Summative Evaluation of National Geographic's *Strange Days on Planet Earth* Television Series and Website with an Adult Audience

Overview of Findings

Prepared for

Sea Studios Foundation

By

Valerie Knight-Williams, Ed.D.
Divan Williams Jr., J.D.

With assistance from:
Christina Foltz
David Tower
Deirdre Price
Laura Santigian

Knight-Williams Research Communications

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Introduction

Strange Days on Planet Earth combines a 4-part television series and outreach program produced by Sea Studios Foundation (SSF) for National Geographic Television and Film and Vulcan Productions, with funding from the National Science Foundation (NSF) and The David and Lucile Packard Foundation. The project comprises three primary components: a broadcast series, website, and a national consortium of informal learning institutions. The project team expects that through consistent messaging and content, these components, when integrated, collectively offer the public enriched opportunities to explore and learn about the environment and the emergence of Earth System Science, a relatively new multidisciplinary approach to studying the planet that involves the physical, life, and social sciences. In particular the project expects to impact the public in three ways, by: 1) Increasing interest in the subject of science and the environment; 2) Increasing engagement and further learning; and 3) Increasing understanding of the environment through Earth System Science.

Knight-Williams Research Communications (Knight-Williams), an independent evaluation firm specializing in the evaluation of science education media, conducted the summative evaluation for the project. The evaluation assessed the extent to which *Strange Days on Planet Earth* realized the informal science education goals described in the project's grant proposal to the National Science Foundation (NSF), which subsequently provided funding for the television series, outreach program, and independent evaluation.

This report presents findings related specifically to an adult audience's experience with the four-part television series and website.[1] Knight-Williams' evaluation randomly assigned adults fitting the target audience profile to either a group that viewed all four episodes from the *Strange Days on Planet Earth* series or a group that viewed these episodes and visited the project website designed to reinforce and extend the series' content. The evaluation then compared the results of assessments completed by both groups at the beginning and end of the evaluation period. The goal of the evaluation was to understand: a) the impact of the series when viewers watch the full four episodes and b) the added value of the website in increasing viewers' awareness, understanding, and engagement with the series' main topics.

Method

Using a quasi-experimental pretest/posttest comparison group design, Knight-Williams recruited 100 participants fitting the series target audience from diverse regions of the country and randomly assigned them to two groups as follows:

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[1] Knight-Williams' independent summative evaluation also included four additional studies focused on other aspects of the television broadcast series and outreach, including: Study 2 (a naturalistic post-series evaluation of the series, website, and local activities at a sample of consortium partner sites); Study 3 (a website evaluation with a sample of website visitors); Study 4 (an evaluation of the consortium partner workshop); and Study 5 (an evaluation of screening events held at a sample of consortium partner sites). Additional information about these studies can be requested from Dr. Valerie Knight-Williams at val@knightwilliams.com

(Series only) Half of the participants viewed the series' four episodes during a timeframe that generally reflected the regularly scheduled broadcast time (weekday evenings). Participants watched the episodes over a 2 week period on DVD. Participants watched the first two episodes during week 1 and the second set of episodes during week 2.

(*Series + website*) The remaining half of the participants watched the four episodes as outlined above and visited the project website. These participants were asked to visit the website http://www.pbs.org/strangedays/index_flash.html approximately 30 minutes 1-2 days after viewing the first two episodes and then again for approximately 30 minutes 1-2 days after viewing the 2nd set of episodes.

The participant sample for the evaluation aimed for: individuals between 18- 55 years of age, a balance of women and men, and a racial distribution of 25%-30% minorities. All participants were screened for a minimal level of PBS viewing *(approximately 1 hour per week)* and visits to their local informal science education institutions (*more than 1 visit a year*).

Although 100 viewers were recruited for the evaluation, a total of 96 viewers completed both pretest and posttest questionnaires within the timeframe allotted for the evaluation. This total included 48 viewers in the *series + website* group and 48 viewers in the *series only* group.

Evaluation issues

The evaluation examined the appeal and clarity of the television series and website as well as the audiences' awareness, understanding, beliefs, attitudes, and engagement with the project's central topics. The specific evaluation issues listed below reflect the issues generated by the project team when asked to prioritize the appeal, learning, and engagement outcomes they hoped to see result from the two media. The evaluation issues included:

Previous lack of exposure to the series and promotions:

- Why didn't participants see the series during the broadcast schedule? Had they heard about it and not watched?

Appeal and clarity:

- What were viewers' reactions to the series and website with respect to overall appeal, production style, and storytelling approaches used to communicate the programming content?
- Did viewers feel the TV and web programming was clear and had a good balance of information, science, and entertainment?

Awareness/Understanding:

The evaluation assessed the extent to which the series has communicated the following over-arching ideas:

- Were viewers made aware that Earth's major systems—the atmosphere, oceans and land -- are all interconnected and that when we push on one side of the planet, impacts may result on the entirely opposite side of the planet?
- Did viewers understand that the pace of change to our environment is faster than ever before in the past?
- Did viewers understand how we humans are playing a diverse and dangerous role in accelerating these changes? Changes that are too rapid for much of the rest of the planet's life to keep pace?

The evaluation also assessed viewers' learning about specific facts and concepts presented in the four episodes and website.

- *Invaders episode:* Has the audience been made aware that invasive species are an environmental problem? Do they understand how invasives can wreak havoc? Impact biodiversity? Cause economic damages? What did they think may have been missing?

- *One Degree Factor:* Has the audience been made aware that there is a general consensus among scientists that humans are playing a significant role in climate change and that our burning of fossil fuels is a major contributor? Does the audience understand that different parts of the world respond differently to climate change? Do they understand that the Arctic may be one of the hardest hit places? Do they understand that the Pacific Ocean has a large-scale temperature pattern that flips back and forth and that climate change will ride atop these cycles? Do they understand that animals have temperature limits in the intertidal? Do they see a connection between Africa and the Caribbean? Do they understand that warming of the Indian Ocean can add a pulse of energy into the atmosphere and influence pressure systems over the North Atlantic which in turn can influence wind patterns over Africa and the amount of dust being carried to the Caribbean? What parts of the film were confusing to them?

- *Predators*: Does the audience understand the relationship between predator and prey as evidenced by the story in Venezuela i.e. that predators kept prey numbers in check? Do they understand the connection between the presence of wolf packs and the growth of aspen and willow groves i.e. that the fear factor, not the killing of elk by wolf packs, is what limits the intensity of elk grazing on the foliage? Does the audience understand that each part of an ecosystem depends on the other parts? Does the audience understand the benefits of marine reserves? Do they understand how fishing down the food web can reduce the ability of a coral reef to respond to other changes like disease?

- *Troubled Waters*: Does the audience understand how certain chemicals can disrupt development? Do they understand how different doses can have differing effects and that sometimes smaller doses can cause more harm? Do they understand how combinations of chemicals in large, long-lived animals like whales and humans can illicit complicated reactions that we are just now starting to decipher? Do they understand how plants can help clean up toxins and how trees can act as natural filters to reduce run-off from agricultural fields? Does the audience appreciate how our water systems are interconnected and how chemicals we put in our water and wash down our sinks and streets can find their way into lake, ponds, rivers, and eventually the ocean? Does the audience understand that open-ocean animals aren't immune to our land-based toxins since many of them spend considerable time close to shore?

Engagement/Action

- What were viewers' perceptions about whether the series involved them such that they felt "included in the quest to understand Earth" and "empowered to make choices that make a difference" as a result of their viewing experience.
- Were viewers left with a feeling of empowerment? Or do they feel there's nothing that they can do to make a difference?
- Have the programs engaged viewers in the environment or turned them off?
- Have they been inspired to take any other action? If so what have they actually done or plan to do?

Additional questions about website not already addressed above:

- Did the viewers act on the web markers?
- What did viewers do at the site? What did they find most valuable?
- Do the web materials increase visitors' knowledge and understanding of the series issues?
- How did they "feel" after using the website – hopeful, optimistic, scared, defeated, inspired?
- Did they make a promise and perceive the "promise" as a valuable exercise?
- Did they use the website to link to any activities?
- Did the website inspire them to action?

Evaluation instruments

Participants in both viewing groups completed an online pre-viewing questionnaire one week prior to viewing the first episode from the series and a post-viewing questionnaire within four days of viewing the final episode. Knowledge items were developed specifically for the evaluation by Knight-Williams and the project team and were piloted with 20 adult representative of the target audience. Attitudinal and belief items were borrowed or adapted from established national polling or evaluation instruments.[2]

Approximately 20 days after participants viewed the final episode, a subgroup of participants (n = 23) were contacted for follow-up telephone interviews. The interviews further probed key issues cited under the preceding bullet points and generally sought to understand the longer-term impact of the series and website on viewers' awareness, understanding, beliefs, attitudes, and engagement with the project's topics.

Analyses

Statistical analyses were conducted on all quantitative data generated from the evaluation. The evaluation looked for significant change in pre-post learning and for relationships with the demographic and background variables measured.[3] To explore for possible significant differences between and within groups the analyses used chi-square, t-tests, and ANOVA as appropriate.[4] Statistically significant findings at $p \leq .05$ are reported in the text.

Content analyses were performed on the qualitative data generated in the open-ended questions on the pre- and posttests. All analyses were conducted by two independent coders. Any differences that emerged in coding were resolved with the assistance of a third coder.

Sample demographic and background information

A total of 96 viewers completed both pretest and posttest questionnaires. This total included 48 viewers in the *series + website* group and 48 viewers in the *series only* group. Table 1, below, summarizes both groups' demographic and other background data.

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[2] Attitudinal and belief items were adapted from the following national survey polls: National Survey on Biodiversity, January 2-16, 2002 N=1500 adults nationwide; Gallup Organization poll April 3-9, 2000, N = 1004 adults nationwide; Gallup Organization poll March 4-7, 2002. N=1,006 adults nationwide; Wirthlin Survey, June 4-7**,** 1999 N=550 adults (split sample) nationwide**;** and Wirthlin Quorum Survey, June 2-June 7, 1999 N=1,004 adult nationwide.

[3] Given the relatively small number of participants in the racial/ethnic groups, results related to these demographic and background factors were not explored.

[4] When examining subgroups with two categories, Levene's test was used to determine whether 2-sample t-tests or pooled t-tests were appropriate for testing the means of the measured variables.

Table 1 Sample demographic and background information			
Demographic/ background factor	**Categories**	***series only*** **(n=48)**	***series + website*** **(n=48)**
Gender	Female	46%	48%
	Male	54%	52%
Age	Mean	36	39
Racial/Ethnic Group	African-American/Black	6%	6%
	Asian American	4%	4%
	White	73%	81%
	Mixed race	2%	0%
	Other	15%	8%
	Hispanic origin	15%	6%
Occupational status	Employed	73%	70%
	Homemaker	10%	6%
	Student	17%	13%
	Unemployed	0%	8%
Level of education	High school graduate	4%	12%
	Some college	21%	15%
	College graduate	40%	46%
	Some graduate	17%	12%
	Graduate degree	19%	15%
Frequency of viewing science/nature programs	Daily	6%	6%
	Weekly	27%	35%
	monthly	35%	29%
	Less than monthly	31%	27%
Frequency of viewing PBS channel	Daily	10%	15%
	Weekly	37%	40%
	monthly	37%	23%
	Less than monthly	15%	19%
Knowledge of the environment	1 (Know nothing)	0%	0%
	2	8%	2%
	3	25%	25%
	4	31%	31%
	5	23%	31%
	6	8%	8%
	7 (Know a lot)	4%	2%
Interest in the environment	1 (Not interested)	0%	0%
	2	0%	2%
	3	8%	2%
	4	10%	15%
	5	21%	21%
	6	27%	27%
	7 (Very interested)	33%	33%

Group comparability

The evaluation gathered demographic and background information to determine whether the two viewing groups should be looked at as having coming from the same population. As expected with the use of random assignment, chi-square analyses revealed that there

were no significant differences in the two groups' composition with respect to gender, race, level of education, interest in and knowledge of the environment, or frequency of viewing science/nature shows and the PBS channel. As shown in Table 1, on the previous page, both groups included a balance of males and females, approximately one-quarter minorities, individuals of varying ages with a mean age in the upper-thirties, a high percentage of employed individuals, a combination of regular and sometime viewers of PBS programs and science/nature programs, and a combination of individuals with varying self-reported levels of knowledge and interest in the environment.

Findings

Overall appeal of the series

The evaluation found that viewers recruited to participate in the evaluation generally liked the *Strange Days on Planet Earth* series, felt the storytelling was engaging, thought the content was interesting, and agreed that the series was visually exciting, clear, and struck the right balance in terms of the amount of information and science provided. Moreover, most viewers thought the series compared favorably to other environmental series they had seen and felt they were likely to recommend it to others.

Although the viewers liked many different aspects of the series, the majority pointed to information they learned about the series' environmental issues. Many viewers also mentioned liking the series' cinematography while others pointed to its' clear explanations or overall presentation. When asked if there was anything they disliked about the series, the most frequent complaint was that the series lacked sufficient solutions or actions people could take to help the environment, with some viewers commenting that this deficiency made the series seem too depressing. Elsewhere in the evaluation, however, when asked a direct question about the series' tone, the viewing sample as a whole found the series to be more hopeful than depressing, so this was apparently an issue for a minority of viewers. Other viewer dislikes tended to focus on some aspect of the series' presentation, such as: a perceived lack of in-depth information, the host Edward Norton, or an element of the series' storytelling style, cinematography, or use of special effects.

The evaluation found few subgroup differences in viewers' ratings of the appeal or educational value of the series. The main differences involved the background variable frequency of viewing science/nature shows. More frequent viewers of science/nature shows rated the series' storytelling, level of visual excitement, and clarity significantly higher than did less frequent viewers. More frequent viewers also felt they were significantly more likely to recommend the series. One other subgroup difference was found in the evaluation involving perceived level of knowledge of the environment. Viewers who felt they were less knowledgeable about the environment rated their learning from the series significantly higher than did those who felt more knowledgeable. Other than the above subgroup differences, the evaluation found no other statistically

significant differences with respect to gender, age, education, or frequency of viewing PBS.

The main findings related to the series perceived appeal and entertainment value are discussed below.

- **Viewers consistently said that they liked the series, found it visually exciting, and were engaged by the storytelling and content**. On a scale of 1 (disliked overall) to 7 (liked overall), the viewing group as a whole reported liking the series (mean rating, 6.0). Again using a 1-7 scale, viewers indicated they felt the series was visually exciting (mean rating, 6.1), and that the storytelling engaged them (mean rating, 5.7). Note that more frequent viewers of science/nature shows rated the series' storytelling (6.1 vs. 5.4) and level of visual excitement (6.4 vs. 5.9) higher than did non-viewers.

  Viewers also gave the series high ratings for content interest, with a mean rating of 6.0, on a scale of 1 (boring content) to 7 (interesting content). No subgroup differences were found in this case.

- **Viewers liked many different aspects of *Strange Days on Planet Earth*, but the group as a whole particularly liked information the series presented about the environment.** Two-thirds (67%) of the viewers independently pointed to series' environmental information as their favorite part. About half of these viewers specifically said that they liked that the series had increased their awareness of environmental threats or problems while half said they liked how the series emphasized the interconnectedness of environmental events. Those who liked learning about the interconnectedness of environmental events either appreciated how this theme was woven throughout the four episodes or pointed to the interconnectedness of events within an environmental story featured in a given episode, most often *Predators.*

  Other aspects of the series that particularly stood out for viewers included the series': cinematography (36%); clear explanations/presentation (27%); narrator/host (9%); depiction of scientists working in the field or collaborating (9%); mystery style approach (5%), and focus on actions the public can take to help the environment (5%).

- **When asked to describe what, if anything, they disliked about *Strange Days on Planet Earth*, viewers as a whole didn't single out any one element. The main dislikes were mentioned by one-quarter of the viewers and focused on the series' lacking solutions or in-depth information/explanations.** Nearly one-third of the viewers (30%) said they had no criticisms of the series, stating that they enjoyed everything or there was nothing they disliked. The main dislike was raised by one-quarter of the group (26%) and focused on the series not showing sufficient solutions or actions they could take to help the environment (26%), with some further commenting that this deficiency made the series seem too depressing to them. A

slightly smaller group, one-fifth (20%) of the viewers, felt the series lacked in-depth information/explanations.

The few remaining viewer complaints' focused on the series' appeal value rather than content. One-sixth (16%) felt the series host, Edward Norton, was *flat, dry*, or not sufficiently *lively* or *engaging,* while another one-sixth took issue with some aspect of series' storytelling style, cinematography, or use of special effects, most often describing them as *too dramatic, cheesy,* or *confusing*. About one-tenth of the viewers (9%) felt the series' pace was generally too slow while another (9%) perceived that the information presented in the series was at times too *one-sided* or *biased*. Finally, just a few viewers (5%) commented that they felt the information and/or format of the series was in places too repetitive.

➲ **Most viewers felt *Strange Days on Planet Earth* compared favorably to other environmental shows they'd seen because of its' presentation style, breadth/ depth of information, comprehensibility, and/or sense of hope or solutions**. When viewers were asked to compare *Strange Days on Planet Earth* to other shows they've seen about the environment, 81% said it compared favorably, 23% said it compared unfavorably, and 15% said it was comparable.

Among those who felt the series compared favorably, a variety of reasons were offered. Nearly half (47%) felt the series offered a more appealing presentation style. One-fifth (22%) felt the series offered greater breadth and depth of the information. Fourteen percent (14%) felt that the series was clearer, easier to understand, and provided just the right amount and level of scientific explanation. Another fourteen percent (14%) appreciated that the series offered solutions and a sense of hope. Finally, about one-tenth (7%) or less of the viewers preferred that the series was: balanced or unbiased and less "preachy" in tone; more persuasive in heightening their awareness of environmental problems (4%); timely and up-to-date (3%); and/or demonstrated the "interconnectedness" of all life forms on Earth (3%).

Those who felt the series compared unfavorably in some way (23%) pointed to different themes without one main issue standing out. These viewers' comments focused on the series': being too slow paced, offering false hope, lacking solutions, lacking scientific rigor, being too reliant on the narrator, being too vague in places, or coming across as too *Hollywoodish* in its presentation.

Those who felt the series was comparable (15%) explained that *Strange Days on Planet Earth* seemed to present similar content in the same ways as did other environmental series.

➲ **Viewers felt the series was more hopeful than depressing.** When asked to rate the series overall tone on a scale of depressing (1) to hopeful (7), viewers generally felt the series was more on the side of hopeful than depressing (mean rating, 4.7).

➲ **Viewers generally found the series clear and felt it offered about the right balance of information and science.** Viewers as a whole agreed the series was generally clear, with the mean rating being 5.9 on a scale of 1 (confusing presentation) to 7 (clear presentation). More frequent viewers of science/nature programs, however, rated the level of clarity significantly higher than did less frequent viewers (6.4 vs. 5.8).

Using a scale from 1 (too little) to 7 (too much), viewers generally agreed that the series had about the right "amount of information" (mean rating, 4.1) and the right amount of science (mean rating, 3.9).

➲ **Viewers expected to recommend the series to others.** When asked if they were likely to recommend the series to others, viewers as a whole felt they were likely to do so. Here the mean rating was 5.9 on the scale of 1 (would not recommend) to 7 (would recommend). More frequent viewers of science/nature programs indicated they were more likely to recommend the series to others than were less frequent viewers.

Viewer learning from *Strange Days on Planet Earth*

In addition to the overall appeal, entertainment value, and clarity issues summarized above, the evaluation also assessed the extent to which the series and website: communicated general environmental themes to viewers, increased their awareness and understanding of particular issues addressed in the four episodes, and increased their engagement, and actions related to these issues. These informal science education goals were assessed through pre- and post testing and by comparisons within and between the viewing groups. The following section provides a general overview of these findings.

Viewers' perceived learning and motivation from the series (and series + website)

➲ **Viewers consistently felt they learned a considerable amount from the *Strange Days on Planet Earth* series.** When asked to rate how much they learned from the series as a whole, viewers gave *Strange Days on Planet Earth* high marks. On a scale of 1 (learned nothing) to 7 (learned a lot), the overall mean rating was 6.3. One subgroup difference did emerge for this item, however, as viewers who felt they were less knowledgeable about the environment rated their learning from the series significantly higher than did those who felt they were more knowledgeable (6.5 vs. 6.1).

➲ **When asked to describe the most interesting things they learned from watching the series, almost all of the viewers' responses focused on information they learned about the topics presented within the episodes, rather than general ideas or concepts woven throughout the four episodes.** Viewers' responses generally fell into four categories, which mirrored the four episodes viewed. The

largest percentage of viewers, more than two-fifths (41%), were interested in information presented about predators and their impact and role in specific environments in the *Predators* episode. Nearly one-third (30%) were interested in information presented about the polluted water that affects humans and animals in *Troubled Waters*. A little over one-fourth (28%) meanwhile discussed information they learned about the destruction caused by alien species in the episode *Invaders,* while about the same percentage (27%) were interested in the causes and effects of global warming presented in the episode *The One Degree Factor*. Beyond the comments that could be generalized to fit under a specific episode, the evaluation also found that sixteen percent (16%) of the viewers learned about the interconnectedness of environmental events throughout the series.

- **Viewers felt that *Strange Days on Planet Earth* increased their understanding of environmental threats and was somewhat successful in increasing their understanding of what they could do to help.** When viewers were asked to rate how much the series (or series + website) increased their understanding of the threats facing the environment, the mean rating for the *series + only* group was 6.5 while the mean rating for the *series + website* groups was 6.4. Both viewing groups were a little more divided about whether the series (or the combined experience of seeing the series and visiting the website) had increased their understanding of what they personally can do to help improve the quality of the environment, however, as evidenced by the somewhat lower mean ratings of 5.5 in the *series only* group and 5.7 in the *series + website* group.

- **Viewers expected to take some action to improve the quality of the environment as a result of their experience with the series.** When asked if they felt whether their experience with the series encouraged them to take some action to improve the quality of the environment, viewers in both groups generally agreed that they felt encouraged to do something in this regard. Using a scale of 1 (discouraged) to 7 (encouraged), the mean rating for the *series only* group was 5.9 and in the *series + website* group 6.0. Viewers were also asked to specify which episode(s) encouraged them to want to take some action. Of the four episodes, *Troubled Waters* seemed to spur the highest percentage of viewers to action (61%) followed by *Invaders* (48%), *Predators* (42%) and then *The One Degree Factor* (41%).

  The most frequently mentioned action viewers expected to take related to the *Troubled Waters* episode and involved reducing the use or purchase of household and garden chemicals. The next most frequently mentioned action related to *Invaders* and involved only buying or planting native/indigenous plants. The third most frequently mentioned action related to *Predators* and involved supporting/encouraging predator reintroduction efforts. Other actions mentioned by 10% or more of the viewers included: Use less energy. buy cars with lower emissions/hybrids, be more careful when traveling to not transport invasive species, drink bottled/filtered water, and join local efforts to help clean water pollution. Actions mentioned by between 5-9% of the viewers included: support global warming environmental groups and politics; drive

less, talk to others about global warming, learn more about predators, support/visit national parks, be more careful when traveling to not transport invasive species, join local efforts to remove invasive species from the community, and learn more about what I can do to reduce water pollution.

Viewers' learning assessed through content quizzes of the series' main environmental themes

In addition to asking viewers to discuss personally salient learning that occurred from viewing the series, the evaluation also assessed the impact of the series and website on viewers' knowledge of information presented in the four episodes. Viewers in both groups were asked to complete a variety of assessments that consisted of true/false, checklist, fill-in-the-blank, and open-ended items, totaling 46 items.

Looking across the combined assessments, the evaluation found that viewers in both groups earned a significantly higher score at posttest than at pretest. Out of a possible score of 44 true/false, checklist, and fill-in-the-blank questions, the *series only* group averaged 20 correct answers at pretest and 33 correct answers at posttest; meanwhile the *series + website* group averaged 21 correct answers at pretest and 34 correct answers at posttest. To assess whether exposure to the website added significant learning value to the series, posttest mean scores were compared for the *series only* and *series + website* groups. The evaluation found no significant difference between the two groups' scores. Therefore, while both groups improved significantly from pre- to posttest overall, exposure to the website did not add significantly to viewers' knowledge as measured by the combined assessments.

The findings from each episode assessment are summarized in turn below. When the findings from each separate assessment are considered, here again, group differences were generally not found although a difference in the scores of the two groups was found for the assessment related to *Troubled Waters*.

Learning related to Invaders

- **Assessment 1: Invasive species' effects and current status** To assess impact on viewers' knowledge of invasive species' effects and current status, both viewing groups were presented with a series of 5 statements about the effects and current status of invasive species and asked to select an answer of True, False, or Don't Know**.** Out of a possible score of 5, the *series only* and *series + website* groups, on average, correctly answered just 2 of the questions at pretest (there were no significant differences in the two groups' pretest scores). At posttest however, viewers in both groups on average correctly answered 4 items. Both groups earned a significantly higher score at posttest than they did at pretest.

To assess whether exposure to the website added learning value to viewing the series, posttest mean scores were compared for the *series only* and *series + website* groups. The evaluation found there was no significant difference between the two groups' posttest scores. Therefore, while both groups improved significantly from pre- to posttest, exposure to the website did not add significantly to viewers' knowledge of invasive species as measured by the true/false assessment.

➲ **Assessment 2: Problems that result from invasive species** To estimate viewers' understanding of the problems that can arise from invasive species both the *series only* and *series + website* groups were asked at pretest and again at posttest to list answer the following question: *Invasive species are defined as any species (plant, animal, etc...) that has been moved from its native habitat to a new area and has caused harm. When an invasive species shows up in a new area, what kinds of problems could arise? List as many things as you can.* Both groups' responses generally fell into about six different categories at pretest and again at posttest, including: chokes out/overtakes local species, economic/industrial/property damage**,** changes habitat (generally), brings diseases, causes erosion, and disrupts natural balance/order.

At pretest, the *series only* group generated an average of 2.4 problems while the *series + website* group generated an average of 2.8 items. At posttest, both groups generated an average of 4 problems. A higher percentage of viewers in each group listed each category at posttest than had listed it at pretest with one exception. The only category mentioned less frequently at posttest was the general category of "changes habitats" where viewers gave vague or general answers about invasive species generally changing the habitat. Where viewers gave specific answers however, the pre- to posttest percentage increases were quite large, as follows:

- At pretest, none or few of the viewers in each group knew that invasive species can result in economic/industrial/property damage, while at posttest two-fifths of the viewers in each group knew this to be the case (39% *series only*, 42% *series + website*).
- At pretest about two-thirds of the viewers in each group (69% *series only*, 67% *series + website*) recognized that invasive species can choke out or overtake local species. At posttest, however, all of the viewers in each group (100%) knew this to be the case, reflecting a one-third increase in each group from pre-posttest.
- At pretest, 15% of less of each group knew that invasive species can bring erosion problems, where about one-fifth in each case knew this at posttest (*22% series only, 19% series + website*).
- At pretest, only a few or none of the viewers in each group knew that invasive species can result in economic/industrial/property damage, while at posttest two-fifths of the viewers in each group knew this to be the case (39% *series only*, 42% *series + website*).

Note that there were no obvious differences in the nature or scope of the responses of the *series only* or *series + website* groups after viewing the series.

Learning related to The One Degree Factor

- **Assessment 1: The connection between events in Africa and the Caribbean**
  Viewers in both groups were asked the following series-specific question about content presented in *The One Degree Factor: The One Degree Factor episode described events occurring in Africa and the Caribbean that are actually connected. Please describe what you learned about the nature of the connection. Be as specific as possible.* In response to this open ended question, two-thirds (66%) of the viewers were able to cite one or more of the following responses identified by the project team as a correct and desired response: African dust can lead to asthma in young children and disease of some coral reef life in the Caribbean (46%); Dust in Africa can travel to the Caribbean (41%); Drought can cause more dust (21%); Dust can carry pathogens with it (6%); and Climate change can affect how much dust is transported (2%). Meanwhile, less than one-tenth (8%) of the viewers gave an incorrect answer that the project team did not want to see represented in the responses, indicating viewers had misinterpreted a point made in the episode. These responses included: Climate change is the cause of drought in Africa (4%); Climate change is causing the dust storms or increasing the frequency of dust storms (2%); or Climate change created the dust (2%). Finally, one-quarter (26%) of the viewers gave a vague or off-point response that didn't fit any of the above responses.

- **Assessment 2: Knowledge of events correlated with global warming** To estimate impact on viewers' knowledge of events scientists have found to be correlated with global warming, viewers in both groups were given a list of 14 possible events. At pretest the *series only* group correctly answered 8 of the 14 items, while the *series + website* group correctly answered 9 items. At posttest, however, the two viewing groups on average correctly answered 11 and 12 items respectively. The mean scores for the two groups at posttest were significantly higher than each group's respective pretest mean score.

  These findings show that viewing the series or viewing the series and visiting the website significantly improved viewers' knowledge of events correlated with global warming. But did exposure to the website add value to viewing the series? To answer this question, posttest mean scores were compared for the *series only* and *series + website* groups. The evaluation found no significant difference between the two groups' posttest scores. Therefore, exposure to the website did not significantly add value to the series with respect to improving knowledge in this area.

- **Assessment 3: Knowledge of the effects of global warming** To estimate impact on viewers' knowledge of the effects of global warming, viewers in both groups were presented with a series of 4 statements about the effects of global warming and asked to select an answer of True, False, or Don't Know. Out of a possible score of 4, both the *series only* and *series + website* groups, on average, correctly answered just 2 of the 4 questions at pretest (there were no significant differences in the two groups'

pretest scores). At posttest however, viewers in both groups on average correctly answered 3 of the 4 items.

These findings show that viewing the series or viewing the series and visiting the website significantly improved viewers' knowledge of global warming effects. To assess whether exposure to the website added learning value to viewing the series, posttest mean scores were compared for the *series only and series + website* groups. The evaluation found no significant difference between the two groups' posttest scores. Therefore, while both groups improved significantly from pre- to posttest, exposure to the website did not add significantly to viewers' knowledge of global warming effects as measured by the true/false assessment.

- **Assessment 4: Contributors to global climate change** To estimate viewers' understanding of the most significant contributors to global climate change, both the *series only* and *series + website* groups were asked at pretest and again at posttest to list what they thought to be the most significant contributors to global climate change. Both groups' responses to the open-ended question about the contributors to global warming generally fell into five different categories at pretest and again at posttest, including: burning of fossil fuels, pollution, deforestation, humans, and depletion of ozone. A substantially higher percentage of viewers listed the burning of fossil fuels at posttest (63% *series only*, 68% *series + website*) than had listed it at pretest (43% *series only*, 55% *series + website*). The other categories were mentioned somewhat less frequently at posttest than at pretest, however. Note that there were no obvious differences in the nature or scope of the responses of the *series only* or *series + website* groups at pretest or posttest.

- **Assessment 5: The effects of global warming on ocean life subject to temperature fluctuations** To estimate the series' impact on viewers' understanding of the effects of global warming on ocean life subject to temperature fluctuations, viewers in both groups were asked the following question: *Every two or three decades, a region of the Pacific Ocean does a major flip-flop between a positive (warm) and negative (cold) phase. How do you think the addition of global warming will affect ocean plants and animals that are already subject to these cycles? Please check one box and explain your answer: Global warming won't affect them; Global warming may help them; or Global warming may harm them.* At pretest 58% of the *series only* group and 50% of the *series + website* group correctly answered that global warming may harm ocean plants and animals. Meanwhile, a considerably higher percentage, more than four-fifths of the viewers in each group (83% *series only*, 85% *series + website*) correctly answered the question at posttest. The pre- to posttest percentage increases were statistically significant in each case.

Learning related to Predators

- **Assessment 1: The connection between wolf packs and the growth of aspen and willow groves in Yellowstone Park** At posttest only, the total viewing sample was asked the following series-specific question: *The Predators episode drew connections*

between the presence of wolf packs and the growth of aspen and willow groves in Yellowstone Park. Please describe what you learned about the nature of the connection. In response to this open ended question, nearly three-fifths (56%) of the viewers were able to cite one or more of the following responses identified by the project team as a correct and desired response: The disappearance of the wolves is linked to the disappearance of the aspens and willows (33%); The presence of the wolves alters the intensity of elk grazing (23%); The presence of foliage in and around streams enhances habitat for other animals including songbirds and beavers (9%) and; Wolves also increase the carrion which aids other animals like scavenger birds and insects (7%).

Meanwhile, nearly one-quarter (23%) of the viewers gave an incorrect answer that the project team did not want to see represented in the responses, indicating viewers had misinterpreted a point made in the episode. In this case an incorrect response included comments to the effect that the wolves were decreasing the population of elk by killing them and with fewer elk there would be less grazing on foliage. Finally, one-fifth (21%) of the viewers gave a vague or off-point response that didn't fit any of the above responses.

- **Assessment 2: The impact of a decline in the shark population on coral reefs**

  Using a scale of 1 (no impact) to 7 (a great impact) viewers in both groups were asked at pretest and again at posttest: *Generally speaking, how much of an impact do you think a decline in the shark population in an ocean bay would have on the ability of coral reef in that area to survive?* At pretest, the mean rating for the *series only* group was 4.9 and for the *series + website* group 5.1 (there were no significant differences in the two groups' pretest scores). At posttest, however, the mean ratings for each group were significantly higher (6.5 for each group).

  The above findings show that viewing the series or viewing the series and visiting the website significantly influenced viewers' estimation of the impact a decline in the shark population. But did exposure to the website add value to viewing the series? To answer this question, posttest mean scores were compared for the *series only* and *series + website* groups. The evaluation found no significant difference in the scores. Therefore, exposure to the website did not significantly add value to the series with respect to improving viewers' knowledge of this issue.

- **Assessment 3: Knowledge of the benefits of marine management areas**

  To estimate impact on viewers' knowledge of the benefits of marine management areas, viewers in both groups were given a list of 7 possible benefits. Out of a possible score of 7, both groups on average correctly answered 3 of the 7 items at pretest (There were no significant differences in the two groups' pretest scores). At posttest however, the two groups correctly answered 6 of the 7 items. The mean scores for the two groups at posttest were significantly higher than each group's respective pretest mean score.

The above findings show that viewing the series or viewing the series and visiting the website significantly improved viewers' knowledge about marine management areas. But did exposure to the website add value to viewing the series? To answer this question, posttest mean scores were compared for the *series only* and *series + website* groups. The evaluation found no significant difference in the scores. Therefore, exposure to the website did not significantly add value to the series with respect to improving knowledge of marine management areas as measured by the assessment.

➲ **Assessment 4: The value of predators** To estimate impact on viewers' beliefs about predators, viewers in both groups were asked for their level of agreement or disagreement with a series of 4 statements at pretest and then again at posttest.

At pretest, the *series only* and *series + website* group mean ratings for all four statements did not differ significantly. Overall, both groups somewhat disagreed with the following three statements: *Scientists are finding that if one part of an ecosystem is destroyed, other parts of the ecosystem quickly adapt to compensate for the loss*; *I think it is often not worth the cost to try to save endangered species* and; *There is no need to reintroduce predators where they are not currently found.* Viewers in both groups generally somewhat agreed, however, with the statement *I enjoy knowing that predators like bears and wolves live in North America* and were neutral about the statement *Where top predators like wolves are present, ranchers, local communities, and hunters will suffer.*

At posttest, viewers in both groups had a significantly higher level of disagreement with the three statements about ecosystem compensation, cost of saving endangered species, and predator reintroduction. Meanwhile, both groups had a significantly higher level of agreement with the statement about enjoying predators, while their agreement with the statement about the effects of wolves on local communities didn't change from pre- to posttest.

The above findings show that viewing the series or viewing the series and visiting the website significantly changed viewers' beliefs about predators. But did exposure to the website add value to viewing the series? To answer this question, posttest mean scores were compared for the *series only* and *series + website* groups. The evaluation found no significant difference in the groups' ratings. Therefore, exposure to the website did not significantly add value to the series with respect to viewers' predator related beliefs as measured by the assessment.

Learning related to Troubled Waters

➲ **Assessment 1: Water pollution effects** Viewers in both groups were presented with a series of 3 statements about water pollution effects depicted in *Troubled Waters* to which they were asked to select an answer of True, False, or Don't Know. Out of a possible score of 3, both the *series only* and *series + website* groups, on average,

correctly answered just 1 of the 3 questions at pretest. At posttest however, viewers in both groups on average correctly answered 2 items.

The above findings show that viewing the series or viewing the series and visiting the website significantly changed viewers' beliefs about water pollution. But did exposure to the website add value to viewing the series? To assess this question, posttest mean scores were compared for the *series only and series + website* groups. The evaluation found there was no significant difference between the two groups' scores. Therefore, while both groups improved significantly from pre- to posttest, exposure to the website did not add significantly to viewers' knowledge of water pollution as measured by the true/false assessment.

- **Assessment 2: The potential effects of pollutants in the water supply** To estimate impact on viewers' knowledge of what scientists consider to be the effects of pollutants in the water supply as depicted in *Troubled Waters*, viewers in both groups were presented with a list of 9 possible effects and asked to check any that scientists currently consider to be an effect. Out of a possible score of 9, both the *series only* and *series + website* groups, on average, correctly answered just 4 of the questions at pretest. At posttest however, viewers in the *series + website* group on average correctly answered 7 items while the *series only* group correctly answered 6 items. Both groups earned a significantly higher score at posttest than they did at pretest.

  To assess whether exposure to the website added learning value to viewing the series, posttest mean scores were compared for the *series only* and *series + website* groups. The evaluation found there was a significant difference between the two groups' scores. Therefore, while both groups improved significantly from pre- to posttest, exposure to the website added significantly to viewers' knowledge of water pollution as measured by the assessment.

Strange Days on Planet Earth's impact on environmental attitudes and beliefs

The evaluation measured a wide range of attitudes and beliefs related to the environmental themes addressed in the series. Although short duration media projects are unlikely to impart major belief or attitudinal change, *Strange Days on Planet Earth* achieved some success in this regard. For both the *series only* and *series + website* groups, significant pre-post differences were found for several items in the evaluation, as follows.

- **Beliefs about the current status and quality of the environment** To estimate impact on viewers' beliefs about the current quality and status of the environment and how much environmental problems affect them personally, participants in both groups were asked for their level of agreement or disagreement with a series of 14 statements at pretest and then again at posttest. The evaluation found significant pre- to posttest differences for 7 of the 14 statements, such that exposure to the *Strange*

Days on Planet Earth series (and/or series + website) influenced viewers' beliefs that the environmental problems addressed in the series exist, are serious, and that they themselves are affected by and can in turn affect these problems. The evaluation did not find the website added significantly to viewers' beliefs as measured by the assessment, however.

- **Beliefs about how much humans have contributed to environmental problems** To estimate impact on viewers' beliefs about how much humans have contributed to environmental issues addressed in the series and website, viewers in both groups were asked at pretest and posttest how much they thought humans have contributed to seven specific environmental issues. The evaluation found significant pre- to posttest differences for two of the seven issues, such that exposure to the *Strange Days on Planet Earth* series (and/or series + website) resulted in viewers' assigning humans a higher level of responsibility for at least two of the environmental issues addressed, including contamination of drinking water and damage to oceans and beaches. The evaluation did not find the website added significantly to viewers' beliefs as measured in the assessment, however.

- **Personal worrying about environmental problems** To estimate impact on viewers' level of worrying about environmental issues addressed in the series and website, viewers in both groups were asked at pretest and posttest to rate how much they worry about several specific environmental issues. The evaluation found statistically significant pre- to posttest differences for three of the seven issues addressed, including invasive species, pollution of rivers, lakes, and reservoirs, and damage to oceans and beaches. The evaluation did not find the website added significantly to viewers' beliefs as measured in the assessment.

Viewers' experience with and reactions to the *Strange Days on Planet Earth* website

Half of the evaluation participants (n=48) were asked to spend time at the project website as outlined at the beginning of this overview. As a result of this activity, the evaluation found the following results with respect to viewers' experience with and reactions to the website.

- **During their visits to the website, viewers engaged themselves in a variety of reading, research, and interactive activities.** Most often viewers decided to read more about: the episodes, the "Why should I care" section, the "What the experts say" section, or the "What can I do" section. They were least likely to read about the series host, the glossary, or the producers. From highest to lowest frequency, viewers reported that they: read more in-depth information about the episodes (83%), read "Why should I care" (67%), read "What do experts say (67%), read "What can I do" (56%), looked at the Educators Guide (38%), read "How do I measure up" (38%), Made a promise (33%), read about the series' host Edward Norton (25%), looked at

the glossary (23%), read about the producers (22%), and pursued other activities (25%).

- **Viewers found various aspects of the website valuable, although the amount of information provided was the most frequently valued aspect (29%).** Meanwhile, 17% said that they liked the web links directing them to different parts of the website. Fifteen percent (15%) found the easy navigation to be the most valuable part of the website. Thirteen percent (13%) found the "What can I do" section to be the most valuable part of the website, while 8% liked the overall layout of the website. Finally, 4-6% of viewers said they liked the "Why should I care" section of the website and the Interactive House feature.

  Viewers were asked to describe what they found least valuable about the website. Although nearly one-third (31%) said that all of the site was valuable, one-quarter (23%) felt the information at the site was too redundant and was essentially the same as what was provided in the series. Smaller percentages of viewers complained of other aspects of the site, including: that it had too much text and reading and not enough interactivity (10%), that the sections on the host and producers weren't of interest (8%), that the site lacked external links (6%), or that the Interactive House feature was slow (4%).

- **One-third of the viewers (33%) made a promise while at the website.** When asked to rate the value of the promise as an exercise, the mean rating was 4.3 on a scale from 1 (not at all valuable) to 7 (very valuable), indicating viewers felt this was a somewhat useful exercise. When asked to explain their ratings, some viewers who gave the promise a positive rating liked the fact that the promise was *motivational* and felt that they were more likely to do the action now that they had promised to do so (27%). Others liked that the promise would serve as a *reminder* later for them to actually do what they had promised (17%). Others still liked that the promise was a *concrete and real* way to commit to an action (15%). Those who gave the promise exercise a lower rating either said that they that they didn't notice the "promise" section of the website, didn't do it, or disliked the promise because it *didn't mean much* to them and gave viewers a *false sense of hope*.

  With respect to the kinds of promises viewers made while at the site, the following promises were reported from highest to lowest frequency: use non-toxic alternatives to household chemicals (31%), don't release unwanted pets into the wild (29%), buy Energy Star appliances (25%), use only native plants in your garden (23%), eat only sustainable food (21%), buy certified forest products (10%), and clean your boat after use (4%).

- **After using the website, more viewers said they felt encouraged, hopeful, motivated, inspired, scared, and optimistic than felt depressed, pessimistic, confused, or defeated.** When asked to select the descriptors that best reflected how they felt after using the website, viewers selected a range of descriptors, including, from highest to lowest frequency: encouraged (60%), hopeful (58%), motivated

(54%), inspired (42%), scared (35%), optimistic (33%), depressed (17%), pessimistic (15%), confused (6%), and defeated (2%).

- **Two-fifths (39%) of the viewers said they linked to some other site from the *Strange Days on Planet Earth* website.** These viewers linked to a wide range of different national and local organizations that provided more ion-depth information and interactive activities related to content provided in the series. No particular websites stood out as the most popular choices.

- **The majority of viewers (58%) in the *series + website* group felt they were inspired to take some action related to the environment and were already able to list at least one action they felt they would take.** The four most common actions included: be more environmentally conscious/proactive in general (17%), reduce use of harmful household and garden chemicals (15%), do additional research on the issues presented in the series (10%), and talk to others/spread the word (10%). Other actions mentioned by less than one-tenth of the viewers included: recycle more, eat sustainable fish, only plant/buy native species, drive less, and conserve energy.

The extended influences of the series and website

Telephone interviews were conducted with 23 participants from the *series + website* group (13 women and 10 men) within three to four weeks of viewing the four episodes of *Strange Days on Planet Earth* and visiting the project website. The interviews explored the extended impact of the series and the website. The evaluation found that:

- **All of the interviewed participants (100%) described something from the series that left a lasting impression on them.**

- **Nine-tenths (91%) of the participants said that they had discussed the *Strange Days on Planet Earth* series with friends, family, or co-workers in the weeks following the evaluation. Just over one-third (35%) reported discussing the website with others since participating in the project.**

- **Eighty-seven percent (87%) stated that they had continued to think about *Strange Days on Planet Earth* in the weeks since they viewed the series.** Almost two-fifths (39%) reported that they had read something that reminded them of the series, and over one-third (35%) reported seeing related subject matter on television or in a movie. Two people said they were reminded of *Strange Days* by feature stories they had heard on National Public Radio (NPR).

- **When asked a general question about whether they had done something new or differently as a result of watching the series and/or visiting the website, over one-third of participants (35%) reported that they had. When asked to consider a list of 17 specific actions that they might have taken after participating in the *Strange***

Days **project, however, a much higher 87% answered "yes" to one or more items on the list.**

- **Over three-quarters of participants (78%) reported a positive overall response to their experiences using the website.**

- **More than four-fifths of the group (83%) felt that the website had reinforced the series content. And almost two-thirds (65%) felt that the website had empowered them to take some action related to the environment.**

- **Over three-quarters of respondents (78%) described the website as well designed, easy to navigate, and useful.**

- **And finally, twenty participants (87%) responded with additional comments that they would like to share with the producers of *Strange Days on Planet Earth*, with only 3 participants (13%) declaring that they had nothing to add.** Of those who did elaborate, less than one-third of the group (30%) offered criticisms or described mixed reactions to the series and the website. Over half (56%) took the opportunity to offer further praise for the series.

Final remarks

Taken together, the above set of findings demonstrate that the *Strange Days on Planet Earth* series appealed to viewers and had a significant impact on their knowledge, attitudes, and beliefs about a wide range of environmental issues related to invasive species, global warming, predators, and water pollution. Although the analysis did not find statistically significant differences between the *series only* and *series + website* viewing conditions -- with the exception of the groups' responses to the *Troubled Water* episode assessment -- it is also important to note that the mean scores and ratings for many items in the evaluation were high for both groups at posttest, and in some cases the knowledge scores and attitudinal ratings were already quite high at pretest.

With respect to subgroup differences across the viewing sample as a whole, few differences were found. As noted at the outset of the discussion, the most frequent subgroup difference involved the background variable frequency of viewing science/nature shows, where more frequent viewers of these programs rated the series' higher on the elements of storytelling, level of visual excitement, likelihood of recommending, and clarity. Only one other subgroup difference was found in the evaluation involving perceived level of knowledge of the environment, such that viewers who felt they were less knowledgeable about the environment rated their learning from the series significantly higher than did those who felt more knowledgeable.

Other than the above subgroup differences, the evaluation found the series was highly regarded by and successful with men and women alike, and by individuals of varying ages, educational backgrounds, television viewing habits, and knowledge of the environment.

Looking ahead to Season 2, the evaluation results indicate that the series' approach is on the right track. *Strange Days Ocean* will likely appeal to and be a successful informal science learning initiative with a general viewing audience, as was recruited for the summative evaluation. Although many different types of implications were raised in the preceding discussion, generally speaking. the findings from Season 1 indicate that viewers will likely respond well to the Season 2 material if *Strange Days Ocean*:

- Offers at a minimum, the breadth and depth of the information afforded in Season 1;
- Continues to present stunning and engaging cinematography;
- Offers a slightly quicker pace;
- Adjusts the host's narration and tone so that viewers perceive it to be more engaging and less monotone or flat;
- Features timely and up-to-date environmental stories that address knowledge gaps or misconceptions in the public's awareness and understanding of the ocean;
- Provides the same kind of clear and comprehensible scientific explanations, yet perhaps in even slightly greater depth;
- Presents a tone that is again balanced between the two extremes of hopeful and depressing;
- Continues to depict scientists working in the field or collaborating;
- Incorporates a similar, mystery style storyline approach;
- Demonstrates even further the "interconnectedness" of all life forms on Earth;
- Works toward an even more balanced tone that is not perceived as too biased, lacking scientific credibility or "preachy;"
- Focuses to a greater extent on solutions and actions the public can take to help improve the environmental problems addressed; and
- Offers a website that further reinforces and expands on the series' content, without being redundant, and more strongly addresses why viewers should care about the environmental problems featured in the series and what they could do about them, with a constructive focus on solutions and actions.