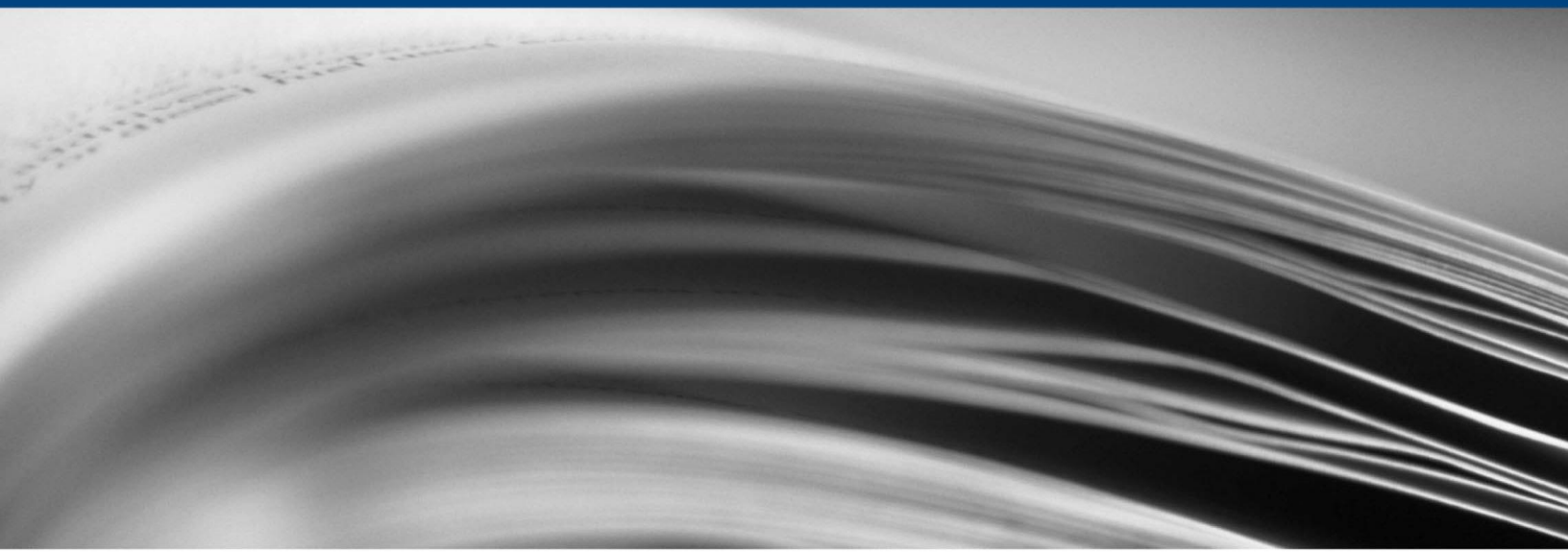

Flight of the Butterflies

Summative Evaluation

June 15, 2015

RMC RESEARCH

Flight of the Butterflies

Summative Evaluation

Submitted to:
Jim O'Leary
Maryland Science Center
601 Light Street
Baltimore, MD 21230
410-545-5975

Submitted by*:*
Elizabeth Goldman
Kim Streitburger
RMC Research Corporation
1000 Market Street, Building 2
Portsmouth, NH 03801
603-422-8888
www.rmcresearchcorporation.com

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Flight of the Butterflies Focus Group

Focus Group Background

In spring 2013, RMC Research Corporation conducted four focus groups with a total of 39 participants who watched either in 2-D or 3-D, *Flight of the Butterflies* for the first time. The St. Louis Science Center (SLSC), where the film was presented in large 2-D format, hosted two focus groups with adults (n=19). The Maryland Science Center (MSC) in Baltimore, which showed the film in 3-D format, hosted one focus group with adults (n=8) and another with middle school age students (n=12). All participants were recruited through the science center membership lists.

The table below presents demographic background of the focus group participants by location and film format.

Table 1. Number of Focus Group Participants by Background and Film Format

		Location (Film Format)		
		SLSC (2-D)	**MSC (3-D)**	**TOTAL**
Gender	Male	6	13	19
	Female	13	7	20
Age	Less than 18	0	12	12
	18-30	2	3	5
	31-50	8	5	13
	51 and older	9	0	9
Highest Education Level	Middle School	0	12	12
	High School	2	1	3
	College	8	2	10
	Graduate Degree or Higher	9	5	14
# of IMAX Films Seen	None	1	4	5
	1-3	7	10	17
	4-6	3	3	6
	7 or more	8	3	11

Notes:

- Although an equal number of males and females participated in the focus groups overall, more females participated in the 2-D discussions and more males participated in the 3-D version group.
- Adult participants tended to be older for the 2-D discussions (St. Louis) than the 3-D discussion (Baltimore).
- Adult participants' education levels were equally distributed between both film format groups.
- Participants who saw the 2-D version group tended to have more experience seeing large format films than did participants who saw the 3-D version.

The focus group discussion followed the format shown in the Appendix A, with initial conversations about overall impressions, favorite scenes and images, and reactions to the narrative storyline. This was followed by a discussion of what participants learned in the course of watching the film, guided by specific questions about butterfly morphology, the work of scientists Fred and Nora Urquhart, and citizen science. The discussion ended with questions about the medium, whether they would recommend the film, and to finish the sentence: "before I thought_____ and now I know _____.

Overall Appeal

Participants were enthusiastic about the film. All agreed that *Flight of the Butterflies* was a "good story well done," describing it as informative and broadly appealing. Several participants also found it "exhilarating" and emotionally compelling—"it was not dry and academic but passionate and scientific," noted one participant. They found the combination of the Urquharts' personal quest and the science content very successful and praised the way the movie wove scientific information and entertainment together. A number said they were impressed by the amount of science the film presented.

Favorite Images and Scenes

Regardless of age, all focus group participants had very positive comments about the film's visual qualities. Comments include: "the imagery was beautiful," "the gorgeous monarch tree in Mexico," and "shots of the flying butterflies were amazing." The scene that many participants found most memorable was the massing of "thousands and thousands" of butterflies on the trees in Mexico, described by one participant as "like a duck's feather." Unsurprisingly, a greater number of 3-D viewers liked seeing all the butterflies leaving the trees together than did the 2-D viewers, although participants in both groups noted they enjoyed the sound of all the butterflies in flight. One 3-D adult viewer appreciated how the film had "book end" images of flying butterflies at the beginning and end of the film.

Many shots of the butterfly life cycle were cited. Middle school students mentioned the visual communication of the life cycle. Some adults described this sequence as "spectacular photography" and visually "striking." Adults also recalled details from the butterflies' mating and egg laying, more than one noting the caterpillar eats the milkweed leaf "like a person eats corn on the cob." A couple of adults thought the close ups of a butterfly and the explanation of using antennae to identify sun, fur for wind, and feet for tasting was "nicely presented." A student reported seeing how many eggs the butterflies laid and where they migrated as most memorable.

Adults named specific scenes they enjoyed more than did the students. Several adults appreciated the attention to detail in artifacts used to portray a previous time era, and a couple of adults noted that the use of older photographs and the old-style fonts serve to bring older and younger generations together. The use of dots and string on the map also pointed to a past, simpler time and technology. Other indications of place and time were the Doc Martin boots wore by the volunteer living in Mexico, the clothing and the dated cars. Many adult participants noted they enjoyed seeing aspects of Mexican culture, particularly the scenes of the Day of the Dead festivals. One student expressed a wish for a translation of the Spanish spoken in the Mexican scenes.

The scenes of Fred Urquart's life seemed to delight many viewers. Participants noted the opening shot of the older Fred, the scene where Fred tested the butterfly tags by running and biking, and Fred on the log realizing his conquest. One participant who home schools her children found the scene where young Fred leaves his books in the grass to follow a butterfly was "ditching school for the learning."

More students mentioned the tagging of the butterflies than adults. The students were also more vocal about criticizing certain scenes and offering suggestions for others. One student thought the scene where the ants eat the caterpillar was so real, they jumped back. Another student found it was "disgusting." One adult felt the ant scene went on too long, although another expressed gratitude that it was limited, since "it is not good for kids to see." By contrast, one student wished the film had included scenes of bird predation so they could "see it happen in flight." A few students said they did not like seeing the rain storm and the dead butterflies. One student said he missed seeing how butterflies can camouflage themselves on red flowers while another wished the egg laying scene was presented more in depth and against different landscapes. A couple of adults said they did not like the scene of the dust cropper coming through the field. "It was too staged and lost me a bit," said one.

Narrative Storyline

Many adult participants commented specifically on the appeal of the storyline and characters, although middle school students had little to say about the storyline other than to call it a "good story."

One of the strengths of the film, noted by several adult viewers, was the blending of a "butterfly" story with a "human" story, both of which appeared to have merits. Adult participants described the blending of the two stories as "all encompassing," "keeping my interest," and "helped me retain [information]." One adult, however, disagreed, asserting that the two stories should have each been "standalone" and expressed dislike with the "jumping back and forth." Another thought the butterfly story was compelling at the species level and did not require a "storybook character." This participant also questioned whether the butterflies portrayed were really Dana and her descendants. In contrast, another participant found this character-driven feature important in helping children understand the multi-generational life cycle of the Monarch.

Many participants enjoyed learning about the Urquharts' story, the longevity of Fred's quest, expressing appreciation for seeing the flowering of many years of work as opposed to "instant gratification." Some adults cited the film's "human interest," particularly the Urquharts' scientific passion, as point of great interest and saw the film as appealing to several generations of viewers. Some described themselves as reacting to the story emotionally, citing in particular the moment in the film when Fred answered the phone in hopes of hearing news about the research and when he traveled, against his doctor's advice, to the Mexican mountains to see the Monarchs. A number of adults found the historical and cultural details part of its appeal. Adult participants frequently described Fred's characteristics, such as his "devotion," his "curiosity as a child," and his "passion" as positive attributes. Several participants appreciated seeing strong female characters, such as Dana and Nora. For instance, one viewer felt showing Nora as an equal partner in Fred's journey was important. Those who commented on the female characters saw them as inspiration for young girls. A couple of middle school students were struck by the fact the people in the film were real people.

To some adult participants, the story of the scientist's journey reinforced an interest in science, the value of science, and exemplified for them "why scientists do what they do." One participant described the film as a "story worth being told." Others stressed the importance of having children see that "there is still scientific work to be done" and that "you don't have to be a scientist" to contribute to scientific knowledge.

Learning about Monarch Butterflies

The film appeared to convey considerable information about Monarch Butterflies. All participants expressed amazement at the extent of the Monarch's migration pattern and the fact that it takes three generations to complete a full life cycle, and many described learning about unique Monarch features, such as their navigational uses of antennae and fur, their edible egg casings, the caterpillars' repeated shedding of their skins, the dramatic increase in size of the Super Monarchs, and the role of milkweed in the Monarch diet.

A number of participants, both students and adults, mentioned that only 1% of Monarchs survive. Smaller numbers noted how Monarchs deter predators through camouflage and a bitter taste. Adults mentioned predators more than the students did, noting both natural predators such as ants and birds and human practices such as crop dusting. About a quarter of adults specifically noted deforestation/ habitat destruction and the role of climate change in jeopardizing the Monarchs. A couple of adults questioned the Monarch's ability to adapt to a changing climate and landscape; one mentioned that UNESCO has named the Mexican hills critical to the Monarchs as a protected World Heritage site. A number of the adults discussed learning about butterfly gardens; two said they intended to create butterfly gardens themselves.

Learning about Science and Citizen Science

All participants found the idea of science as something non-specialists could participate in as intriguing. Both the mechanics of engaging citizens in the massive tagging project and the idea of contributing to a larger purpose were topics of discussion. Participants also described learning about real people who had made this startling discovery within the last 40 years.

About half of adults and nearly all students named tagging as a new idea. As one viewer noted, "without the tag, just the whole cluster of butterflies would have been nice, but not the answer to science." Participants were intrigued both by the technical aspect of affixing the tags—"it was an old school way to track but it worked," said a student—and by the large social network of taggers the Urquarts engaged. A number of participants described the tagging effort as heroic, particularly in a time before social media. Several participants, students and adults, noted how social media could facilitate such a campaign today.

Another point of new learning was about citizen science, named by several adults and nearly all students. The students struggled to define citizen scientist, suggesting that it meant "both a citizen and scientist," or "a scientist who works locally," or "self-employed." Several students defined a citizen scientist as a volunteer or non-professional scientist. About a third of adults and half of the students expressed interest in serving as a citizen scientist. One student identified herself as a citizen scientist, noting that she participates in the "Backyard Bird Count." Several adults said they wished the film contained information about how to become a citizen scientist, and one adult suggested the St. Louis Science Center start such a program. One student wondered if it were possible to be a citizen scientist in space.

Points of Possible Confusion

A number of participants had questions they felt the film left unanswered. Questions about butterflies chiefly concerned the timeline of the butterfly generations; a number of adult participants said the film could have made that clearer. Others wished to know more about the migration patterns, and why Monarchs congregated at one place in Mexico. A small number of adults wondered how well the Monarch phenomenon was known to Mexican scientists. Some participants also wondered how the two research assistants in Mexico were funded.

The distinction between male and female butterflies was also confusing to some participants, both adults and students; a small number said they would have liked to be able to distinguish male and female, and that all the butterflies looked the same.

Participants also had questions about tagging. Both adults and students questioned why the tagging process did not harm the butterflies' wings. Two adults wished to know what old age looked like for a Monarch. Miscellaneous questions included wondering how butterflies fly in the rain (a student), what triggers the "super" generation (adult), what made Fred so interested in butterflies as a boy (adult), and whether NASA could "tag" Monarchs from space (adult).

A couple of participants said they would like to see the film a second time, that some details were too quick to catch. Another reported enjoying leaving a movie with more questions than they came in with; the film served as a spur to further learning.

Changed Perspectives

Participants completed the statement I used to think _____and now I know _____ in two ways. Some reflected on their knowledge of butterflies and science, while others reflected on their anticipation of the film itself.

Examples of misconceptions identified were that butterflies lasted several seasons, that they were fragile, and that many survived, remarking on the 1% survival statistic and the toughness, not fragility, the butterflies displayed. One adult said she had thought of butterflies as "pretty ornaments" and after the film wanted to visit Mexico to see them in situ. Both adults and students noted surprise that the discovery of the Monarch migration was so recent.

Adults expressed some surprise that the film was as emotionally compelling as it was; some had expected a film about metamorphosis. Many students expressed relief that the film was not as girly, hokey, childish, 1980s, or dry as they had expected and said that they liked the film much better than they thought they would. "This changed my understanding of migration," reported one student who has read books about butterflies independently. Some participants also expressed concern for the future of the butterflies. One recalled "it was my job as a kid to cut down milkweed; it was the enemy then but now it's different."

Others noted changes in their understanding, such as learning that butterflies could fly in the rain, or die at any time, not just in a resting state.

Suggestions

A small number of participants offered suggestions for improving the film, noting that they would have liked to know more about Fred's childhood fascination with Monarchs. Some suggested visual

clarification through comparison, for example, between male and female Monarchs and between "Super" Monarchs and the others.

Students did suggest that the title was not dramatic, offering *Chasing Monarchs*, *Adventures of the Monarchs*, *The Mystery of the Monarchs*, and titles on similar themes as having more appeal to their peers.

Motivation for Viewing the Film/ Attending the Focus Group

Many participants, both students and adults, said they attended in order to learn something about butterflies or because they loved butterflies. About a fourth of Baltimore participants said they were drawn by the MSC itself; all of the students went because either because FOB was a 3-D and IMAX film.

Two adults said they were motivated by the need to get people involved in science; one adult attended the film because of the promise of adult dialogue. One student was also attracted to the exchange of opinions and one was drawn by the prospect of learning.
Students said they attended in order to watch a 3-D movie; several students also cited the MSC as the reason for attending

Medium/ 2-D and 3-D Format

Nearly all participants found the film's visual effects stunning. A viewer of the 2-D version said the treatment of high-speed action was well done, and viewers of the 3-D version described the visual effects as "stunning". The 3-D version was screened at the MSC, where slightly more than half of all participants saw the film. They were effusive in their praise of the format's effectiveness. Viewers of the 2-D version mostly found the format fine but some felt the film would be better or equally effective on a regular high-definition widescreen, rather than the IMAX screen. One participant appreciated the pace of the film and thinks with "fast movement you can't see as well as slow, this was well done". Most of the viewers commented on the quality of the visuals and audio. The "wing sounds were so believable", said one viewer.

Viewers of the 3-D version who were familiar with the format found FOB's treatment "not gimmicky" and expressed relief that it did not induce headaches or motion sickness. Most viewers described the sound as "not annoying", although a small number of students wondered if the sound of the massed butterflies was real. Participants appeared excited about the 3-D effect that makes butterflies appear to fly right up to them. Many viewers felt engaged and wanted to touch the butterflies. One adult felt "the scenes were so real, it could have been animated." Another adult who watches science films frequently called the film "beautifully done – the 3-D was fantastic." All students, who saw the 3-D film said they were more likely to go to another IMAX film.

Flight of the Butterflies Borrowed Trunk and Pop-up Banners

Background and Methodology

The Maryland Science Center provided RMC with the list of science centers/museums that borrowed the Flight of the Butterflies trunk and/or pop-up banners along with contact information, borrow date and planned return date. RMC researchers contacted 17 museums that had either recently borrowed the materials or recently returned the materials so feedback about the use of the trunk and/or banners would relatively be fresh in the minds of the respondents. Contacts were made with science center/museum staff through email asking if they were willing to participate in a 20 minute interview or if preferred, a copy of the interview survey could be sent and respondents would reply at their convenience and return the filled out survey. Data collection occurred from June 2013 to the beginning of September 2013 including up to three reminder emails sent to non-respondents. Of the 12 respondents, one was interviewed in-person, six were interviewed over the telephone and five replied by completion of the survey. Table 2 below lists the data collection method, the outreach materials asked about by the names of the museums/science centers participating in this part of the evaluation.

Table 2. Data Collection Method for Evaluation of Trunk and/or Banners

	Data Collection Method I=Interview S=Survey	Trunk	Banners
Carnegie Science Center	I	X	X
Cincinnati Museum of Natural Science	S	X	
Hastings Museum	I	X	X
Indiana State Museum	S	X	
Kentucky Science Center	I	X	
Marbles Kids Museum	I	X	X
Maryland Science Center	I		X
Moody Gardens	I	X	X
NM Museum of Natural Science	I	X	X
St. Louis Science Center	S	X	X
The Wildlife Experience	S	X	X
Virginia Air & Space Center	S	X	X

Trunk Evaluation

Eleven museum or science center staff members participated in live or telephone interviews with RMC researchers or completed the interview protocol on paper and mailed it to researchers at RMC Research. Refer to Appendix B for the trunk evaluation interview protocol. All quotations in the following report are drawn from these interviews.

Of the 11 respondents, two were Education Curators. Other positions represented in this study with one representative each were: Education Director, Education Programmer, Exhibit Programmer, Program Developer, Program Development Coordinator, Program Specialist, and Theater Manager. Of nine respondents who indicated how long they had been at their museums or centers, four had served their positions for ten or more years, one had been in his or her position for one year; the remainder had been in their positions from three to six years.

Visitor Profiles
Audiences for *Flight of the Butterflies* trunk-related activities, according to respondents, included three camp groups, two school groups, two media events (one in-house, one outside), and one family program.

Workshops related to *Flight of the Butterflies* Trunk
Only two of the respondent conducted workshops associated with *Flight of the Butterflies*. One had a "learning lab" for students based on *Flight of the Butterflies* and tied to state standards. An example activity engaged middle school students in comparing the functions of GPS (global positioning system) and the Monarch antennae. Students rotated through different stations, did related math activities, and operated a speed radar gun.

At the other museum, a series of events for the public called "Bugs and Butterflies" focused on the Monarchs' flight and migration but also explored differences between Monarchs and other butterflies and between butterflies and "bugs." The respondent noted that many participants did not realize that butterflies are actually insects: one pair of legs is curled up tight to the body and only visible with magnification.

The value of the trunk materials in conducting workshops
The respondent at the center where the learning lab was conducted called the trunk materials "very good," noting that the people liked the digital microscope best. As a result, that institution has purchased at least three additional microscopes and staff is using the microscopes with all science programming. The respondent where "Bugs and Butterflies" took place bemoaned a lack of time to delve deeply into the materials but noted that the materials inspired some "great new ideas" staff will use in the future.

Placement of facilitator with trunk materials
Respondents were asked where in the institution the facilitator and trunk materials were placed—adjacent to the theater, at the theater entrance or exit, at the museum entrance, or elsewhere. Seven respondents reported that facilitators and materials were placed adjacent to the theater and at the theater entrance; none said they were placed at the theater exit, and two reported the facilitator and

trunk materials were placed at the entrance to the museum itself. Other settings were in a main gallery, in a naturalist's lab, and near an animal exhibit (one instance each at three museums).

Other ways the trunk was used

At one institution, the trunk materials were used during its August "free Sunday" (when is open to the public at no charge) and that day the museum drew some 3,000 visitors—three times the usual attendance. Another institution took the trunk materials to off-site events, such as school events where the museum staffed a booth to promote the *Flight of the Butterflies* film.

Five museums used the trunk materials on-site to promote the film; one featured trunk materials during the weekend opening of *Flight of the Butterflies* and again during school vacation and at summer sessions with teachers. Staff at another museum set up a terrarium on-site with the live Monarch caterpillars and created marketing around the terrarium. At another institution, the trunk materials were part of a centerpiece for a Butterfly Weekend focused on Monarchs. The museum showcased some live Monarchs at the event and included a guest lecture on Monarchs by an entomologist.

> "Everything about the trunk was added value."

When trunk materials were used

All 11 respondents used the trunk materials during the course of *The Flight of the Butterflies* screening.

Frequency of trunk materials use

Three respondents reported that they used the materials several times a day; four said they used the materials once or twice a week and three said they used them once or twice a month. Two respondents indicated less frequent use of the materials.

Trunk materials used

The table below shows number of respondents who used individual trunk items.

Table 3. Item Use by Number of Respondents

Item	Number of respondents using it
Plastic model	10
Microscope slides	10
Inflatable butterfly kit	9
Specimens	9
Digital microscope	8
Milkweed seeds	8
Bookmarks	7
Butterfly farm	6
Magic of the Monarchs book	6
Educator's Guide	5
CD	1
NOVA video	0

Nine respondents offered explanations of their use of the trunk items. One institution used its own (video) microscope; another had its own inflatable butterfly kit. One encountered IT incompatibility and was unable to use the microscope. Time was a factor at one institution, while ease of set-up and break-down was a factor at another. Two respondents said they did not use the videos. Several respondents said staff used some materials as reference but preferred more interactive materials for visitors.

> "The trunk was a huge inspiration for creating an interpretation station all about butterflies."
>
> "The educator's guide and CD and *Monarch Magic* gave us ideas for summer camp activities."
>
> "Our visitors LOVED the life-cycle plastic models."
>
> "The inflatable kit was so popular we eventually had to patch it."
>
> "We copied *Monarch Magic* for future use."
>
> "[Visitors] liked coming back often to see the Monarchs' progress."

Supplementing *Flight of the Butterflies* trunk materials with other materials

One respondent did not supplement the trunk materials with other items, saying: "It had enough pieces to it." Three respondents reported supplementing the trunk materials with other butterflies and moths from their own institutional collections, particularly to highlight differences between Monarchs and other butterflies and moths. One of these three also reported purchasing plastic life cycle models of other bugs, including a moth, a painted lady butterfly, a mealworm, and an earthworm. Another respondent reported securing live butterflies, which attracted many repeat visitors who came to check on the stages of the metamorphosis. A third used materials from the trunk and the museum's permanent collection to create a butterfly exhibit at the entrance. Respondents also did art activities based on butterflies, for example, showing children how to make paper butterflies (folding paper a certain way to create fluttering wings) and attach those paper butterflies to a butterfly tree. One staff member made costumes of Monarch butterflies and other garden creatures, especially pollinators, for children. At another institution, staff showed children how to make magic scratch sheets in the shape of butterflies. Elsewhere, staff made paper butterflies and butterfly flip books with visitors.

One respondent reported undertaking more scientific activities with materials from the trunk and online searches, creating hands-on activities to help visitors understand how the Monarch's shape and wing position help it fly, learning about metamorphosis, and exploring Monarch coloring and Viceroy mimicry.

Linking the trunk with local exhibits or events

Two respondents reported using the trunk materials for marketing, conducting demonstrations at school or special events and on local media. Two institutions used the trunk materials in connection with a special butterfly events devoted to all things Lepidoptera. One respondent reported plans to use ideas and supplies from the FOB trunk to generate interest in an upcoming exhibit devoted to bugs.

Rating the trunk: Most effective elements for visitor responses and learning

Tactile elements, such as the two lifecycle model sets were "very relatable" and appealing to children and overnight campers, several respondents reported. Any hand-on activity, including the use of the microscope, also had broad appeal, even for preschoolers, as one respondent noted. Mounted specimens tended to interest somewhat older visitors who were intrigued to see butterflies up close. One institution that featured live specimens reported that visitors were most engaged by them and generated more discussions about Monarchs than other materials did.

> "Our guys could play with [the plastic models] and created games with them."
>
> "The microscopes sparked ideas for other kinds of programs."
>
> "Visitors loved the live specimens."
>
> "Our visitors love looking through microscope at things they can't normally see."

Trunk materials and activities' alignment with visitors' interests

Six of the 11 respondents regarded the alignment of trunk materials with their visitors' interests as "very aligned," four found it "somewhat aligned," and one chose a point between the two. Many institutions cater to both children and families, and all respondents said that the trunk contained something of interest to both children and adults. Kinesthetic, tactile, and hands-on activities especially appealed to children, and specimens, slides, and microscopes attracted older visitors, although some respondents reported that children were also fascinated by magnification.

> "People were engaged; they wanted to talk to us, and the materials kept their interest."
>
> "Butterflies are inherently interesting. … There doesn't seem to be an age limit."
>
> "Preschoolers are interested in bugs second only to dinosaurs."
>
> "The materials were broad enough to satisfy every age group."
>
> "The tactile elements engaged children."

Trunk materials and activities' alignment with institutional learning goals

Seven of the 11 respondents characterized the trunk materials and activities as "very aligned" with their institution's learning goals; three found them "somewhat aligned," and one chose a point in between somewhat and very.

At one institution, where a new strategic plan is steering a course toward "more modern natural history," the *FOB* trunk materials were a welcome addition and the entire *Flight of the Butterflies* experience fit well with an institutional focus on citizen science. At another institution, staff grew milkweed on site; that, combined with all the trunk information, highlighted issues of declining milkweed habitat. A respondent elsewhere noted that the museum was "always pushing science" and the trunk materials provided new ways to teach science, especially hand-on science.

1. Clarity of descriptions for trunk activities

All respondents said the descriptions for the trunk activities were either "clear" (6 respondents) or "very clear" (5 respondents). One respondent who had encountered other trunks associated with large screen film said the FOB instructions were "very easy to use." Others noted, "I understood how to use everything" and "[instructions] were fairly easy to understand."

2. Adaptability of trunk materials for different audiences (e.g., by age or topic knowledge).

All 11 respondents also reported that the trunk materials were either "very easily adaptable" *6 respondents) or "adaptable" (5 respondents). At institutions that focused more on younger children, some materials, primarily the more content-rich elements such as the books or videos, were used often. One respondent reported that the three-dimensional models were especially in introducing scientific words. For example, staff could present a model of a "chrysalis" [a word specific to butterflies], engage visitors in exploring it, and liken it to a cocoon, a word more familiar to most visitors. One respondent praised the ease with which materials could be tailored for specific instruction. Another said the trunk materials "meshed very well" with existing museum materials.

> "The materials lent themselves to addressing a variety of topics and catering to different age groups."
>
> "The trunk materials and activities were "perfectly matched [and] offered a lot to so many ages and interest levels."

3. Success of the trunk in extending the learning experience from the film

Nine of the 11 respondents answered this question: four characterized the success as "good," two as "very good," and three as "excellent." Not all respondents could confirm that visitors who used the trunk materials also saw the film; one explained that while the film drew a wide age range of visitors, the trunk materials and activities drew more children. Trunk materials were available at some institutions before and at others after screening *Flight of the Butterflies*; in a couple of instances the materials were on a table and could be investigated before or after the film's screening. Facilitators tended to engage visitors before the film rather than after.

> "Seeing the materials in the theater lobby seemed to make visitors more interested in the film and provided a chance to stop after the film and talk about what they had seen."

No respondent reported results of any measurement of visitor learning, although one described a visitor's "light bulb" experience of animal mimicry, and another observed facilitators processing new learning with younger visitors. A respondent from an institution that ran a program for Girl Scouts reported that the pre-film discussion appeared to deepen learning. Three respondents described the materials as complementing and extending the film experience. A respondent who used the film and trunk materials in an explicitly educational context found the trunk a helpful teaching tool.

In one institution, the trunk seemed to serve more to generate excitement about the film rather than extend learning and staff did not explicitly tie the trunk to the film; this respondent expressed doubt about the trunk's success as extending learning from the film.

The *FOB* trunk compared with other educational materials for giant screen films

Four of the 11 respondents offered comparison between the *FOB* trunk materials and other materials for giant screen films: two rated the *FOB* materials as "excellent," one as "very good," and one as "good." Four respondents indicated that they had not received or worked with trunk materials before the *FOB* trunk, or had received so few materials in earlier instances that drawing comparisons was not possible. Three respondents did not address this question.

> "I have never received marketing for any film that was so thorough and helpful."

Of those responding, one noted that the *Flight of the Butterfly* materials were much more extensive than usual, explaining that usually they receive a simple poster. The educator's guide came in for special notice for usefulness to staff at this institution. While rating the FOB trunk materials as "very good," another respondent surmised that "all trunks suffer because we don't have the same kids over a long period of time." The butterfly garden didn't work for visitors at that institution, for example, because visitors only saw part of the metamorphosis.

Interest in using similar trunks that accompany other giant screen films

All respondents responded enthusiastically to the prospect of using similar trunks with other giant screen films. Noting that this was the first trunk staff had received, one respondent said he or she would be "absolutely" be interested in using similar trunks, explaining that it saved staff time: "We could have researched [the Monarchs] but here it was already done and we just had to implement it." Cost effectiveness was especially an issue with films with relative short runs: staff have to weigh investing in resources for a short-lived show against investing in something with more long-term use. The *FOB* materials rendered that issue moot.

> "If this is the standard, we need more!"
>
> "[The trunk offered] easy access to proper and informative materials and was foundation to our interpretative efforts."
>
> "Having a tangible experience extends the learning. You know the coloring sheets will go home and those families will remember the experience longer than the movie."

Another respondent also used the word "absolutely" about using similar trunk materials in the future; yet another respondent said that the materials generated "more creative" ways to market the film. Other superlatives included "totally" and "definitely" with respect to willingness to use and "great" with respect to materials. Another described the materials' dual use in promoting the film and enhancing teaching about butterflies as a "win-win."

Suggestions for the design of future trunks

A couple of respondents urged more hands-on materials for younger visitors and one urged more microscope slides for "older visitors." One respondent would have liked more time with the materials. The respondent at the institution with IT incompatibly with the digital microscope urged caution in making assumptions about digital options. Three respondents offered no suggestions. The remainder of respondents, however, respondents characterized the trunk materials as having a "nice variety" and "great mix" of materials, appropriate for a range of ages and suitable both for short interactions as well as longer, sustained interactions.

> "[The trunk] gave me a lot of options for use with groups of different sizes."
>
> "It was wonderful. Please don't change a thing."

Pop-Up Banners Evaluation

Nine museum or science center staff members participated in live or telephone interviews with RMC researchers or completed the interview protocol on paper and mailed it to researchers at RMC Research. Refer to Appendix B for the banner evaluation interview protocol. All quotations in the following report are drawn from these respondents.

Of the eight respondents indicating their roles, two were Education Curators. Other positions represented in this study with one representative each were: Education Director, Education Programmer, Program Developer, Program Development Coordinator, Guest Service Provider, and Theater Manager. Of eight respondents who indicated how long they had been at their museums or centers, five had served their positions for ten or more years; the remainder had been in their positions from four to six years.

Use of the Banners

All respondents indicated audiences for *Flight of the Butterflies* banners were for visitors on the floor; three reported specifically using them for school groups; and one cited workshop participants and another for patrons during a membership evening where the banners were placed "in the front of the museum entry like a processional."

Two out of eight respondents reported having the banners hang before and during the film screening whereas most (6/8) said the banners were up only during the film screening period, which ranged from two to twelve months.

There were five pop-up banners including Life Cycle, Migration, Citizen Science, A Unique Creature, and A Day in the Life. Respondents were asked if all of the banners were put up or just particular ones. The majority of institutions hung all five banners with the exception of one only hanging the Life Cycle banner. About half of the respondents reported using the banners without facilitation and the others said facilitation was available upon request or available during specific times. One person noted that ushers and ticket-sellers would direct visitors to banners if they were seeking more information.

Some museums incorporated the banners into existing exhibits such as gardens, rainforest or butterfly exhibits. Described one respondent, "The marketing department supplemented the banners with silhouettes of butterflies they created out of a window cling materials. The silhouettes had questions and answers about butterflies, so that on entering the Moody Gardens a visitor first saw the questions with the butterfly silhouettes, then the banners." Another interviewee mentioned pairing the banners with resources from the traveling trunk during class times.

Value of the Banners

On a scale from 1 (poor) to 5 (excellent) the average of 4.0 indicated most respondents felt the banners were very good in extending the learning experience from the film.

> *"The design is beautiful and the text was thorough but concise. They touched on all the information I deem important for all my butterfly workshops."*
>
> *"Not sure but did see students and adults taking photos for later reading; text is well-organized with good content and language appropriate for middle school students. Words that may be unfamiliar are defined in context. Photos and visuals are appealing. They help people understand what they will see before the show."*
>
> *"As an educator, I found them well laid out, the information easily digestible."*
>
> *"We didn't do any formal surveys on it, but any time you walked by, two or three people would be standing there, reading them. People also took photos of the banners so they could read them later."*
>
> *"From what I know, they helped people learn, they made the experience more cohesive with the activities. Especially for parents, it gave more layers."*
>
> *"I can say that most people would have seen them before the film; definitely a good primer".*
>
> *"They were a great preview and wrap up for the visitors."*

Of the five respondents answering how the banners compared to other educational materials received along with giant screen films, most thought they were very good or excellent. Respondents said "most banners or posters are not as informative as FOB," "nothing like it," "colorful and eye catching" and "the whole marketing plan for this film was great."

All respondents reported they would be interested in using similar banners to accompany other films. They felt it was an effective way to internally publicize the film and prime visitors for the main points of the film. One respondent said, "Absolutely, the theater lobby is usually quite plain and these banners made it seem like more of a part of the museum."

Most respondents thought the banners provided good background information about the film and about monarch butterflies. Less value was put on ways the banners provided ideas for additional activities and use of the truck resources.

All the respondents rated the banner attributes as being appropriate for middle school age students. In order of highest average ranking (1 to 3), visuals/photos (2.7), language used or organization of ideas (2.6), and science content (2.4).

Overall, respondents were very pleased with the content and design of the banners. Only one person made the suggestion of "make them trip over proof".

"Good visuals are always appealing. Keep the middle school vocabulary level."

"I thought they've got it," she said. "They were a perfect blend of words and pictures that could tell a story, and they were bright, colorful, and eye-catching."

"Very adaptable for the museum's audiences, especially the tactile elements."

"Visually pleasing, good amount of information. Great."

"I love the information that was included and the layout was clear and attractive. They're a great tool and the only suggestion I could add would to please, please include them for other films!"

Flight of the Butterflies Community Grantees

Background and Methodology

The Maryland Science Center accepted proposals from museums and science centers whose educators attended the two-day workshop in April 2012 and were interested in developing or expanding educational programming in conjunction with the screening of *Flight of the Butterflies*. Nineteen proposals were submitted and approved for $1,500 each. One grantee institution did not go through with their proposed plan and thus never received the grant money.

All proposals were obtained by RMC for review and reference. In collaboration with The Maryland Science Center, RMC designed a survey for the grantees to gather information about the implementation of the proposed programming, challenges, successes, and sustainability. The survey instrument can be found in Appendix C. In May, 2013 all grantees were contacted via email and asked to participate in an online survey using Survey Monkey. Each institution contacted was sent their proposal for reference which helped in answering questions about what was proposed and what was implemented. RMC sent out several reminder emails to non-respondents during June, July, and August resulting in 11 completed surveys; a 61% response rate.

Table 4 below outlines the 18 granted proposals with the proposed timeline, target audience, brief programming description, and an "X" indicating survey participation.

Table 4. Flight of the Butterflies Grantees

Institution	Timeline	Target Audience(s)	Programming Description	Survey Participation
American Museum of Natural History NYC	Jan. 2013 – June 2013	Families, Scouts 6-16 years old	14 sleep over events will incorporate live caterpillar station, butterfly craft activities, duplicate traveling trunk materials	
CA. Academy of Sciences San Francisco	Oct. 2012- June 2013	General Public Youth Groups	Display case and microscope and special programming in Naturalist Center and Explorer's Cove	X
CA Science Center	Summer 2012 Fall 2012 Spring 2013	PK-5 Grade teachers	2 day workshop for teachers	
Center for Science and Industry (COSI)	Apr. 2013 July 2013	Families K-8 Teachers	Family Day Event on Butterflies 2 day workshop for teachers/informal educators	X
Omaha's Henry Dooly Zoo and Aquarium, Omaha, Nebraska	Sept. 2012 Sept. 2012 Spring 2013	Public Teachers Teachers	Butterfly tagging events Workshop on butterflies Workshop on butterflies	X
Houston Museum of Science, Houston, TX	Oct. 2012 Apr. 2013 Ongoing	K-12 Teachers K-5 Teachers Youth K-7 age	Workshop Workshop Insect classes with butterfly castle	
Kentucky Science Center	Nov. 2012 Apr. 2013	Girl Scouts	Program activities learning how to be Citizen Scientist	X
Liberty Science Center	Fall 2012- Spring 2013	Families	Pocket science and table top activities – citizen science	
Marble Kids Museum	Sept. 2012- Nov. 2012	Youth and Families	Special programming – dress up "Butterflies in the Garden"	X
Pacific Science Center	Ongoing During movie Fall 2012	Public Public Teachers + students	Activities; citizen science Lobby craft activities Workshop + field trips	X
Science Museum of Virginia	March – Oct. (ongoing)	Public	Monarch Waystation	
ASTC Science World Vancouver	March – June 2013	Families Gr. 1-7 Youth	Monarch tree; free drop-in workshops	X
NMNH Smithsonian Institution	October 2012- February 2013	Middle school age through adult	Programming using digital devices	
St. Louis Science Center	June – September	Public Youth	Establish a "Flight Garden" (summer campers will help)	X
Carnegie Science Center	Apr – Aug	K-12 Spring Public	Indoor butterfly habitat; programming and hands on activities	X
Discovery Place	March 2013 Ongoing	2-5 teachers Public	Professional development workshop and materials; Lab will have hands-on activities and participate in citizen science	X
Fort Worth Museum of Science and History	Up to Jan. 2013 end of movie	School groups Public	Play shops for school groups Activities for opening day	
Science Museum of Minnesota	Ongoing	Science Educators Youth/Families	Materials for on-site resource center Materials for off-site collectors trading place (libraries)	X

- Most institutions (15/18) proposed programming for the general public or families including special activity exhibits or event days.
- Over 60% of grantees (11/18) proposed to implement programming geared for youth or school groups. Sleepover events, butterfly classes, play shops, and summer camp activities were mentioned.
- Several of the institutions (7/18) planned for conducting formal or informal science educator workshops or making butterfly related materials accessible to educators.

Survey Findings

Of the 11 responding grantees, nine are science museums or centers, one is a zoo/aquarium, and another is a children's museum. All respondents work within their institution in a programming capacity, whether it is management, development, or specialization.

Respondents were asked to reflect on the **time devoted to planning and implementing their projects**.

- 8/11 indicated they spent more than 10 hours of planning; 3 estimated 4-9 hours
- All but one respondent reported spending more than 10 hours in implementing the project; 1 reported 7-9 hours
- Everyone felt the amount of time spent planning and implementing was sufficient for meeting the goals of the project

Grantees were given a list of potential **resources they used for planning or implementing their projects**. If they did utilize the resource, they were asked to rate how helpful it was (very, somewhat, and not at all).

- The majority of grantees (10/11) used the education guide and most felt it was very helpful (7/10).
- 8/11 accessed the Flight of the Butterflies website and more than half found it very helpful (5/8).
- 7/11 used the posters and all respondents felt they were very helpful (7/7).
- The Maryland Science Center was contacted by 7/11 grantees and all but one grantee found this resource to be very helpful. However, one grantee reported The Center was not at all helpful but without explanation.
- 6/11 grantees used the borrowed pop-up banners in their institution and all grantees felt they were very helpful for their project (6/6).
- Less than half of the grantees used the traveling trunk (5/11) for their project and 3/5 reported the trunk as being very helpful.
- Other helpful resources sited by grantees include texts such as Monarchs in the Classroom, The Last Monarch Butterfly; websites: Monarch Watch, Xerxes Society, Monarch Lab, ArKive, EOL, and other university based sites.

Respondents were asked about the **project implementation, challenges they faced, and successes encountered.**

- Most grantees executed their projects as planned (7/11). Those experiencing changes to their projects reported the following:
    - Not being able to begin a butterfly garden, they instead provided workshops to the general public and educators.
    - Being able to source Western Monarch chrysalis and butterflies, they exhibited these specimens instead of a static display.
    - They did not deliver a planned teacher workshop (reasons unknown).
    - Since learning monarch butterflies do not live as long as they hoped, the grantee kept live butterflies during the month of May for their peak field trip season. They also added a butterfly-themed weekend of activities by partnering with a botanical garden.
- About half of the grantees (6/11) indicated **a degree of challenge** while implementing their projects.
    - A couple of grantees sited **audience turnout** as a problem. One institution had to cancel some of the planned classes and attributes outreach challenges to having a local butterfly museum to compete with. The other grantee dealt with varying audience sizes on an event by event basis.
    - One grantee's challenge was learning about **butterflies' mortality**, as mentioned above, and shortened the planned live butterfly display for only one month.
    - Financial struggles were experienced by one of the grantees. That is, they were faced with selectively choosing what supplies could be covered using the **current fiscal year budget** when the grant funding was for the following year's budget.
    - The timing of the planning, proposal approval, and implementation affected the availability of some of the materials sourced. The grantee felt the alternatives they implemented were equally valuable.
    - One grantee's challenge was planning a program about the migration of monarchs when the actual migration has been very low in their area over the last few years.
- The reported **successes of the implemented projects** fell into four broad categories including the ability to share information in an engaging way; providing citizen science awareness; reaching audience members; and just the fact of extending existing life science programming was viewed as a success.
    - Half of the respondents felt their project was a success due to the **engaging aspect**. For example some grantees said:

"I encountered many enthusiasts who LOVED soaking up with information and participating in the activities. Those who came were engaged and inspired."

"Being able to display live monarchs were the most engaging and captivating for the public."

"Even with the shortened duration of our live butterfly display, seeing live butterflies before viewing Flight of the Butterflies reminded our visitors and students that these animals depend on habitats all over North America, including their back yards. Experiences with live animals are always powerful."

"We had large interest from the general public for our tagging demonstrations. Due to this interest and success, we plan on continuing to tag monarch butterflies each year during migration at the Zoo & Aquarium and our Wildlife Safari Park."

"With added resources because of this mini-grant, we were able to create visually engaging displays and interactive opportunities that covered a wide range of related information--spanning from general butterfly info (life cycle, how to identify butterflies) to what makes monarchs unique (monarch migrations and the differences between those on the East and West Coasts)."

- Respondents also indicated having programming that encouraged audience members to take **citizen scientist actions** was beneficial.

"Planting milkweed seed activity was a popular take-home and provided a visceral means of helping after seeing the film and learning of monarch decline."

"We were also able to include information on the importance of creating butterfly habitats and how participants can help."

"I think it also showed the girls (Girl Scouts) what they can do to become involved in helping the plight of the butterflies."

- Projects reached many audience members, which pleased the grantees.

"In the Naturalist Center and Early Explorers Cove areas of the museum, our projects were a successful combination of programming and self-guided activities and displays. They reached broad, diverse audiences in both small group and larger drop-in, self-guided formats."

"Great group of teacher participants made the professional development a success."

"The monarch story time programming was well attended and provided an opportunity for kids to ask questions to our staff. We had the highest turnout in overnight enrollments in at least 3-4 years."

- Survey respondents were asked about their target audience(s) and the potential impacts they experienced. Most grantees (10/11) indicated their projects included programming for a youth/student audience. Several reports (7/10) were based on observations or perceptions; three grantees based their reports on observations and evaluations conducted.

  - When asked about what impacts the programming had on the participating youth, grantees felt the youth were very **engaged in learning about butterflies, their ecosystems, and how humans can contribute to their survival.**

"At the butterfly pinning workshop, a mother told me that the workshop would be a life changing event for her daughter. She loved butterflies and science that much."

"Youth who participated in our nature camp experiences were extremely engaged while observing the life cycle stages of chickens (hatching eggs), butterflies, and plants while attending this workshop. Without these funds, all of these experiences would not have been possible! The impact was great, students were excited and engaged and extremely curious in checking on the progress of these changing creatures throughout the week."

"Larger understanding of the role of butterflies in our environment and how they can help provide habitat for a variety of species that live or migrate through our state."

"Many schools and families in Minnesota study the monarch life cycle. These resources will provide support for both formal and informal science learning about the monarch, it's life cycle and habitats."

"Younger elementary students learned about the life cycle, that animals can be dependent on other species and climate conditions to survive."

"Many of our visitors are families; youth of all ages made butterfly crafts and learned about anatomy, life cycles and protecting butterfly environments through our activities."

"The youths were able to learn a broad range of monarch and other butterfly related information and hopefully get inspired to learn more and to make a difference."

"A sense of oneness with animals and a desire to help the monarch butterfly survive by planting milkweed."

  - Aside from the youth audience being impacted by the projects, a couple of grantees reported on the **learning benefits their teen volunteers/staff** experienced from working on the projects.

"Our teen volunteers and teen staff interpreted crafts and activities about butterflies, and learned a lot in the process."

"We had high-school volunteers deliver the monarch story time programs and assist with milkweed seed planting so they learned a lot in order to answer questions."

- Several grant projects (7/11) included educators as part of the audience. Generally, **the impacts on the educators included gaining more information about butterflies and their survival, and accessing additional materials for their classrooms.** Four grantees based their opinions on observation and evaluation whereas three grantees' reports were from observation only.

"Many already used butterflies in their curriculum but were glad to have even more to offer their students. Some were unfamiliar with much insect curriculum and were glad to have a starting point that my brief Professional Development workshop provided."

"Thirty educators participated in a multi-day workshop and learned about Monarch life cycle, adaptations, and the interdependent relationships of the monarch and other wildlife and plants in a prairie setting. Thanks to the generous funds from the grant supplied the tools and supplies for educators to build their own insect net for use in the field, as well as the Monarchs and More Educator guides and the Milkweed, Monarchs, and more reference guide. We also purchased tags from Monarch Watch for educators to use so that they may take Citizen Science methods and opportunities back to their students."

"Similar to the student impacts. With teachers we focused more heavily on species found in our state and necessary host/nectar plants required to support populations."

"We did a special screening of the film for teachers and several of them indicated they would bring their students to see the film and complimentary programming as well as recommend it to teacher colleagues. It met their curricular objectives and provided an anchor for further investigations in their classrooms."

"Hopefully, they learned more about relevant topics and got inspiration for ways to include information and various activities in their classroom. We recently had a high school teacher see a blog post about the Monarch Waystation display and activity that we had in the Naturalist Center and wanted us to share information about how she could have her biology classes create a virtual one in addition to the real one they're building."

"We received great positive feedback that the PD helped increase their knowledge and provided a great resource and collaborative group."

- About half of the grantees (6/11) said their projects specifically addressed the role of being a "Citizen Scientist". These projects included **hands on activities such as tagging butterflies, proper identification of monarchs, and conducting butterfly counts**. In addition, some projects encouraged citizen science participation by **sharing and discussing publications on the subject**.

"Our educator audience learned how to make their own nets for catching monarchs and also learned how to properly tag them with tags from Monarch Watch. We hope that these educators continue doing these activities with their students and that they too become citizen scientists."

"As a part of our project we not only did monarch tagging with the teachers, students, and public, but we also did butterfly counts. The data from these counts were collected and submitted for local lepidopterists to use."

"The displayed map on migration was attributed to data collected from citizen scientists. Activities teaching identification of monarchs and featured avenues for reporting sightings of monarchs promoted citizen science."

"The 'Specimen Spotlight: Migrating Monarchs' program included some information about citizen science monitoring projects and mentioned that it was something visitors might be able to participate in."

"Discussion on citizen science efforts like Journey North, etc."

- The majority of grantees (10/11) said they plan on continuing at least some aspect of their project. Many of these grantees reported **the continued use of the materials they obtained with the grant money**. A few grantees were **considering offering future youth camps or professional development for educators.**

"Yes! I loved the hand held microscope in the traveling trunk so I purchased three for the museum. These and the grow lamps will come in handy with future programs. The microscope in particular, which I plan to use for workshops on various topics. It's a very easy and versatile tool."

"Yes, these resources will be a permanent part of the leading library and the nature trading places. Volunteer training will continue on an ongoing basis to insure best engagement practices."

"Yes, we will keep all the display items until we cease showing the film. Story time programming featuring monarchs will continue as well. Activities such as make and takes or seed planting will cease when consumable supplies run out but if we are able to collect milkweed seed we will plant it again. We will be modifying and expanding activities to use with our summer camp participants."

"We will continue to interpret the activities about butterfly anatomy, life cycles, and environmental protection. Using the grant money, we were able to make a large, walkable map showing monarch migration, which we will definitely use in the future."

"Yes, certain created displays, such as a butterfly mobile ID activity in the Cover and a Riker box with a male and a female monarch in the Naturalist Center, will most likely remain on long term display. The wireless digital microscope purchased for use in "Specimen Spotlight" has and will be used for related and non-related programming. Particular monarch and other butterfly-related materials and activities will most likely pop up again at various times of the year like during our 'Tis the Season for Science winter programming and National Pollinator Week."

"Yes, we are working to use materials in some of our camp programs as well as work on the garden area behind our building. We also keep the butterflies purchased from the University of Kansas in a space that is open to the public every day. I love to see the kids marvel at them as well as Educators talk to parents and children about the Monarch butterfly."

"Yes, but on a much smaller scale. Rearing monarch larvae and bringing them out for "Show and Tell" programs throughout the summer and releasing adult monarchs."

"We plan to continue all pieces of the project into the future [tagging events, PD for educators} because not only are they important, but they have had a positive impact on participants."

"We may consider offering future Nature camps and Life Science teacher professional development sessions. Possible PD offered in the future."

- Respondents were given the opportunity to make any other comments about the mini-grants. All comments were in a positive light with regard to **attending the staff professional development** conducted by the Maryland Science Center and the opportunity to **expand existing butterfly programming**. One grantee proudly reported their tracked numbers for audience participation.

"We greatly appreciate the opportunity for our staff development and the opportunity to lend and use monarch/butterfly materials in our programming - thank you!"

"The give-away materials like the seed packets and tattoos were very popular and engaged children. We interpreted butterflies here before the workshop and grant, but the grant gave us the ability to improve upon existing activities, and supported the crafts. The workshop and contacts greatly changed our perspective on how to get visitors personally involved in helping local ecosystems."

"I have attended other professional developments in the past, and this one was by far the most beneficial and well planned. The goals were straight forward and there were plenty opportunities for support. Thanks you very much!"

"I am butterfly obsessed after attending this training. I'm turning into the resident butterfly person. Thank you so much for such a great opportunity. I will carry the knowledge and love I've gained about Monarch butterflies with me forever!"

"The mini-grant has given us a great opportunity to supplement our existing resources!"

"We have direct tracking that 1172 students + 247 adults saw the film and participated in the complimentary monarch programming (looked at displays, did an activity, etc.) from fieldtrip bookings. Many more general public visitors engaged with it as well but we have no hard numbers for that group."

Community Grantee Summary

The Maryland Science Center accepted proposals from museums and science centers interested in developing or expanding educational programming in conjunction with the screening of *Flight of the Butterflies* through a $1,500 grant. Of the 18 proposals funded, most of the institutions planned programming for the general public or families; many institutions targeted school groups or summer campers for special events; and some planned professional development for science educators. Grant funds were allocated to developing hands-on activities, purchasing science equipment, live butterfly specimens, and professional development resource materials. Several of the grantees planned activities that encouraged participants to become citizen scientists, which was also stressed in the film.

In May, 2013 all 18 grantees were contacted by RMC Research via email and asked to participate in an online survey using Survey Monkey. RMC sent out several reminder emails to non-respondents during June, July, and August resulting in 11 completed surveys; a 61% response rate.
Of the 11 responding grantees, nine are science museums or centers, one is a zoo/aquarium, and another is a children's museum. All respondents work within their institution in a programming capacity, whether it is management, development, or specialization. Overall, grantees expressed gratitude and appreciation for the opportunity to attend the professional development and in turn expand their existing butterfly programming.

Respondents were asked to reflect on the **time devoted to planning and implementing their projects**. Most grantees spent more than 10 hours of planning and implementing their projects. All agreed that the amount of time spent in preparation and conducting the activities was sufficient for meeting project goals.

Grantees were given a list of potential **resources they used for planning or implementing their projects**. The most popular resource was the education guide and generally grantees found this to be very helpful. More than half of the grantees accessed the Flight of the Butterflies website and about half of those grantees felt it was very helpful. All of the grantees that used the posters or borrowed the pop-up banners found them very helpful. Less than half of the grantees used the traveling trunk for their project and all reported the trunk as being at least somewhat helpful. The Maryland Science Center was contacted by 7/11 grantees and all but one grantee found this resource to be very helpful. However, one grantee reported The Center was not at all helpful but without explanation. Other helpful resources sited by grantees include texts such as Monarchs in the Classroom, The Last Monarch Butterfly; websites: Monarch Watch, Xerces Society, Monarch Lab, ArKive, EOL, and other university based sites.

Respondents were asked about the **project implementation, challenges encountered, and successes experienced.** Most grantees executed their projects as planned (7/11). Those who made changes to their projects said they were of a logistical nature, such as not being able to start a butterfly garden or being able to obtain Monarch butterflies or shortening the live butterfly exhibit. These situations were overcome by rearranging schedules or replacing project components with another. About half of the grantees (6/11) indicated some degree of challenge while implementing their projects. Those included the timing of the grant money which affected purchasing materials, the program planning when actual migration was locally low, and a couple of grantees reported audience turnout as a

challenge. All grantees felt their programs were successful, specifically in four areas including the ability to share information in an engaging way; providing citizen science awareness; reaching audience members; and just the fact of extending existing life science programming.

When asked about what **impacts the programming had** on the participating youth, grantees felt the youth were very engaged in learning about butterflies, their ecosystems, and how humans can contribute to their survival. Of those grantees providing programming for educators, they reported the educators gained more knowledge about butterflies and their survival and now had additional access to related materials for their classrooms**.** In addition, a couple of grantees thought their teen volunteers/staff were now more knowledgeable about butterflies by being involved in the programs.

About half of the grantees (6/11) said their projects specifically addressed the **role of being a "Citizen Scientist".** These projects included hands on activities such as tagging butterflies, proper identification of monarchs, and conducting butterfly counts. In addition, some projects encouraged citizen science participation by sharing and discussing publications on the subject.

With regard to **program sustainability**, the majority of grantees (10/11) said they plan on continuing at least some aspect of their project. Many of these grantees reported the continued use of the materials they obtained with the grant money. A few grantees were considering offering future youth camps or professional development for educators.

APPENDIX A: Focus Group Questions

Focus Group Questions

I. Overall, what did you think of the film?
   a. Which scenes were your favorites?
   b. Which images were the most memorable?

II. What were some of the most interesting new things you learned from the film?
   a. What did you learn about monarch butterflies from the film?
      i. About the life cycle (egg to adult, life time)?
      ii. About how they survive (food, predators)?
   b. About threats to their survival?
   c. What did you learn about the study of butterfly migration?
      i. The migration calendar?
      ii. How they navigate during migration?
   d. The scientific quest of Fred and Nora Urquhart?
   e. The tagging program?

III. Was there anything confusing about the film?

IV. How would you describe the work of "citizen scientists" based on the film?
   a. Does their work seem appealing to you? Why or why not?
   b. Could you imagine doing the work of a "citizen scientist"? Why or why not?

V. Do you feel the film used the medium (large format 2-D or 3-D, as appropriate) well?

VI. Which scenes or images stand out?

VII. Would you recommend this film to others?
   a. Why or why not?
   b. Who would you or would you not recommend the film to?

VIII. Finish the line: Before I saw the movie I thought _____ and now I know _____.

APPENDIX B: Trunk and Pop-Up Banner Questions

Flight of the Butterflies Trunk and Pop-Up Banner Evaluation

This survey/interview is one component of the summative evaluation of the Flight of the Butterfly *project. Your feedback helps producers understand the strengths of a project and how to best design future projects. We welcome your honest and thorough feedback.*

Please tell us about yourself:

Name:

Institution:

Please describe your position:

How long have you worked in Science Center education?

TRUNK

Please tell us how the trunk was used in your institution.

1. With which of the following groups was the trunk used in your institution? (Check all that apply)

___ Visitors on the floor ___ School Groups

___ Workshops ___ Other:

2. If you conducted workshops related to the film topic or content, please state the name of the workshop and describe the learning goals and content.

3. How valuable were the trunk materials in the success of these workshops? (circle one)

Not valuable Valuable Very Valuable

Explain why:

4. If you used the materials on the Center floor, where was the facilitator located? (Check ALL)

___ In or adjacent to a butterfly exhibit ___ Near the Center entrance

___ Near the theater entrance ___ Other:

___ Near the theater exit

5. Please describe briefly any other ways the trunk was used in your institution (e.g. special events, marketing uses, etc.).

6. Over what period of time was the trunk used? Start Date: _____ End Date: _____

6a. Was this

___ Only before the film started screening

___ Only during the film screening period, or

___ Both before and during the film screening

7. How extensively was the trunk used?

___ Several times a day.
___ Most days.
___ 1-2 times a week
___ 1-2 times a month.
___ Less frequently.

8. Indicate whether all of the materials were available to your education staff. If not, indicate which ones you used in your institution

___ All materials were used.

___ The following materials were used (Check ALL that were used):

___ Hand held digital microscope
___ Microscope slides – butterfly compound eye, antenna, scales
___ CD still/videos from Flight of the Butterflies
___ The Incredible Journey of the Butterflies – PBS NOVA DVD
___ Butterfly Farm Rearing Kit with pre-paid certificate to obtain live specimens and milkweed seeds or plants
___ Inflatable butterfly kit of life cycle stages- egg, larva, pupa, adult
___ Mounted specimens showing monarch and viceroy butterfly mimicry
___ Life cycle plastic models – egg, larva, pupa, adult
___ Monarch Magic book by Lynn M. Resenblatt
___ Educator Guide Summary and CD
___ Milkweed seeds for planting
___ Bookmark – 10 sets of 6 bookmarks

Explain your choices (reasons why those were selected or not):

9. In creating the educational experience from these materials, did you supplement these with any other materials? Please describe what you used and why.

10. Did you link the use of the trunk with local exhibits or events? If so, please describe.

Rate the Trunk

11. What did you find most effective in your use of the trunk? (please explain in terms of visitor responses and learning)

12. To what extent were the activities and materials aligned with the **interests** of your visitors?

Not at all appropriate Somewhat appropriate Very appropriate

Explain:

13. To what extent were the activities and materials aligned with the **learning goals** of your institution?

Not at all aligned Somewhat aligned Very aligned

Explain:

14. Were the instructions for the activities clearly described?

Not clear Clear Very clear

Explain:

15. How easily adaptable were the materials for different audiences (in terms of ages and knowledge of the topic).

Not easily adaptable Adaptable Very easily adaptable

Explain:

16. How successful was the trunk in extending the learning experience from the film?

Poor Fair Good Very good Excellent

Explain:

17. Rate the trunk compared to other educational materials you have received along with giant screen films.

Poor fair good very good excellent

Explain:

18. Would you be interested in using similar trunks that accompany other giant screen films? Why or why not?

19. What suggestions do you have for the design of future trunks?

POP-UP BANNERS

1. With which of the following groups was the pop-up banners used in your institution? (Check all that apply)

___ Visitors on the floor ___ School Groups

___ Workshops ___ Other:

2. If you conducted workshops related to the film topic or content, please state the name of the workshop and describe the learning goals and content.

3. How valuable were the banners in the success of these workshops? (circle one)

Not valuable Valuable Very Valuable

Explain why:

4. Please describe briefly any other ways the banners were used in your institution (e.g. special events, marketing uses, etc.).

5. Over what period of time were the banners up? Start Date: _____ End Date: _____

5a. Was this

___ Only before the film started screening

___ Only during the film screening period, or

___ Both before and during the film screening

6. Indicate whether all of the banners were put up or just particular ones.

___ All banners were put up.

___ The following banners were used (Check ALL that were used):

___ Life Cycle
___ Migration
___ Citizen Science
___ A Unique Creature
___ A Day in the Life

Explain your choices:

7. Which of the following best describes how the banners were used in your institution:

___ Banners hung without any facilitation

___ Facilitation was available on request

___ Facilitation was available during specific times

___ Other:

8. In creating the educational experience from these banners, did you supplement these with any other materials? Please describe what you used and why.

9. Did you link the use of the banners with local exhibits or events? If so, please describe.

Rate the Banners

10. How successful were the banners in extending the learning experience from the film?

Poor Fair Good Very good Excellent

Explain:

11. Rate the banners compared to other educational materials you have received along with giant screen films.

Poor fair good very good excellent

Explain:

12. Would you be interested in using similar banners that accompany other giant screen films? Why or why not?

13. In what ways were the banners valuable for the development of outreach for this film and/or for your use of the trunk materials? (Check ALL that apply)

___ Background information about the film
___ Background information about monarch butterflies
___ Ideas for additional activities
___ Other:

14. How appropriate is the following attributes of the banners for middle school age students**?**

	Not Appropriate	Appropriate	Very Appropriate
Organization of Ideas			
Science Content			
Language Used			
Visuals/Photos			

15. What suggestions do you have for the design of future banners?

APPENDIX C: Community Grantee Questions

Flight of the Butterflies Mini-Grant Projects Spring 2013
Evaluation Questions for Project Coordinators

Interviewer: _____ Date: _____

Interviewee: _____

Organization: _____

Position within Organization: _____21114

Other Project Member: _____

Organization: _____

Position within Organization: _____

Attach Project Proposal for Reference

1. Approximately how much time was devoted to planning the project?

   How much time was given to implementing the project?

   Was this sufficient?

2. Did you utilize any of the following resources in helping you plan or execute the project? If yes, how helpful was the resource?

	Yes	No	If yes, how helpful		
			Very	Somewhat	Not at All
Maryland Science Center					
FOB website					
Education guide					
Posters					
Traveling trunk					
Pop-up banners					

Other resources: _____

3. Were the project activities implemented as planned? ___Yes ___No
   If no, what were the changes?

4. Were there any challenges in implementing any of the project activities and how were they addressed?

5. What were the successes of the project? What contributed to the success?

6. If student/youth audience, what do you think the impacts were on the youth who attended? Is that your perception or did you conduct evaluations?

7. If educator audience, what do you think the impacts were on the teachers who attended? Is that your perception or did you conduct evaluations?

8. Did your project address the role of being a "Citizen Scientist"?

   If yes, can you describe the activities that promoted the role of "Citizen Scientist"?

9. Do you have any plans to continue any aspects of this project? If so, what are they?

10. Any other comments.

The research team is also interested in obtaining feedback on the use of the traveling trunk and/or pop-up banners. Would you have opinions on the effects of these materials?

If no, who would we contact?