that they were “well educated about global warming” and “already knew” most of the main facts in response to questions about their climate change discussion and reactions.

Interviewees were asked if they discussed any of the new messages from their conversation with their visitor group. Two-thirds of interviewees hadn't, though a few planned to discuss messages with their group “on the way home.” Approximately one-third of interviewees said they had discussed the guide's messages with their visiting group but didn't elaborate. Four interviewees mentioned that they had discussed climate change facts with their visiting group. One stated that he discussed how *Hot Pink Flamingos* could be a story of hope.

## CLIMATE CHANGE AND THE OCEANS

One of the goals of the *Hot Pink Flamingos* exhibition and the guide/visitor interactions was to increase visitors' awareness of the connection between climate change and the oceans. Interviewees were asked to reflect on their conversation with the guide and report on what, if anything, they learned about climate change and the oceans. Two-thirds were able to mention some fact about climate change and effects on the ocean animals, habitats or coastal regions. Interviewees most often reported that they had learned about the impact of the rising temperature on sea turtles' reproduction cycles and habitats (see first quotation below). Others mentioned large-scale effects of the rise in sea level on coastal animals and habitats or the impact of rising temperatures on penguin populations (see second quotation).

(Based on your conversation with the volunteer, what, if anything, did you find out about climate change and the oceans?) Specifically how the females [sea turtles] are outnumbering the males because their eggs are born in warmer sand, which really [is] a whole change [because of] global warming. [It] has to do with what we produce. So it was good. [female, 41, group of adults and children]

The penguins had been chasing food, which had gotten scarce where they were possibly because of warming or change in the food, in the food of the penguins, so it brought home these things. [female, 76; male, 77; adults-only group]

I figured that maybe one of the reasons the penguins washed up on the beach in Brazil is because your staff member said they had to go out further to get food and so they got caught in the current. So I figured that maybe had something to do with climate change but I don't know. [female, 67, adults-only group]

In contrast, approximately one-third stated that they had learned nothing about climate change and the oceans either because the guide didn't talk about the topic or because the interviewee felt that s/he already knew everything.

You know what, we didn't talk about it. It was so crowded in there and there were so many people wanting to talk with her that I didn't want to dominate. [female, 53, alone]

## PERSONAL ACTION TO ADDRESS CLIMATE CHANGE

### GUIDE SUGGESTIONS

Interviewees were asked if, based on the conversation with the guide, they found out anything about ways to personally address climate change. Overall, interviewees were challenged to discuss any new information learned from the conversation with the guide. Over two-thirds said they hadn't learned anything from the conversation about ways to personally address climate change. Most explained that the guide didn't mention any suggestions or that they were already doing everything they could (see first quotation below). A few explained that while they didn't learn about possible actions from the guide, they had gleaned such information from the *Hot Pink Flamingos* exhibition displays (see second quotation).

She did a little bit cover that but again nothing more that I didn't already know and had already been practicing. [female, 36, alone]

(Based on your conversation with the volunteer/staff member, did you find out anything about ways you personally can address climate change?) I don't know if we got that far with her because we just kind of wanted to keep moving, see stuff, but I think just talking to her made us pay attention to things farther on that, you know, all the information is there and it's just a question of whether or not we were looking for it, and so I think she helped us pay more attention to it. [female, 53; male, 53; group of adults and children]

Five interviewees stated that they had learned about concrete actions to prevent climate change from conversations with the guide. Interviewees were asked to list the suggestions that the guide made, which included using power strips to limit power consumption, eating seasonally, reusing water bottles, generally recycling and reducing car use by biking, walking or carpooling.

### PLANS TO TAKE ACTION

Of the interviewees who learned about ways to personally address climate change, most planned on taking action (see quotation below). Three considered plugging electronics into power strips and turning power strips off to save energy. Three interviewees considered water saving changes including buying a faucet aerator or water-saving washing machine. A few others mentioned reusable shopping bags, “just thinking differently,” eating seasonally or reusing water bottles.

(What additional actions to address climate change, if any, are you considering taking in the future?) I mentioned before, the people are eating, recycling, because a lot of time it’s a little bit more time consuming like recycling or buying bulk and putting it in your own containers but it pays I think. And we can see that it takes [effort]. [female, 39, group of adults and children]

## CHALLENGES TO TAKING ACTION

Interviewees were asked what challenges might prevent them from taking action to address climate change. Approximately one-half didn’t describe any challenges since they were already engaging in all of the actions they planned to take. The other one-half of interviewees described challenges that they expected to face or were already dealing with, including the area that they live in isn’t transit friendly, additional hassle, lack of time, increased stress and money.

## THOUGHTS AND FEELINGS ABOUT CLIMATE CHANGE

One-half of interviewees said the conversation with the guide didn’t affect their thoughts about climate change and the oceans at all. A few of these interviewees felt that components of the exhibition, rather than the discussion with the guide, had an effect on their thoughts and feelings; “the talk itself probably didn’t do anything, it was more the penguins being stranded.”

The other one-half of interviewees mentioned some effect of their conversation with the guide, including that they were “surprised” by what they learned and that the conversation had made them “more aware” (see first quotation below). A few others stated that the conversation with the guide left them sadder and more worried than before (see second quotation).

(In what ways, if any, did your conversation with the volunteer/staff member affect your thoughts and feelings about climate change?) [By] making us aware, behind the scenes, about animals that we cannot see every day and [how] they are being affected. [female, 39, group of adults and children]

Well they made me very, very sad.... I think what happens to me is I feel powerless and in some ways it’s overwhelming. People evolve, creatures evolve and who knows if there will even be a future [for] this planet. It is depressing because we’re here and we’re attached to the planet but it might just be part of what happens.... And that’s sad. [female, 65; female, 52; adults-only group]

## OVERALL OPINION OF EXHIBITIONS ON CLIMATE CHANGE AND THE OCEANS

Interviewees were asked whether the Monterey Bay Aquarium should be presenting exhibits and programs about climate change. The majority of interviewees responded positively that it was “good” or “important” for the Aquarium to present such exhibitions. When asked to elaborate, many interviewees stated that it was important to educate other less-informed visitors (see first quotation on next page). Approximately one-half of interviewees were in favor of exhibitions on climate change and the oceans because it connected with their ideas of the Aquarium’s institutional mission (see second quotation). Almost one-half of interviews also stated that it was important to educate “the next generation” (see third quotation). Finally, some mentioned that actually seeing the animals was important to inspire people to take action (see fourth quotation).

I think that a lot of people are not aware like I am aware of the issues with the cows and eating meat and all that. I think a lot of people from other areas [don't know]. We're from Santa Cruz, California, so we're inundated with it but people who are from Utah or Idaho or from small towns might not be as inundated. [female, 58; male, 63; group of adults and children]

The educational programs here have always been really good from what I've seen personally. It's the role of the institution too so that's what they should do, absolutely. [female, 38; male, 37; adults-only group]

It's a great thing for the kids to get involved in. It's a great way to get the new generation into showing how to save the Earth and our animals that are so precious to us. [male, 28, group of adults and children]

We need to help all these poor animals. I wasn't aware that a lot of them are going to be extinct and it shocked me. I mean I love the sea life and I was totally shocked to see that there's so many of them that are in danger. I think it's a good thing because it informed me. [female, 62, group of adults and children]

A few were considerably less positive about the Monterey Bay Aquarium presenting exhibitions on climate change and the oceans. Three interviewees stated that they weren't sure it was a good idea, that it was overly "preachy" or that it "takes away from the experience if there's too much of it" (see quotation below).

(Do you think the Aquarium should be presenting exhibits and programs about climate change? Why or why not?) I'm going to be honest, [it was] a little overbearing. All the clean energy things seem a little concentrated to me [at the end]; maybe you want to break it up in smaller sections that relate to the different areas of the exhibition, or even the entire aquarium. I think that would be better suited [to] kind of tone it down. [male, 21, adults-only group]

## PRINCIPAL FINDINGS: *ENOUGH STUFF* PRESENTATION

RK&A conducted telephone interviews with 28 adult visitors who had attended *Enough Stuff* during the 2010 summer months at the Aquarium. Interviewees were asked to discuss their overall opinion of the program and understanding of relevant issues relating to climate change and the oceans.

### EVALUATION OBJECTIVES

The evaluation of *Enough Stuff* examined visitors’:

- ◆ Overall experience;
- ◆ Understanding of programs’ messages;
- ◆ Affective and cognitive experiences, including learning about climate change and attitudinal changes;
- ◆ Reaction to the Aquarium’s presentation of climate change information; and
- ◆ Plans for future action to address climate change and possible barriers.
- ◆
- ◆

### DATA COLLECTION PROTOCOL

RK&A collected telephone numbers from visitors who attended *Enough Stuff* and conducted in-depth telephone interviews two to four weeks after the visit. All data were collected in July and August 2010.

### TELEPHONE NUMBER COLLECTION AND IN-DEPTH TELEPHONE INTERVIEWS

To understand the visitor experience during *Enough Stuff*, RK&A conducted in-depth telephone interviews with adult, English-speaking family groups. Trained data collectors intercepted adult, English-speaking visitors (18 years or older) on the outdoor deck before or after *Enough Stuff*. Data collectors asked visitors to provide their telephone number and agree to a telephone interview. If the visitor declined, the data collector logged the visitor’s gender, estimated age and reason for refusal. If the visitor agreed, he or she filled out the telephone number collection form (see Appendix G). Two to four weeks later, data collectors called visitors to conduct the telephone interview. All interviews were audio recorded with participant consent and transcribed to facilitate analysis.

### PROGRAM DESCRIPTION

*Enough Stuff* is a NOAA-funded program presented three times daily on the Aquarium’s outdoor deck. The 15-minute program tells the story of a parent and child who are visited by three different ocean animals. Through songs and dances, they learn the potential impacts of climate change on each of the animal’s homes and lives. As stated in the *Enough Stuff* script, the parent, child and the audience also learn that small changes in their own lives can have a big impact.

### DESCRIPTION OF VISITORS

#### PARTICIPATION RATE

Over eight days, 110 telephone numbers were collected at *Enough Stuff*. There were 121 refusals or blank forms returned for a response rate of 48 percent. Two to four weeks later RK&A contacted visitors

from the telephone recruitment forms (see Appendix G) and interviewed 28 English-speaking adults, ages 18 years and older over the course of 15 days.

## DEMOGRAPHICS

Of the 28 visitors interviewed, approximately two-thirds were female (64 percent) and one-third were male (36 percent). Interviewees' ages ranged from 21 to 75 with a median age of 45 years.

Three-fourths of interviewees had visited the *Hot Pink Flamingos* exhibition (74 percent). One-third saw a show in the auditorium, though none of the interviewees saw *Whales to Windmills*. One interviewee had also seen *Watt a Waste* on the outdoor deck.

## OPINIONS OF ENOUGH STUFF

### THOUGHTS AND IMPRESSIONS OF ENOUGH STUFF

Interviewees were asked to explain their reactions to and share their thoughts and feelings about the *Enough Stuff* program. While a few had trouble remembering the program at all, most interviewees had positive impressions and praised the program's entertainment value, as one interviewee said, "[the performers'] voices were excellent. It was fun." Approximately one-half stated that they appreciated the program's environmental message and thought about it afterwards (see quotation below). Two described the program as educational.

I think they had a very good message that we should be conscious of the things we use that pollute and [the importance of] preserving the environment. [female, 63]

In contrast, a few interviewees expressed frustration about the program's message and the information presented (see the quotations below).

It was excellent and seeing the subject was fine. I understand the whole concept of what the Monterey Bay Aquarium is trying to achieve but it was over and over and over again. It was like overkill to me. [male, 56]

It turned out to be cute and the kids really liked it. But we didn't learn anything new. We already do everything that they suggested. We were looking for some new tips and we didn't get any ... [and] it's always nice to pick greener tips that you're not using, which didn't happen for us. [female, 43]

### PROGRAM EXPERIENCE FOR ADULTS AND CHILDREN

Almost two-thirds of interviewees thought that *Enough Stuff* worked well for children and adults. These interviewees praised the program's content and presentation (see first quotation on next page). A few were more focused on the effect of the program on the children in their group, emphasizing that their children enjoyed it and that the performers were very approachable (see second and third quotations).

I thought it had a great message for adults and it's never too early to introduce children to that concept and ... I know the kids had a great time. They loved the costumes and the way the people were singing and presenting it. I think that was, to them, one of the highlights of our trip. [female, 63]

[*Enough Stuff*] conveyed the message [of] responsibility to our world, taking care of everything so I was rather impressed and glad that my son and daughter had a chance to see this. [male, 54]

I thought it was good and [the performers] did a good job.... I thought everybody there did a really good job and they were really friendly after the performance. My daughter actually went up to the woman in the flamingo costume and she talked to her for a bit and she was really friendly and gave my daughter a lot of attention so I was happy about that. [male, 41]

About one-third expressed negative or neutral opinions about the program's experience for adults and children. A few stated that the show was either too "corny" or "young" for their older children and teenagers, while a handful of others stated that the storyline and message was too complex for their young children. Finally, a few didn't have strong feelings either way and simply thought the show was mediocre or had no opinion about it.

### **SPECIFIC ASPECTS OF *ENOUGH STUFF***

Interviewees were asked to share what aspects they enjoyed most about *Enough Stuff* and what could be improved. One-half of the interviewees said that they enjoyed the songs, music or performers most (see first quotation below). About another one-half mentioned the environmental message as the most appealing aspect of the program (see second quotation). A few couldn't think of anything that they enjoyed most.

I'm a musician so I liked the group singing and the harmony and singing. I liked the actual musical side of it. [male, 41]

The overall message. Just reusing stuff, get rid of clutter basically so the animals can, you know, have a better place to live. But I mean the overall message. [female, 21]

Interviewees were then asked what could be improved about *Enough Stuff*. Approximately one-half couldn't think of anything. About another one-half had suggestions about the location, message or presentation of the program. A few didn't like the outdoor deck or found the weather distracting. A few others recommended changes to the storyline and more new information about environmental solutions (see quotations below).

Overall I just think it was a little bit long. I can understand why they had the background of the girl sitting at home and not doing anything, but I work with preschoolers and I think that their attention would have been lost in the first three minutes. [Another] thing, when I took marketing classes the first thing they teach you is 'know your audience.' You know to get into the Aquarium as a family it cost us about \$90.00. As a family that has that kind of money to actually enter the Aquarium, I felt like we already knew the steps that we needed to take to help out the environment, which is recycling and reusing and using less energy. And even though the overall idea is a really good concept, I'm not exactly sure if you're hitting your target audience with those key elements because the actual audience that's attending is semi upper middle class [and already knows the facts presented in *Enough Stuff*]. [female, 45]

(What could be improved about the program?) For people who are already doing the basics, we need the next step of what's greener. We run into that a lot, we're already recycling, reusing and the solar panels and that kind of thing. Well what's the next layer? [female, 43]

## MESSAGES FROM *ENOUGH STUFF*

Interviewees were asked what messages they took away from *Enough Stuff*. Three-quarters of interviewees mentioned one or more general environmental messages that were presented in the program, including that human actions affect nature; be conscious about waste; reduce, reuse, recycle; and care for animals and nature (see first quotation below). One interviewee specifically stated that *Enough Stuff* presented a message to buy fewer things and observed that there were mixed messages about consumerism (see second quotation below).

The kids [are] fairly young so I don't know that they got the full message, but it introduces them and we did talk about it some afterwards so that it would maybe stick with them a little better. About being conscious of the materials that you use and to use reusable objects rather than the plastics and to be aware of pollution and the effect it has on animals. [female, 63]

You never know how the kids' minds work but I think they got the message, the main message of less stuff. Going back to the first question, the other impression that came was it was odd hearing that message and then walking past all the gift stores where they want to sell you stuff that you don't need. It seemed a little ironic. [male, 56]

Approximately one-quarter of interviewees couldn't recall any messages that they gleaned from *Enough Stuff* (see quotation below).

[My daughter] is only four so the colors, singing and dancing were great for her. It's hard to tell what their little minds grasp at that age. I thought it was very enlightening. We were talking about polar bears but there's so much more to it than that. I thought it would be a good message for maybe a seven or eight [year old child]. I think they would grasp a little bit more but as far as mine, I don't think I can answer that for you right now because she's four. [female, 45]

## NEW INFORMATION AND LEARNING

Interviewees were asked if they or their children took away any new messages or ideas from *Enough Stuff*. Two-thirds of the interviewees didn't receive any new messages or information, but many of those found that the program reinforced ideas they already knew (see first quotation below). Conversely, one-third stated that they heard new information about concrete things to do to reduce waste (see second quotation).

(Were any of these messages or ideas new to [your son]?) Well not really new, but I think they were reinforced by the little drama. (And what about you, did you take away any new messages or ideas?) I did, [to be] more creative with the activities that we plan for our kids when we're home. [male, 33]

(Were any messages or ideas new to your children?) Some of them were new for them. My daughter mentioned that she didn't realize how [much waste products] affect the wild. (Did you take away any new messages or ideas?) Just come to realize that really every single effort helps even if it looks little. Like I have my bags that people have given me, instead of using plastic bags, and I just keep forgetting to bring them with me every time that I go to the store, so it's something that I need to put more emphasis not to forget about them. [female, 38]

## WAYS TO PROTECT THE ENVIRONMENT

In an effort to gather multiple perspectives on the messages of the program, interviewees were also asked what, if anything, they learned about protecting the environment from watching *Enough Stuff*.



Approximately two-thirds said that they or their children learned about the impact human actions can have on animals and the environment (see quotation below).

[The children] didn't know about the temperature of the water and the change in the ratio of genders in the sea turtle. They didn't know there [are] more females because the water is warmer. So that was new, [and] that was worth the conversation. [female, 43]

Interestingly, interviewees also mentioned the amount of waste in daily life and observed that *Enough Stuff* made taking action to reduce waste seem possible and even fun (see quotation below). None of those interviewees who discussed reducing waste had seen the other theatrical presentation.

There's a lot of waste and [the message was] not to waste. I think [the children] got that. Also, [the message] about protecting [the animals]. If we do waste then we're going to hurt the animals. So obviously that was the message. [female, 43]

One-third didn't think that their visitor group learned anything about protecting the environment either because the children were too young or because they were already knowledgeable (see quotation below).

I'm not sure that [my son] learned anything that he didn't already know. You know he watches a lot of Discovery channel and he had watched that week, as a matter of fact, a lot about the sharks. So you know I think they're fairly well schooled to begin with. You know I don't think it hurts, but that was not the highlight of the day for him. [female, 72]

## EMPOWERED TO MAKE A DIFFERENCE

### PROMPTED TO TAKE ACTION

The Aquarium hoped visitors would leave the program feeling that they can make a difference. Interviewees were asked how they felt at the end of the program and whether they felt like they could take action. The majority of interviewees stated that the messages presented in *Enough Stuff* were important, especially for children, while also recognizing the complexities faced (see first quotation below). Some stated that *Enough Stuff* emphasized that little actions can make a big difference and that the show made them think (see second and third quotation). One individual didn't feel as positively about the effect of the program and stated that its message was "overkill."

[That is a] hard question. I think that I've always tried my best to recycle and do all the things that are important. Maybe I'm not out there trying to save the whales, but we support it as best we can monetarily. Hopefully, [that] can make it a better world for coming years because it's kind of a scary thing that these animals are going [to become] non-existent. We just visited Alaska a couple years ago, and you see that the glaciers are all breaking away and it's sad. You don't really know what to do about it other than do your part, and be sure that your kids understand that they have to do their part too. [female, 46]

I think you all did a really good job of getting the message across that everybody can do something, which I think is important because you have a wide array of visitors and although I think you have a lot [who] are pretty in tune to environmental concerns and recycle and compost and all that stuff, I think there's also an awful lot of people [for whom] that's not part of their awareness. [female, 48]

I feel that if you [get] 80 people out of a hundred to do [something], not necessarily a lot, even a little, [and] if you get 80 percent of the population to do a little, it turns [out] to be a lot. My mom and dad do nothing. They don't recycle. They don't do anything. [male, 35]

## PERSONAL ACTIONS TAKEN

Interviewees were asked what personal actions, if any, they were inspired to take after watching *Enough Stuff*. Most interviewees mentioned behaviors that they already do to address the issues raised in the presentation; “we compost, we recycle, we keep our heat down in the winter and our air off in the summer and [already] do all of that stuff.” A few interviewees mentioned taking additional action such as recycling, reusing items, using less, bringing reusable bags when shopping, walking or biking more and not littering (see quotation below).

We're trying to turn more lights off. I just hit the power cord switch for the computer, because there's no reason to have a computer on for four days if you're not going to use it... We could also save on our electric bill, which saves on the coal that's being burned or whatever to produce the electricity. [male, 35]

A few couldn't think of any new behaviors that they could engage in to address the issues raised in *Enough Stuff* (see quotation below).

We already take action. The program didn't inspire us to do anything more. It was a lovely program and it's nice to see the Aquarium always trying to add an honest new message without being overbearing. It's nice when I teach it at home and then go out and find other places in the community supporting it, reinforcing. [female, 45]

## CHALLENGES TO TAKING ACTION

Interviewees were then asked what challenges they faced in taking personal action. Two-thirds of interviewees gave multiple examples of challenges including obstacles in their communities, cost, remembering and effort (see quotations below). One-third didn't mention any challenges to taking action to protect the environment, as they are already taking personal action.

Obviously manufacturers can make a difference by not making everything in all this plastic, right? But they do and I doubt that that will [change]. You know we can buy a little bit less and recycle, and when I go shopping instead of getting new bags, I can bring my own. People can help but the manufacturers [have a big impact]. I buy kids' stuff and it comes with a ton of packing. And everything you buy comes with a ton of packaging. [female, 43]

(What challenges might prevent you from taking these actions?) A couple of times I've gotten lazy and not wanted to ride my bike, [the program] concretized [the importance of] it. We do need to [do it]. Don't become lazy. [female, 45]

## CLIMATE CHANGE AND THE OCEANS

### CONNECTION OF *ENOUGH STUFF* TO CLIMATE CHANGE

Each interviewee was asked to discuss how *Enough Stuff* related to climate change and the oceans. Most perceived some relationship. One-third of interviewees stated generally that climate change means it's harder for animals to live in the oceans (see first quotation below). Another one-third stated that trash hurts the oceans (see second quotation). Approximately one-third stated that they were still confused

about the relationship as presented in *Enough Stuff*, either because they found the program itself confusing or because the topic is such a complex issue (see third and fourth quotations).

I thought [*Enough Stuff*] did a really good job of relating to climate change and the ocean. I think the aspects that they specifically talked about when it came to the animals [and] describing [their] situation was very good. We need to be taking care of the environment because it influences the animals. [female, 45]

I think it completely relates to climate change. I personally think that the whole global warming is everything. It's changing things in the sea. The people who own these businesses out in our waters, they're such huge companies. What really as a small person can you do? [It's] horribly sad because it's killing all of the beautiful life out in the ocean. [female, 46]

I don't remember every detail of the little skit. I don't remember there being a direct correlation or thinking along those lines. My whole experience at the Aquarium [is that] you have six hours there [and] when you leave you get the feeling that something should be done but you're not sure what. [female, 45]

The program was about climate change in the ocean? Some of it was about crowding, [animals] got pushed out of their homes. So I guess it was mostly the animals that were living directly in the ocean that were reflecting the temperature change and things. It would have been nice, I think, to see more about waste products in the ocean. You know, my kids know that there's a huge amount of plastic in the ocean and that there's areas of the ocean that are just dead because there's not enough oxygen to support life. So that would have been a more in-depth layer that really motivated my kids to make changes. So maybe that's the next step, but that's something that we continually remain shocked about even though we know it, that there's just thousands and thousands of square feet, miles of the ocean that very little if anything at all lives there. [female, 43]

## REACTION TO PROGRAMS ON CLIMATE CHANGE

RK&A asked all interviewees about their reaction to the Aquarium presenting programs on climate change and the oceans. Most interviewees were enthusiastic about seeing programs and stated emphatically that the Aquarium should present programs on climate change (see first quotation below). Others wanted more in-depth information and praised the *Hot Pink Flamingos* exhibition as part of an Aquarium-wide focus on climate change education (see second and third quotations). Six interviewees were unsure or didn't think it was a good thing for the Aquarium to do (see fourth quotation).

(Do you think the Aquarium should be presenting exhibits and programs about climate change?)  
Yes I do. On an individual day it's hard for people to see what difference they're making, but I think once people see that as a global community we can make a larger, much bigger impact if we're all doing the right thing environmentally. [male, 33]

I think if they're going to, they need to do bigger studies, they need to show people the history of the climate changes, because we have had [an] ice age, and we have had very hot ages where the ice had melted. So I think they need to do more of a study on that and show the history of what our climate's had, [what] our climate has been in the past, and what's the difference now as opposed to back then. [female, 43]

(Do you think the Aquarium should be presenting exhibits and programs about climate change?)  
Definitely, I think it's critically important. There's a growing number of people who are aware

but because a lot of the climate change setbacks are not being seen as much in this country as they are in other places like Australia and some of the Island countries, it's easy for people to buy into the idea that it's all just something made up by the wacky environmentalists. So I think it's good that your new exhibit [*Hot Pink Flamingos*] with the flamingos and the sea turtles [and] that video. I noticed that was really popular where you could put your face on the screen and pledge to do something. I thought that was really an excellent exhibit. And I applaud the Aquarium [because] I know that that may be stepping out a little bit on a limb. I really applaud the Aquarium for doing that. [female, 48]

I'm not really sure if they should because I'm not really sure it's true to be really honest with you so, you know, I know that there's lots of evidence that leads us to that but I think that if they're going to talk about that they need to speak both sides very clearly and let people make a choice. [female, 45]

# PRINCIPAL FINDINGS: WATT A WASTE PRESENTATION

RK&A conducted telephone interviews with 27 adult visitors who had attended the *Watt a Waste* theatrical presentation during the 2010 summer months at the Aquarium. Interviewees were asked to discuss their overall opinion of the program and understanding of relevant issues relating to climate change and the oceans.

## EVALUATION OBJECTIVES

The evaluation of *Watt a Waste* examined visitors’:

- ◆ Overall experience;
- ◆ Understanding of programs’ messages;
- ◆ Affective and cognitive experiences, including learning about climate change and attitudinal changes;
- ◆ Reaction to the Aquarium’s presentation of climate change information; and
- ◆ Plans for future action to address climate change and possible barriers.

## DATA COLLECTION PROTOCOL

RK&A collected telephone numbers from visitors who attended *Watt a Waste* and conducted in-depth telephone interviews two to four weeks after the visit. All data were collected in July and August 2010.

### TELEPHONE NUMBER COLLECTION AND IN-DEPTH TELEPHONE INTERVIEWS

To understand visitor experience during *Watt a Waste*, RK&A conducted in-depth telephone interviews with adult, English-speaking family groups. Trained data collectors intercepted adult, English-speaking visitors (18 years or older) on the outdoor deck before or after *Watt a Waste*. Data collectors asked visitors to provide their telephone number and agree to a telephone interview. If the visitor declined, the data collector logged the visitor’s gender, estimated age and reason for refusal. If the visitor agreed, he or she filled out the telephone number collection form (see Appendix G). Two to four weeks later, data collectors called visitors to conduct the telephone interview. All interviews were audio recorded and transcribed to facilitate analysis.

## PROGRAM DESCRIPTION

*Watt a Waste* is a NOAA-funded program presented three times daily on the Aquarium’s outdoor deck. The 15-minute program tells the story of a child who, through songs and dances, learns about the negative impact of wasting energy at home. As stated in the *Watt a Waste* script, the child and the audience also learn that small changes in their own lives can have a big impact.

## DESCRIPTION OF VISITORS

### PARTICIPATION RATE

Over 10 days, 90 telephone numbers were collected at *Watt a Waste*. There were 112 refusals or blank forms returned for a response rate of 45 percent. Two to four weeks later, RK&A contacted visitors

from the telephone number collection forms (see Appendix G) and interviewed 27 English-speaking adults, ages 18 years and older over the course of 17 days.

## DEMOGRAPHICS

Of the 27 visitors interviewed, over two-thirds were female (74 percent). Interviewees' ages ranged from 28 to 73 with a median age of 42 years.

Over two-thirds of interviewees had visited the *Hot Pink Flamingos* exhibition (69 percent). One-third saw a show in the auditorium, and a few of the interviewees saw *Whales to Windmills*. A few had also seen *Enough Stuff* on the outdoor deck.

## OPINIONS OF WATT A WASTE

### THOUGHTS AND IMPRESSIONS OF WATT A WASTE

Interviewees were asked about their thoughts and impressions of *Watt a Waste*. One-half stated that the performance was well done and fun or mentioned that the performers were very talented (see first quotation below). Slightly less than one-half stated that they thought about the general environmental message after the performance and that it had an impact on the children in their group as well (see second and third quotations).

We all said that they were so fantastic. They must be experienced performers. They sing better than the ones at American Idol. [They were] professional, they sound it. [female, 58]

I know my daughter does remember it. It stuck with her if I turn [the light] on in her room and I tell her, 'just leave it on for a little bit and I'll come turn it off' before she goes to bed. And she [says] 'no, remember the show, we can't leave it on.' So she'll go ahead and turn it off. [Or] I'll remind her: remember the show they said no energy monsters, you get those filthy monsters when the lights are on. So it stuck with her, she remembered it. [female, 30]

I always ask my kids [what they thought] because I think it's predominantly for them, those kind of dramas, and my daughter said [that] the Mad Scientist one with the monsters was good and effective and got its point across. She's been walking around the house turning off lights on us while we're still in rooms ever since. She's 11 and she's very astute and insightful. She said the other one was not as effective; we watched both of them. (The other program called *Enough Stuff* wasn't effective?) She didn't think it had the same impact at all. [female, 52]

A few visitors offered constructive criticism for the program, including focusing on other aspects of climate change and using less energy, from microphones and amplifiers, during the show (see quotation below).

Using less energy wasn't [the most] effective way of helping the environment. The bigger problem was that there are too many people in our world right now, overpopulation is a bigger problem than energy use. And my daughter said that [the Aquarium was] using electricity for the music [for *Watt a Waste*]. I'll just say that was my one thing I took away is that you guys were focusing on the wrong approach. [female, 43]

### PROGRAM EXPERIENCE FOR ADULTS AND CHILDREN

Almost two-thirds of the interviewees stated that *Watt a Waste* was good for adults and children. Some appreciated having the conservation message reinforced for both adults and children (see quotation below). Others enjoyed the program but felt that only their children benefited from the content. In

contrast, one-third had constructive criticism for the program, including that there should be more participation, and that the presentation should have presented new information to children (see second quotation). Also, one parent worried that “the monsters were a little bit scary at first.”

(What thoughts or impressions come to mind when you reflect back on seeing the program?) I thought it was good for everybody. I’m constantly astonished by the lack of recycling I see in my friends, so I like that message reinforced wherever possible. So it’s good for adults as well as kids. [female, 42]

[*Watt a Waste* is] putting out a good message but when kids [have to] sit there, there’s like a little war. I think when kids participate they tend to retain things a lot more than they do if they’re just sitting there watching something. We were hoping that maybe it would have been a little bit more geared towards kids as far as participation. [male, 42]

### **SPECIFIC ASPECTS OF WATT A WASTE**

When asked what part of *Watt a Waste* they enjoyed most, one-half of interviewees discussed its general environmental message (see first quotation below). Another one-half said that the performance and the music was what they enjoyed most (see second quotation).

(What did you like or enjoy most about the program?) The message because it’s so important to know that it’s the little things that you do [that make a difference]. We saw two performances. Even though it’s a big problem, you as one person can do a lot. And the message is really good. I have a six-and-a-half year old and three year old. They understood it. [female, 42]

(What did you like or enjoy most about the program?) I would probably have to say the music. I really liked that. I really liked that song that they did: the reduce, reuse, recycle [song]. It gets stuck in your head. I thought that was the best part of it. [Also, the] timing was really good, you know, it kept the kids’ attention, it wasn’t too long. I thought it was good. [female, 36]

Interviewees were then asked what could be improved about *Watt a Waste*. Approximately one-half couldn’t think of anything. One-half wanted the show to be more interactive or provide additional information (see first and second quotations below).

I think it would be [better] if they had some audience interaction. Maybe getting the audience involved in it here for a little [of the] time. [My kids] talked about those things. [male, 39]

(What about the program could be improved?) A little more information on why conserve so much. How does it affect the sea life directly? All it said is don’t do this because this is [bad]. Maybe a little more [information] for the adults. [male, 48]

### **MESSAGES FROM WATT A WASTE**

Interviewees were asked what messages they gleaned from *Watt a Waste*. Two-thirds said that they took away messages about conservation and not to waste, as well as specifically that turning off lights at home is important (see first quotation below). Others mentioned the songs and the connection between waste and the oceans (see second quotation). Three didn’t take away any messages.

[My children] asked a lot of questions after about the penguins and the heat and why you have to shut things off. So it was good because then I just re-emphasized how important it is to shut off

the lights and shut off the water, and that was good for them. Because you know how kids are with that, so that was a good pointer for them. [female, 36]

I think the main thing is kids make an attempt to conserve energy, save on electricity. If you abuse the atmosphere, it's [going to] affect the ocean's sea life. In fact, that's what I made sure my [older child] got out of it and she got an understanding. I talked to [both of my children] a little about it. It was nice show; it's a nice day. And colors you know, a lot of colors, I think that kept my son's interest. [male, 48]

## NEW INFORMATION AND LEARNING

Interviewees were asked if they or their children took away any new messages or ideas from *Watt a Waste*. Approximately two-thirds didn't learn any new messages from *Watt a Waste*, although many discussed how the program reinforced ideas they already knew (see first quotation below). Approximately one-third learned that energy waste affects animals and concrete steps to reduce it (see second quotation).

(What messages or ideas do you think you and your child took away from the program?) I don't think they were new but this certainly wasn't a big deal to them before this, and now it's a big deal. [female, 31]

(What messages or ideas do you think you and your child took away from the program?) Some of the things like leaving computers on [or] when you leave the lights on ... I think [my daughter] didn't really think about that beforehand. I didn't really realize that they would be necessarily sucking tons of energy. [female, 43]

## WAYS TO PROTECT THE ENVIRONMENT

In an effort to gather multiple perspectives on the messages of the program, interviewees were also asked what, if anything, they learned about protecting the environment from watching *Watt a Waste*. Approximately one-third stated that they learned either they shouldn't waste or they should reduce, reuse and recycle (see first quotation below). Approximately one-third stated that actions connect to the environment, and that simple things make an impact (see second quotation). The last one-third didn't feel that they clearly learned anything and expressed some lasting confusion about climate change effects on the oceans and possible actions to take (see quotation on next page).

[My children] definitely learned to reduce energy and save the animals by wasting less. They can help preserve the resources that we have. [male, 32]

By throwing things in the garbage can or using less of things and not being wasteful, they're protecting the animals they like. Doing this is protecting animals in the ocean [so] that they won't get sick or get hurt or anything like that. [female, 39]

I don't know if they picked up anything. I didn't pick up anything myself other than you know make an attempt to or continue to [try]. No, I don't think [we learned] anything really deep other than [what] parents might tell their kids all the time. Maybe the kids didn't realize how it [affects the environment]. I'm not so sure myself exactly how changing a light would affect the oceans. Maybe I could probably figure some things out. But I don't think they conveyed that message to anyone. I don't think [my children] picked it up; if they did I didn't, I missed it. [male, 48]



## EMPOWERED TO MAKE A DIFFERENCE

### PROMPTED TO TAKE ACTION

The Aquarium hoped visitors would leave the program feeling that they can make a difference. Interviewees were asked how they felt at the end of the program. Over one-half stated that *Watt a Waste* presented an important message and that the program made them think (see first quotation below). Interestingly, a number of interviewees were very focused on discussing how others need to be inspired to change, “I already feel that way, I just want more people to feel that way” (see second quotation). Almost one-half stated that it was inspiring, and that they felt they could make a difference. A few stated that they already do what they can and don’t plan to change or take further action (see third quotation).

By just teaching our kids, we felt like we could make a difference.... We feel like if we’re teaching our kids and actively recycling and watching our energy use and things of that nature, [and] if we’re taking the time to be consistent the kids learn about it and that passes on. [female, 39]

(The Aquarium hopes visitors leave the program feeling that they can make a difference. How did you feel?) It’s really, really good. Sometimes they just don’t get the message in the Midwest. Wherever the ocean is, not my problem. Yeah it is. And it’s not just the ocean, it’s everything, the whole global warming, and the animals [on the] show, the sea turtle and the flamingos and everything. That hit home. Look what global warming’s doing. Our kids are like, what? What do you mean the mama sea turtle can’t find the dad, so they’re amazed. You know, little things like that, so I think the message you guys are sending is really good. [female, 42]

I’ve always thought that we have been [conscious of waste]. I don’t leave rooms with lights on. I mean when I go to vacuum, when I leave I turn all the lights off. If the kids leave lights on, I’m always thinking who left the light on. We do that already. We do make a difference without me having to think about it specifically. [female, 53]

### PERSONAL ACTIONS TAKEN

Interviewees were asked what personal actions, if any, they were inspired to take after watching *Watt a Waste*. Most interviewees mentioned behavior that they planned to do more of or already do that addresses the issues raised in the program. Approximately two-thirds stated that they could take personal action by turning off the lights among other things (see first and second quotations below). Some also stated that they already do those things mentioned in *Watt a Waste* and don’t plan to change (see quotation on next page). A few others mentioned unplugging electronics, recycling, not buying Styrofoam or walking and biking more.

Personal actions yeah, I did think [about it]. We’re going to be more conscious about how we use electricity in the house and making sure lights are turned off and that we keep our thermostat set for the appropriate temperature during the season. [female, 45]

[We are] very conscious of turning off lights all the time when we’re not using it. And we’ve worked on that already, but my daughter’s taking it to new heights. She turns them off while we’re still using them. It’s very comical. [female, 52]

(What personal actions might you and your family take given what you saw or heard in the program?) We [already] practice that. I’m not going to do anything more than what we normally do. We try to recycle when we can and we try to do our best to shut lights off and close doors in the winter to conserve energy. So I mean I don’t think we’re going to do anything more, because we’re aware of that kind of stuff already. [male, 37]

## CHALLENGES TO TAKING ACTION

After describing personal actions, interviewees were asked to reflect on what challenges might prevent them from taking action. Almost one-half couldn't think of any challenges as they are already taking personal action. One interviewee discussed in detail how *Watt a Waste* helped her children overcome what had previously been a challenge to conserving energy (see quotation below).

(What challenges might prevent you from taking these actions?) There [were] a few, but the kids seem to overcome it ever since they saw the show. My kids are afraid of the dark and they use their closet light and the night light. When they saw the little girl turn off her light, and there were no monsters because she turned off her light, then they realized that maybe if they do that, then maybe the monsters will go away. Maybe by leaving the light on they're actually bringing the monsters. They want to shut off their closet light a little more, because that was a challenge before. We have night lights now. They're happy because it's for them and it's just bright enough they can see, but not bright enough to bring in the energy monsters. [female, 39]

In contrast, the other one-half mentioned a variety of challenges including: laziness, time, inconvenience, forgetting and community challenges (see first, second, and third quotations).

(What challenges might prevent you from taking these actions?) I guess being lazy. You know how we all get lazy sometimes, you'd rather put things in the dryer than hang them out on the line, those kinds of things. Or being tired and busy, being very tired and busy and not being able to have the time to do it. [female, 52]

You have to really spend time, extra time, [to] recycle the stuff or rinse the jars out instead of just throwing them in the trash. Or whatever the case is, it's just that time. God created the Earth for us, and we appreciate that, so we need to say thank you for that one by trying to recycle and keep the Earth clean. We're not overboard about it, but we really try to do what we can. [female, 36]

I try not to purchase Styrofoam. We have a really great recycling plant near Monterey County, but it doesn't take Styrofoam. What's up with that? Don't sell [it] if you can't recycle it. You go to Costco, you buy fruit and it comes in those big huge plastic molds. And even though it says ... I'm able to recycle the plastic, it's still a big chunk of plastic. My kids [reuse it] by playing with it. You [have a] catch-22, do you want [to] put them in a cardboard box you know, that's trees.... There's hemp [and] you can get the cornstarch utensils. You've got DuPont owning the planet. There's a big evil right there. You want to talk about a challenge, yes, DuPont, that's a challenge right there. Then to switch over from the nasty plastic to something that isn't going to be so bad like the cornstarch plastic forks and knives and stuff like that. [female, 42]

## CLIMATE CHANGE AND THE OCEANS

### CONNECTION OF *WATT A WASTE* TO CLIMATE CHANGE

Interviewees were asked how *Watt a Waste* relates to climate change and the oceans. Approximately one-half were confused and unable to answer the question. The other one-half stated examples of how the program related to climate change and the ocean, including: energy use leads to CO<sub>2</sub> pollution, global warming leads to warmer oceans and trash affects the oceans (see quotation below).

(In what ways, if any, do you think the program relates to climate change and the oceans?)  
Everything is connected. It's pretty profound. There's the energy we use [that] comes from plants and industry where it's produced, and in the production of that kind of energy, there's a lot of carbon dioxide and other gases getting into the air, and those gases affect the atmosphere and the atmosphere as it changes, it affects the temperature at both the North and South Poles. And that affects the temperature of the water, so it's all one big huge ongoing connected circle. And I think every individual needs to take their part. But I also think really honestly that industry, big industry is probably a great deal more the culprit than the individuals. I think a lot of individuals are trying to be really mindful and careful. [female, 52]

## REACTION TO PROGRAMS ON CLIMATE CHANGE

Finally, interviewees were asked whether the Aquarium should present programs on climate change. The majority of interviewees stated that it was very important to present programs on climate change. Most stated that the message was especially important for animals and children (see first and second quotations below). Some others stated that its necessary to promote change and that it's an important part of the Aquarium's mission.

Climate change affects the currents in the ocean layers and it affects the migration of different sea life and that can affect their health. They're an Aquarium and they study sea life so, yes, definitely they should be talking about that stuff. [male, 48]

(Do you think the Aquarium should be presenting exhibits and programs about climate change?)  
I think it's really important. Everything starts with education. With the kids it's very important that they learn these things. It was a great show, and you guys [are] a doing a great job. Keep doing it. [male, 32]

In contrast, a few interviewees said they weren't sure if it was a good idea for the Aquarium to present programs on climate change (see quotation below).

(Do you think the Aquarium should be presenting exhibits and programs about climate change?)  
That's a great question. I'm also aware, because I read some of the literature, that there's a lot of conflicting evidence on climate change and what's really causing it and what the agendas are behind all that. So where did the facts come from? Who provided these facts? Is there conflicting evidence? Rather than it being pure science, [purely] looking at these beautiful things in our world, for the first time when I walked through the Aquarium I felt like we'd stepped across that line into stuff that is somewhat controversial. I didn't enjoy that. I missed the pure joy of exhibits that focused on the magnificence of what's out there in the sea. It suddenly became a controversial issue and I'm like, 'Oh darn.' [female, 52]

# PRINCIPAL FINDINGS: *WHALES TO WINDMILLS* AUDITORIUM PROGRAM

RK&A conducted telephone interviews with 29 adult visitors who had attended the *Whales to Windmills* auditorium program during the 2010 summer months at the Aquarium. Interviewees were asked to discuss their overall opinion of the program and understanding of relevant issues relating to climate change and the oceans.

## EVALUATION OBJECTIVES

The evaluation of the *Whales to Windmills* auditorium program examined visitors’:

- ◆ Overall experience;
- ◆ Understanding of programs’ messages;
- ◆ Affective and cognitive experiences, including learning about climate change and attitudinal changes;
- ◆ Reaction to the Aquarium’s presentation of climate change information; and
- ◆ Plans for future action to address climate change and possible barriers.
- ◆
- ◆

## DATA COLLECTION PROTOCOL

RK&A collected telephone numbers from visitors who attended *Whales to Windmills* and conducted in-depth telephone interviews two to four weeks after the visit. Telephone number collection occurred over five days in August 2010.

### TELEPHONE NUMBER COLLECTION AND IN-DEPTH TELEPHONE INTERVIEWS

To understand the visitor experience during the *Whales to Windmills* auditorium program, RK&A conducted in-depth telephone interviews with English-speaking adults. In-depth interviews encourage and motivate visitors to describe their experiences, express their opinions and share with the interviewer personal thoughts and reactions. In-depth interviews produce data rich in information because interviewees talk about personal experiences in their own words.

Trained data collectors intercepted adult, English-speaking visitors (18 years or older) inside the auditorium after *Whales to Windmills*. Data collectors used a continuous random sampling method to ensure they didn’t bias the sample. Data collectors asked visitors to provide their telephone number and agree to a telephone interview. If the visitor declined, the data collector logged the visitor’s gender, estimated age and reason for refusal. If the visitor agreed, he or she filled out the telephone number collection form (see the Appendix J). Two to four weeks later, data collectors called visitors to conduct the telephone interview. All interviews were audio recorded with participant consent and transcribed to facilitate analysis.

## PROGRAM DESCRIPTION

*Whales to Windmills* is a NOAA-funded program presented four times daily in the auditorium of the Monterey Bay Aquarium. The 15-minute program also includes a preshow multiple-choice quiz on inventions inspired by the oceans. As stated in the presenter packet, the program uses video and a live presenter to present hopeful stories of how inventions inspired by ocean life can help people save energy.

## DESCRIPTION OF VISITORS

### PARTICIPATION RATE

Over five days, 100 telephone numbers were collected. There were 69 refusals or blank forms returned for a response rate of 59 percent. Two to four weeks later, RK&A contacted visitors from the telephone recruitment sheets (see Appendix J) and interviewed 29 English-speaking adults, ages 18 years and older over the course of six days.

### DEMOGRAPHICS

Of the 29 visitors interviewed, approximately two-thirds were female (66 percent) and one-third were male (34 percent). Interviewees' ages ranged from 19 to 70 with a median age of 46 years.

Over two-thirds of interviewees had visited the *Hot Pink Flamingos* exhibition (69 percent) and a few had also seen a show on the outdoor deck. Approximately two-thirds saw the auditorium program with children (62 percent).

## OPINIONS OF WHALES TO WINDMILLS

### THOUGHTS AND IMPRESSIONS OF WHALES TO WINDMILLS

Interviewees were asked to explain their reactions and share their thoughts and feelings about the *Whales to Windmills* auditorium program. All of the interviewees had positive, general impressions of *Whales to Windmills*. Almost one-half stated that the theme of innovation inspired by nature left the strongest impression (see first quotation below). The other approximate one-half mentioned that the program was educational, informative, interesting or fun (see second quotation).

[My] impressions? I just thought it was awesome how the whale fins were used to make blades for wind turbine fans. I would have never have thought that grooves would have actually increased the efficiency rather than just a bladed edge on the other one. So it really kind of opened my eyes to the fact that the creatures of this planet have a lot to offer for us to learn about. [female, 59]

(What thoughts or impressions come to mind when you reflect back on seeing the program?) I thought it was great. I learned things that I didn't know, and you seemed to see how people reflected and used nature in creating things that better the environment and our use of energy. [male, 62]

One-half of the interviewees also mentioned, independently and without being asked, that the program was too short. Some requested more time for longer question and answer sessions, slowing the presentation down and additional animal examples (see quotation on next page).

I thought it was a little too short. It should have been a little bit longer. Overall, the speaker was good. I think it would have been nice if you could have had a question and answer session. Because there were a lot of kids in there and it would have been nice for them. [male, 33]

## PROGRAM EXPERIENCE

All of the interviewees praised *Whales to Windmills*. Approximately one-half stated that the program itself was fine or good and didn't have additional opinions, while the other one-half said the program was educational, provided good examples and used compelling visuals (see quotation below). Three mentioned that it was simply nice to be able to sit down.

[*Whales to Windmills* was] very educational. It brought up some neat ideas and I was telling my children that if we see one of those wind turbines that's shaped like a whale's fin ... or if it's got a squiggly kind of shape then we know where it came from. It was designed after a whale's flipper and my kids thought that was pretty interesting too. [male, 37]

Though not specifically queried about the program's success with children, almost one-third independently mentioned the impact on children in their group. Of these interviewees, nearly all felt that the program worked well for children (see quotations below), while two stated that it didn't.

We all enjoyed [*Whales to Windmills*]. We went in there with our family. We had kids ages 11 and under and they were all entertained by it. I thought it was good [and] educational. We learned from it instead of just being entertained. [female, 46]

I thought it [*Whales to Windmills*] was great. I really liked it. I really would have liked to have seen more things, if you had found more ways in which they used nature to create other things. That would be great, inspire people to create more. I think it's a neat thing for kids to learn and adults to know too. [male, 62]

## SPECIFIC ASPECTS OF WHALES TO WINDMILLS

Interviewees were asked to share what aspects they enjoyed most about *Whales to Windmills* and what could be improved. Approximately one-third enjoyed the visual aspects the most, including the opportunity to see videos and beautiful photographs of animals (see first quotation below). Another one-third enjoyed the presenter's facilitation of the program the most, including the presenter's style, manner and availability to answer audience questions (see second quotation). The other one-third enjoyed the content of the program the most (see third quotation).

(What did you like or enjoy most about the auditorium program?) Probably the quality of the video and stuff and the pictures underneath the water. I'm not sure what type of camera you guys use, but they capture a really good image. [female, 65]

(What did you like or enjoy most about the auditorium program?) [The presenter] who was giving the presentation made it very interesting and entertaining. [She gave] out information. She made us laugh and have a good time. [female, 64]

I just thought it was very interesting. I thought it was interesting to learn about those kinds of technologies and how brilliant people are coming up with those kinds of ideas. Like the ships for the Navy or whatever and that technology so barnacles won't grow.... I just thought it was very enlightening. People actually thinking about things like that to make things better and looking to nature to do that. [male, 37]

Three stated that the pre-show quiz was the part that they enjoyed most (see quotation below).

I actually liked the scenario before the actual program. I liked that [it was] like a little quiz game. That's actually pretty good. [female, 31]

Interviewees were then asked what could be improved about *Whales to Windmills*. Over one-third didn't have any suggestions about aspects to improve. Another one-third recommended scheduling the show for longer than the allotted time (see first quotation below). Slightly less than one-third wanted the show to be more interactive with the audience (see second quotation).

(What about the auditorium program do you think could be improved?) [Making] the show a little longer, I would have enjoyed [it more]. I would have been quite happy with 20 or 25 [minutes]. Of course other people may have less time. [female, 51]

(What about the auditorium program do you think could be improved?) Maybe if it was a little more interactive. You could have questions, but that was after it was over [when] people are already leaving. I enjoyed it. If it were a little bit longer, I would have enjoyed it. Maybe even a couple more examples, and if we could ask a few questions that would have been interesting too. [male, 37]

## MESSAGES FROM *WHALES TO WINDMILLS*

Interviewees were asked what messages they took away from *Whales to Windmills*. Over one-half of interviewees said that the main message was showcasing innovations and improvements inspired by nature (see first and second quotations below). Almost one-half described the program message as one of conservation (see third quotation). Three were unclear or didn't know what messages the program presented.

I think the main one was that there's a lot that can be learned from the oceans. The Aquarium does a really good job of [showing] how vast they are and how much richness there is in the ocean. This talks about innovation [and] things we can learn from the ocean and then apply it to completely different [situations]. That really stood out. [female, 46]

I think the main thing that I took away was there are a lot more answers to our questions that are right in front of us, that we're just not conscious enough of our physical environment anymore. And so we've lost our relationship with that, and so we're hopefully trying to regain that relationship so we can improve our lives. [male, 53]

(What messages or ideas did you take away from the auditorium program?) It was the Aquarium showing what people are doing to take care of our planet, which is something the Monterey Bay Aquarium [can] do [as] the caretaker for Monterey Bay, so the program for me was just kind of a way to [see] what we're doing here [and what] other people are doing in other parts of the world. [female, 43]

## NEW INFORMATION AND LEARNING

Interviewees were asked if they took away any new messages or ideas from *Whales to Windmills*. Over one-half mentioned at least one example of ways in which ocean plants and animals inspired inventors. The most common examples were whale fins to turbines, boxfish to car design and shark skins to ships

(see first quotation below). One interviewee each mentioned the kingfisher beaks to the train, seaweed photosynthesis to energy and birds to the Wright brothers' flight (see second quotation).

(Based on what you saw or heard during the auditorium program, what, if anything, did you find out about ways ocean plants and animals are inspiring inventors?) I found out a lot. I was really surprised to think that the ridges on the humpbacked whale would somehow affect [wind energy and] they would be used for windmills, or that fish could inspire a fuel-efficient car. I feel like I learned a lot ... lots of interesting associations. [female, 46]

Well, for me, the thing that sticks in my head and comes back the most is the beak [inspiring] the train and how the beak of a bird protects the birds. [Engineers] studied that and studied the environment, and how these birds go into the water and fly, how the shape of their beaks could then be translated into something that we use in the world today and can help reduce costs or reduce energy and reduce sound and just all sorts of things that we strive to do. I think that connection was the most inspiring. [male, 62]

In contrast, slightly less than one-half of interviewees had trouble thinking of examples. Some stated that they had generally learned a lot while others were unable to remember learning anything from the program at all (see quotation below).

To be honest with you my mind is totally blank on what I saw in there. Now because I'm at work, [then] I'm at school and [busy]. So, I remember watching, I remember seeing it but I couldn't tell you ... off the top of my head what it was [about]. [male, 49]

## EMPOWERED TO MAKE A DIFFERENCE

### PROMPTED TO TAKE ACTION

The Aquarium hoped that visitors would feel positive after attending *Whales to Windmills*. Therefore, interviewees were asked how they felt at the end of the program and why. One-half stated that, in general, the program was a positive experience (see first quotation below). Almost one-half discussed ways in which they felt positive about nature, animals or the progress innovation has made (see second and third quotations).

I feel very positive about it. Like I said, I thoroughly enjoyed it. I thought it was very informative and I've been going down to the Aquarium once a year since you guys opened and I don't always get into the auditorium, but I'll make sure that I do next time I'm down here. [female, 50]

(The Aquarium hopes visitors leave the program feeling more positive. How did you feel?) Oh, a lot more positive and I enjoyed it at the same time. It's not like it's being shoved down people's throats. It's done in a way that you come out of it with lingering thoughts about all these animals and protection and not harming them. [female, 21]



(The Aquarium hopes visitors leave the program feeling more positive. How did you feel?) Yes, positive. Instead of seeing the negative all the time and all the damage we're doing and everything it was sort of nice to see because we know that, and we can see that in other parts of the museum. I just think it was nice to see something positive and how people ... use it in a positive way. [male, 62]

In contrast, three felt more worried or worse about the situation (see quotation below).

I don't know if I feel positive about the environment. I love the things that the Aquarium does to make people aware of the environment, but I think we have a long road to go before people are really dialed into that.... The Aquarium's preaching to [the] choir because people that go there are more ecologically aware of stuff; that's why they're there. Whereas people who don't go there are more ignorant about things, and I think we have a lot of work to do. But I don't know. I think the Aquarium is very positive itself, but I don't think that our environmental situation is positive. [female, 41]

### PERSONAL ACTION TAKEN

Interviewees were asked what personal actions, if any, they were inspired to take after watching *Whales to Windmills*. Approximately one-half of interviewees mentioned activities that they already do consistently, and the most common was to share the information that they learned with others (see first quotation below). Some mentioned recycling and reusing. A few mentioned not littering, buying better consumer goods and starting a garden (see second quotation).

I've been sharing that information with people I know, especially since I don't even live in California anymore. I actually live in Texas. About the need to protect our natural resources and ocean. [male, 37]

Well the number one thing is plastic. [There's] so much [trash] down on the ground or at the beach and stuff like that. You're just being a slob and you don't realize what you're doing to people or animals, so I would just say just really more about all that—the environment. [female, 21]

The other one-half couldn't identify any personal actions that they personally could engage in to address the issues raised in *Whales to Windmills* (see first and second quotations below).

(What personal actions might you take given what you saw or heard in the program?) Well, there's not really much I can do to be honest with you. [female, 50]

Well I don't know. I certainly can't emulate [the] brilliant minds that think up these things. I suppose I would want to support research that was aimed at learning and applying principles [of] marine behavior [and] problems with energy and food and so on. I think that at this point in my life—I'm over 50—there's nothing personal that I can do in this field but I would learn about it and I would encourage other people to learn about it, particularly young people and to think about entering professions like this. I think it's great. [female, 65]

## CLIMATE CHANGE AND THE OCEANS

### CONNECTION OF *WHALES TO WINDMILLS* TO CLIMATE CHANGE

Each interviewee was asked to discuss how *Whales to Windmills* related to climate change and the oceans. One-half stated that they learned something about climate change and the oceans from the program. The most common examples were that everything was connected, that one can take personal action and that innovative ideas come from the oceans (see quotations below).

(In what ways, if any, do you think the program relates to climate change and the oceans?) Oh, I thought that [it] was part of the whole thing. You know, when you talk about the environment, climate change is part of our environment, and the ocean is a big part of how our climate is. So it's all interrelated. If you mess up one thing, you're going to mess up everything. [male, 25]

I think it may just [make] me a little more aware. I am aware of climate change and things—I'm very proactive in that—but it certainly gave me [a few] minutes to sit down and think, 'Oh, my goodness. Look at all the rubbish that we're putting into the ocean, and the fish that can get destroyed.' So, on a one-to-one basis at least, I've started talking to people about not using caps—they cannot discard plastic so that it can go off into the sea and things. [female, 51]

The other one-half didn't think the program dealt with climate change (see first quotation below). A few of these interviewees observed that though the issue of climate change wasn't addressed in the auditorium program, it was an emphasis in other areas of the Aquarium (see second quotation).

I didn't make that connection [between *Whales to Windmills* and] climate change. (Did you see a connection?) No, I didn't. [female, 43]

[*Whales to Windmills*, where] we agreed to take the survey, wasn't about climate change. It didn't focus on it. We saw other ones while we were there, and I think they should. I think it's good. It's a hot topic; everybody's talking about it. It seems to be politically correct to mention it, but I think that the Aquarium in general was doing a good job of not just saying 'Yeah it's [here] and there's not much we can do about it' but [instead] actually educating people in practical ways to do their little part. [female, 46]

### REACTION TO PROGRAMS ON CLIMATE CHANGE

RK&A asked all interviewees about their reaction to the Aquarium presenting programs on climate change and the oceans. Almost all of the interviewees agreed that the Aquarium should present programs on climate change. Most stated that presenting programs is important since climate change affects everything (see first quotation below). Some also mentioned that it was educational and important for society at large (see second quotation).

I think they should because climate change affects everything in our lives right now. It affects the way we live; it affects the temperature around us; it affects the crops; it affects our lives pretty much more than most people give it credit.... And [visitors] at the Aquarium, I would imagine this is probably their first opportunity to even hear or see anything like this—what's going on because in their everyday lives they're not subjected to any of it unless they're an environmentalist or somebody working on the outdoors or in forestry or the marine world or wherever they can see the direct results of what's happening in the environment. [female, 50]

Yes, and you know if [the Aquarium] can create another [program] that deals with climate change and the sea ... to talk specifically about how the climate change is affecting the sea. That would be good. [female, 51]

A few were ambivalent and suggested more equal representation of different viewpoints on climate change (see quotations below).

Right now it just seems to me that a lot of the people who are talking about climate change are looking at the worst-case scenario. [It] might [not] be good for the Aquarium [to show what we are] already seeing, not so much of the worst case but more of a down-to-earth, grounded: this is what we're seeing, if this continues at the rate we're seeing right now what's going to happen. The solid, real rather than the fire and brimstone that you see all the time in the media. I would love to be able to see that in the Aquarium. [female, 43]

(Do you think the Aquarium should be presenting exhibits and programs about climate change?) Well, you're hitting on a really hot subject. And I've heard presentations from both sides [and] whether there's real substance to it or not. So definitely [what] you were presenting [was in] favor that [climate change] does in fact exist and is ongoing. Just last night I saw a presentation on a channel that was just the opposite. It said that the foundations for the study and the study itself were suspect in terms of its accuracy. So it could go both ways I guess. [female, 38]

# APPENDICES

## APPENDIX A. HOT PINK FLAMINGOS EXHIBITION PHOTOS



Introduction



Under Water



Hope Electrified



Iceless Arctic



**Acid Ocean**



**Faith and Action**



Simmering Seas



World of Change



Vanishing Feast



Make Change



## APPENDIX B: GUIDE INTERPRETATION: GENERAL OBSERVATION FORM

REMOVED FOR PROPRIETARY PURPOSES

## APPENDIX C: CLIMATE CHANGE CONVERSATIONS KEY WORDS

To qualify as a “climate change conversation,” the discussion between an Aquarium interpreter and a visitor may touch on general issues or activities that relate to climate change (such as recycling, electricity generation or oil pollution) without directly mentioning the terms “climate change” or “global warming.” For example, a discussion about solar power or the need to reduce America’s dependence on foreign oil would qualify as a climate change conversation.

However, a climate change conversation must focus on more than the biology or natural history of an animal or a habitat. In the case of animal/habitat discussions, the conversation must allude to at least one impact of climate change on that animal or habitat (such as rising sea levels and warming seas) OR to human activities that either promote or slow climate change. For example, a conversation that focuses solely on describing a sea turtle’s nesting behavior wouldn’t qualify as a climate-change conversation, while a conversation that mentions the loss of a sea turtle’s habitat due to rising sea levels would.

Below is a list of specific key words the observer can listen for to identify climate-change conversations:

### **GENERAL**

- carbon
- climate
- energy
- ethical responsibility
- future generations
- stewards of the Earth

### **ENERGY**

- alternative energy
- biodiesel (diesel from recycled fat, grease, tallow)
- biomass energy
- BP (British Petroleum)
- clean energy
- CNG (compressed natural gas)
- coal
- dams
- electricity
- energy-efficient
- fossil fuels
- geothermal (the Earth’s/underground heat)
- green energy
- hydropower/hydroelectric
- manure digester (manure + bacteria = natural gas + fertilizer + mulch)
- methane (from landfills and manure; burned to generate electricity)
- grid; national electrical grid
- grid; smart grid

- natural energy
- natural gas
- nuclear power
- oil
- propane
- renewable energy
- solar panel
- tidal power
- volcano
- waste-to-energy plants
- wind farm
- wind power/turbine

## **RESULTS OF CLIMATE CHANGE: on Earth systems**

### General

- climate change
- global warming
- warmer/rising temperature

### Atmosphere

- carbon pollution
- carbon footprint
- carbon neutral
- carbon offset
- emissions
- excess carbon dioxide
- greenhouse/heat-trapping gases
- storm frequency/intensity increased
- zero-emission

### Marine - carbon

- acidification
- ocean chemistry
- sequestration/carbon sink (ocean absorbs/dissolves carbon dioxide)

### Marine - currents

- circulation/current shifts
- food disappearing
- food webs disrupted
- low-oxygen “dead zones” (increase in size)
- marine stratification increased
- ocean mixing decreases
- upwelling delayed

### Marine - ice

- glaciers/permafrost melting
- sea ice retreating

### Marine - sea level

- coastal erosion
- flooding
- salt water intrusion
- sea level rise
- storm surge
- thermal expansion
- tidal inundation

## **RESULTS OF CLIMATE CHANGE: on animals**

### Wading birds

- loss/inundation of wetlands

### Coral

- calcium carbonate skeletons/shells
- calcification slowed/decreased
- coral bleaching (lose symbiotic algae/zooxanthellae)
- coral reef skeletons harder to make
- plankton shells thinning

### Polar bear and Walrus

- relocate Arctic villages
- starvation (polar bears hunt from ice)
- walrus calves have no where to wait for feeding moms

### Spotted jelly

- jellyfish blooms

### Sea turtle

- sea turtle nests flooded
- sea turtle nests warmer
- more females than males develop

### Penguin

- penguins starving

## **ACTIONS TO SLOW CLIMATE CHANGE**

### General

- green fee/tax
- reduce, reuse, recycle

### Electricity

- cold water wash (for clothes)
- clothesline (hanging clothes to dry)
- compact fluorescent light bulbs (swirly bulbs)
- Energy Star appliances

- energy consumption reduced
- LED (light emitting diode)
- vampire/standby power (drawing electrical power even when turned off)

#### Fossil fuels

- bicycle
- bus
- car air filter kept clean
- carpool
- drive less
- drive the speed limit
- electric/hybrid car
- public/alternative transportation
- rapid transit
- rideshare
- tires properly inflated

#### Foods

- buy in bulk
- canvas shopping bags
- compost
- CSA = community supported/sustainable agriculture
- eat less red meat, cheese and dairy
- eat local, organic
- eat grass-fed beef
- eat more chicken, eggs, sustainable fish, organic veggies
- garden

#### Marine

- mangroves/wetlands/mudflats/salt marshes restoration
- raise/build dykes and levees

**APPENDIX D: GUIDE INTERPRETATION: FOCUSED OBSERVATION FORM**

REMOVED FOR PROPRIETARY PURPOSES

**APPENDIX E: GUIDE INTERPRETATION: EXIT INTERVIEW GUIDE**

REMOVED FOR PROPRIETARY PURPOSES

**APPENDIX F: PRESENTATIONS: INFORMATION SHEET**

REMOVED FOR PROPRIETARY PURPOSES

**APPENDIX G: PRESENTATIONS: TELEPHONE RECRUITMENT FORM**

REMOVED FOR PROPRIETARY PURPOSES

**APPENDIX H: PRESENTATIONS: TELEPHONE INTERVIEW GUIDE**

REMOVED FOR PROPRIETARY PURPOSES

**APPENDIX I: AUDITORIUM PROGRAM: INFORMATION SHEET**

REMOVED FOR PROPRIETARY PURPOSES

**APPENDIX J: AUDITORIUM PROGRAM: TELEPHONE RECRUITMENT FORM**

REMOVED FOR PROPRIETARY PURPOSES

**APPENDIX K: AUDITORIUM PROGRAM: TELEPHONE INTERVIEW GUIDE**

REMOVED FOR PROPRIETARY PURPOSES