



Using social science in National Park Service climate communications: A case study in the National Capital Region

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Abstract

Since 2012, the National Park Service's (NPS's) Urban Ecology Research Learning Alliance (UERLA) and George Mason University's Center for Climate Change Communication have partnered on a collaborative "research-to-practice" internship program that employs undergraduate and graduate-level students to produce interdisciplinary, science-based climate change communication products for parks in the NPS National Capital Region (NCR). Materials created through this program are rooted in social science insights (e.g., trusted sources, social norms, place-based learning), climate science, and the communication needs of participating regional parks. As a result, the end products (e.g. websites, videos, ranger toolkits) produced by this program fulfill many functions: increasing public awareness of climate impacts on park resources, nurturing the connection between people and places, meeting evolving interpretation demands by developing material for a variety of channels, effectively engaging visitors in climate dialogue, and helping parks lead by example by addressing how a changing climate can alter cultural, natural, historical, and recreational resources. The success, adaptability, and longevity of this program have provided NCR parks with a wealth of innovative products that support the park stewardship mission to preserve resources for future generations. Five examples will demonstrate the breadth of work undertaken by interns.

Climate change and park management

For over one hundred years, the National Park Service (NPS) has been committed to preserving—and protecting—our nation's natural and cultural resources for the enjoyment of future generations. Climate change is a substantial threat to the parks, memorials, monuments, and lands within the national park system. In accordance with the NPS mission, park management is tasked with taking appropriate actions to ensure continued conservation of national resources. Historically, land management and planning practices in the bureau have changed to respond to challenges faced by parks over the decades, and, though the scale of the threat may be greater, NPS has proactively initiated responses

to the impacts climate change will have on public lands (Monahan et. al. 2014).

The NPS Climate Change Response Program provides information about existing and potential impacts of climate change on park resources by offering adaptation resources, including scenario planning workshops, coastal adaptation strategies, and cultural resource adaptation strategies. NPS also provides individual parks with the resources needed to adopt sustainable operational practices. Lastly, because of the strong trust Americans place in the National Park Service as a source of climate change information, NPS staff have exceptional opportunities to teach park visitors about

the consequences of climate change on park resources (Leiserowitz et al. 2011). NPS has developed educational materials for communicating the challenges parks face as climate change continues, as well as the many ways that parks are upholding the NPS mission by planning for and adapting to change.

The partnership between NPS’s Urban Ecology Research Learning Alliance (UERLA) and George Mason University’s Center for Climate Change Communication (Mason 4C) is a clear example of the type of publicly oriented, science-based climate communication NPS is pursuing. The “research-to-practice” internship program is premised on applying social science insights to help NPS support its mission in Washington, D.C., region parks. The program takes a multidisciplinary approach to communication, employing graduate and undergraduate students—with expertise ranging from hard science to graphic arts—to design materials that enhance public awareness of climate change impacts on parks in the National Capital Region.

Using social science research to inform communication materials

Former NPS Director Jonathan Jarvis referred to the National Park Service as an “extraordinary education institution where millions of people learn about the environment, conservation, and our rich and complex history” (NPS 2010). Park personnel are uniquely positioned as potential climate change communicators—not only due to the sheer volume of attendees who patronize and enjoy the parks every year, but also due to visitors’ receptivity to climate messaging. A survey conducted across 16 national parks in 5 different regions found that 56% of NPS visitors are concerned about climate change and 61% want to learn about climate change in the park (Thompson et al. 2013). Other research indicates that individuals who are already engaged with climate change believe that parks should take a leadership role in climate change education and mitigation efforts (Groshong et al. 2018). (Although this particular study was conducted using state parks as the government agency, results may be applicable on a federal level as well.)

Given the confluence in visitor interest in climate change information and the core tenet education plays in the NPS mission, it is natural that communication programs on this subject have been launched within the bureau. Likewise, NPS dedication to science-based principles requires that any communication strategies employed must be rooted in research and buttressed by social science theory and park-based climate science. From framing to visual design, social science has clear

insights into best practices for climate communication. For instance, messages are most effective when they speak to the values and beliefs of their target audience. While individuals who are already concerned about climate change want to learn about climate-friendly actions they can take (e.g., installing a solar panel), individuals who are skeptical of climate change respond better to framing those same actions as economically, instead of environmentally, beneficial (Roser-Renouf et al. 2015; Hine et al. 2016). Some frames speak to a wide range of audiences—a public health lens consistently elicits positive responses to climate messaging from individuals across the spectrum of climate change acceptance (Myers et al. 2012).

Another well-documented factor in the efficacy of climate messaging is the “place” of the message—whether the threat is portrayed as global or local. Research supports that presenting climate change within a local framework can be effective across all audience segments as it allows individuals to personally connect to the issue in a way that is relevant to their daily lives, (e.g., a trail closure in a park they visit frequently (Schweizer et al. 2012; Hine et al. 2016). Further, national parks can be extremely meaningful to people—place-attachment is a powerful bond that can trigger the desire to protect locations that have emotional and cognitive significance (Scannell et al. 2010). National parks—especially in the National Capital Region—can be culturally iconic spaces that connect with people’s sense of identity. Whether an individual comes to a park daily or visits for the very first time, climate change messaging that is delivered in the context of local impacts to that park makes the issue more tangible.

These principles, among many others, are core components in the message strategies used in the Integrated Resource Adaptation (IRA) program. Over ten weeks in the summer, under the supervision and mentorship of doctoral students and faculty at Mason 4C and NPS, undergraduate and graduate students from a variety of geographic locations and educational backgrounds (i.e., social science, natural science, film, and graphic design) form interdisciplinary teams and collaborate with staff from dozens of park sites in the NPS National Capital Region to create climate change communication products.

The program strives to meet multiple goals: (1) increase public awareness about climate change impacts on park resources and park responses; (2) foster connections between people and places; (3) meet the evolving interpretation demands by developing material for a variety of channels (i.e., booklets, web pages, so-

cial media posts); (4) apply communication research to effectively engage visitors in a climate change dialogue; and (5) help parks lead by example demonstrating how a changing climate can alter their cultural, natural, historical, and recreational resources.

Interns work closely with NPS staff to create written and visual materials calibrated to communicate topical impacts of climate change in concrete, engaging ways that meet the communication needs of participating parks. The regional parks are Antietam National Battlefield, Catoctin Mountain Park, Chesapeake and Ohio Canal National Historical Park, George Washington Memorial Parkway, Harpers Ferry National Historical Park, Manassas National Battlefield Park, Monocacy National Battlefield, National Capital Parks–East, National Mall and Memorial Parks, Prince William Forest Park, Rock Creek Park, and Wolf Trap National Park for the Performing Arts. Projects are developed with each park’s media use, virtual and in-person traffic, and visitor preferences in mind to present the most relevant and engaging material on park- or region-specific topics.

By crosscutting social and environmental science, this internship works to bring best practices in communication theory and park-based climate science to NPS management. Moreover, it also provides the students with important climate change communication training experiences that can be applied to parks and other academic and professional venues. Interns build invaluable professional skills through their collaboration with mentors, park staff, and other interns. They become comfortable making autonomous decisions, conceptualizing ideas and seeing them through development, understanding and using the strengths of team members, and navigating communication with multiple collaborators. But most importantly, park visitors benefit from the range of communication products designed through this program that offer insight into the ways climate change is impacting the irreplaceable natural, cultural, historic, and recreational resources found in our national parks.

Examples of communication projects

Over the past eight years, 58 interns have collaborated with 13 park units and the regional office to create educational resources for the parks and their visitors. Interns have developed communication campaigns and materials that provide topical information on climate impacts in the parks to the targeted public. Virtual visitors can peruse park websites and read well-researched narratives about climate change and the many conservation strategies parks are engaging in to adapt

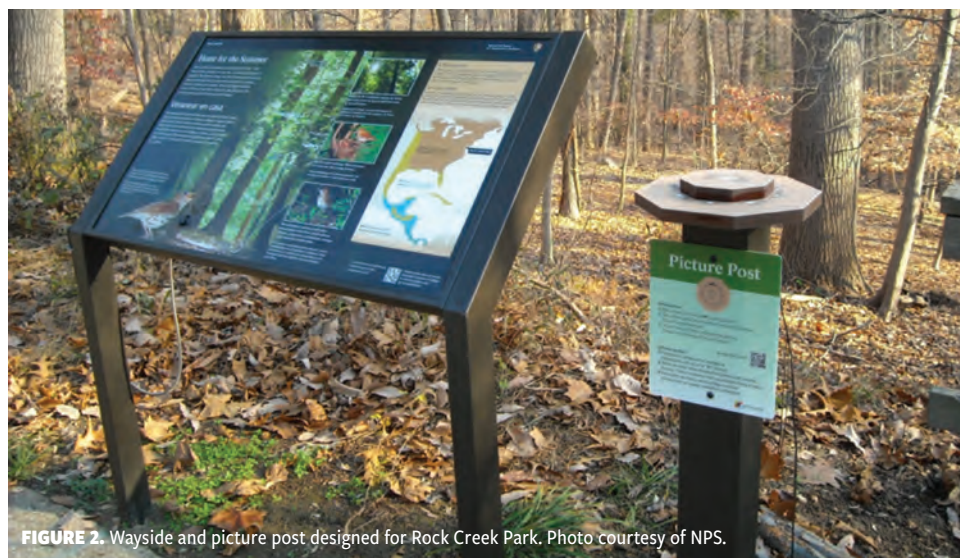
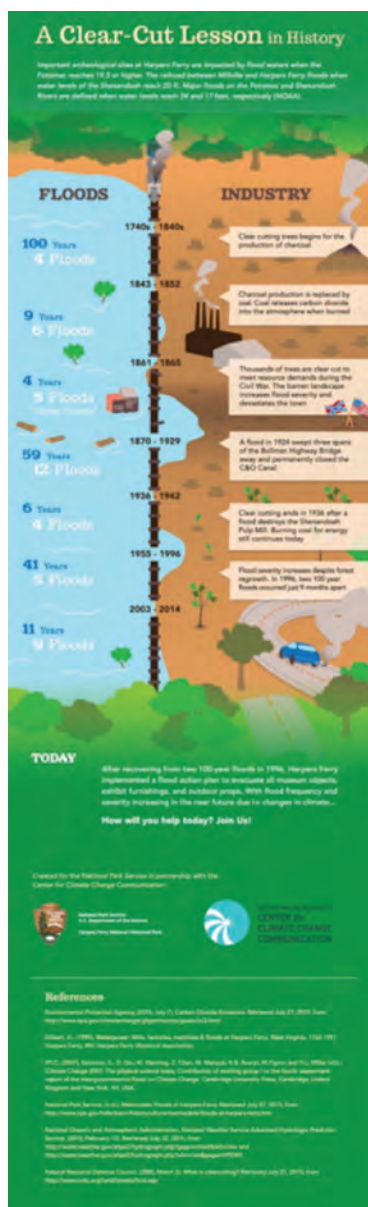
to changing conditions. Park visitors can learn from written climate change communication materials with complementary graphics, watch videos about climate impacts and solutions, and participate in citizen science and active learning. Interpreters have access to innovative resources that will help them engage visitors and encourage reflective thinking about the National Park Service’s role in responding to a changing climate.

Park-specific infographics. Place-attachment is an extremely powerful communication tool to employ in climate change communication. Recent research has found that place attachment is not limited to communicating in a set location but can be an effective strategy to use in online climate communication as well (Monani et. al. 2018). Many of the parks in the National Capital Region maintain park-specific websites that are perfect venues for housing digital climate communication material. Infographics, in particular, provide audiences with simple, visual ways to digest complex information—making them widely used and effective communication tools.

Throughout the lifespan of the internship program, infographics have been used as standalone and supplementary materials for many projects. A particular project of note was developed in 2015. Interns developed several infographics for Harpers Ferry National Historical Park. One of the infographics from this project utilized a timeline structure to demonstrate the interactions between industrial activities, climate change, and floods at Harpers Ferry (see Figure 1). By visually walking visitors through time and drawing on concrete facts and statistics, the infographic makes climate change less temporally distant and contextualizes past, present, and projected impacts on an iconic regional park. Presenting climate change impacts in this fashion educates visitors with a clear and succinct visual narrative. This product has been regarded as an exemplary form of climate change communication within NPS.

Waysides and picture posts. Wayside exhibits—panels located along trails that detail additional written and/or visual information on topics of historic or natural significance within the parks—have long been used by NPS and function to enhance “a direct and meaningful connection between visitors and the landscape” (NPS 2009). The 2013 intern team built on this long-standing, in-park communication program and designed waysides for use in Kenilworth Park & Aquatic Gardens, Rock Creek Park, and Wolf Trap National Park for the Performing Arts. To accompany these waysides, picture posts—wooden posts on which visitors

FIGURE 1. Flooding infographic designed for Harpers Ferry National Historical Park.



may place their phone and take a guided image of their surroundings—were developed to promote visitor engagement with the concepts of phenology and sea-level rise and serve as a platform for citizen science (see Figure 2). The pictures taken at these posts help NPS staff and scientists track ecosystem changes in the parks. The combination of informative written content and active participation in citizen science greatly promotes place-based visitor engagement—allowing them to make meaningful connections with their surroundings that not only enhance their experience in the parks, but also strengthen feelings of attachment. The waysides and picture posts developed for this project shared NPS’s 2017 Achieving Relevance through Interpretive Media and Technology national award with nine other parks.

Regional “trading cards.” In 2018, interns were tasked with developing regional products, rather than park-specific products. Regional geology was the assigned theme, and the interns chose to use ecology as an avenue to make the connection between geology and climate change. Because of the regional scope of the project, the interns developed a series of “trading cards” to highlight the different geologic features found within 12 parks in the National Capital Region (see Figure 3). These cards linked to an online ESRI StoryMap that expanded on the geologic features, discussed how underlying geology influences over-

lying ecology, and exemplified how climate change may disrupt this relationship. A unifying character (Washington the wood thrush) was used on the cards and throughout the StoryMap. The use of characters in communication products and educational tools has been found to increase engagement and information retention (Jee et. al. 2012).

The trading cards were developed with the main goal of directing visitors to the website. By doing so, visitors would be able to learn more about the connection between geology, ecology, and climate change. However, it was understood that some park visitors may not take the extra step to visit the website. Should visitors choose not to view the website, they would still be exposed to the key points of the webpage by reading

the simplified climate message and brief descriptions on the cards—allowing a wider audience to be reached, directly, within the parks. Messages used throughout this series of products also sought to normalize climate-friendly actions as informed by social norms messaging strategies.

Regional and park-specific video projects. Visual storytelling—a powerful way to convey information to diverse audiences—is a tool used often by the National Park Service, especially to communicate climate change impacts. Individual videos and video series are one of the most frequently produced products in the internship program. In 2016, one group of interns was tasked with a project for the entire National Capital Region. They developed an educational video that explained

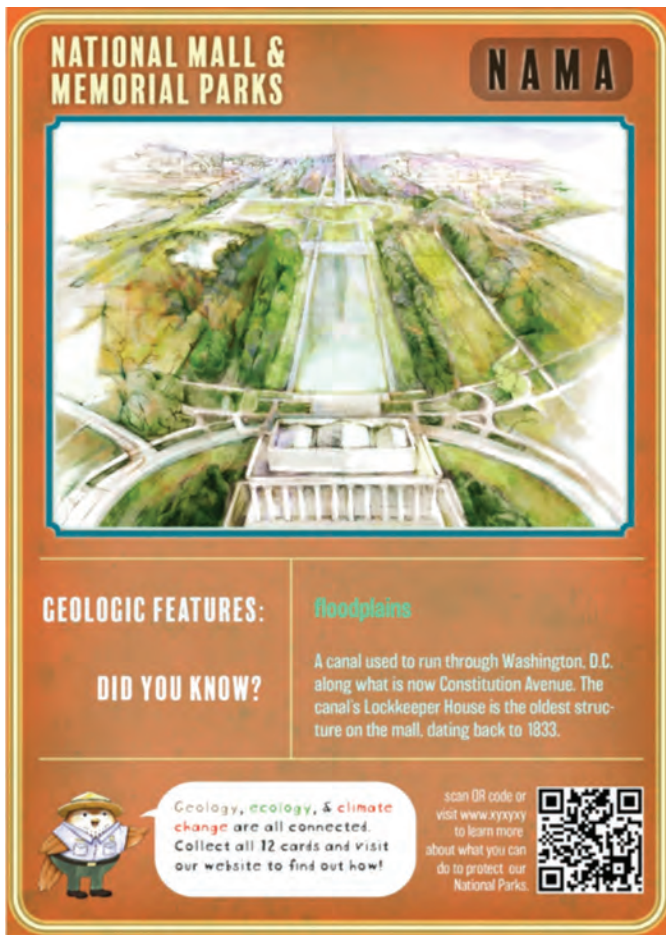


FIGURE 3. One of the trading cards in the collection, designed for the National Mall and Memorial Parks.

the implications of sea-level rise on multiple national parks in the region. As a complement, the interns also created ranger briefs for interpreters that included sea-level rise science, impacts on that specific park, and effective communication strategies that center on how the park is acting to reduce the threat. For example, interns explained the erosion of Dyke Marsh (George Washington Memorial Parkway) and emphasized the park’s restoration work and how it upholds the NPS mission.

In 2017, another group of interns worked with staff in Rock Creek Park to develop four short videos that emphasized (1) floods in the park and their potential to increase in frequency as a result of climate change; (2) how the park manages invasive species, and the importance of volunteer groups in this process; (3) the ecosystem benefits of sustaining wooded areas within city bounds (e.g., flood control, pollution mitigation, erosion control, and improvement of water quality and wildlife habitats); and (4) how changing migration patterns may influence the District of Columbia’s official bird, the wood thrush. These videos feature various rangers and volunteer partners and highlight

how they are dealing with current and potential future climate change consequences. Additionally, they capture the beautiful scenery and treasured places that are found within Rock Creek Park. Viewers will watch the educational videos and be transported to the popular attractions that are featured in the videos and may be compelled to visit these parks.

Facilitated dialogue. Climate change is a complex, scientifically dense topic. Many individuals, particularly those who are not typically involved or engaged with climate change, respond best to engaging stories, personalized narratives, positive social norms, and highly credible sources. Individuals believe information provided by trusted sources, especially sources of unbiased expertise. Because park personnel are perceived as highly credible sources of climate information, their confirmation of climate impacts within their parks can be particularly compelling to visitors.

In 2017, a team of interns developed a facilitation guide—a technique used frequently by interpretive rangers to encourage discussion and reflection among visitors—and an accompanying infographic that integrated facts about the changing climate and outcomes of the Civil War battle at Monocacy National Battlefield. This guide provides basic facts about climate science, park-specific climate change impacts, and “what if” scenarios that encourage the visitors to reflect on the importance of resources at the park (i.e., Monocacy River, plants, insects) and how changes could have influenced the outcome of the battle. Additionally, throughout the guide, communication tips are provided for rangers to enhance their knowledge of effective in-person communication strategies. These include gaining an understanding of their audience and reading body language to direct the path of discussion. One example from the guide encourages visitors to consider how a delayed, premature, or longer growing season—which is a documented indicator of climate change (NOAA 2013)—would influence the strategic movement of the troops, line of sight, and potential cover during battle. Another example integrates elements of public health into the narrative and encourages discussions about how heat waves—a significant climate change impact—would have affected overall health of the soldiers and their ability to perform their duties. This facilitated discussion approach highlights the direct implications of climate change on human health—a frame that has been informed through communication research and has repeatedly proven to be an effective approach (Myers et al. 2012). Overall, the guide helps rangers effectively engage in facilitated dialogue and encourage visitors to make connections

between the historic events that occurred at Monocacy National Battlefield and climate change impacts.

Conclusion

Each year, students with a variety of educational backgrounds and experiences work collaboratively with National Capital Region parks to promote and support visitor education about climate change impacts in parks and the efforts of park management to address them. Throughout the summer, park staffs contribute their time and resources to ensure that interns are on track to develop accurate and usable materials. Guided by social science insights and best practices in communication informed by climate change communication research, interns develop scientifically accurate materials in order to meet the goals outlined by the parks. Final products are tailored to fit each park's communication platforms and are approved by park superintendents. The scope of these final products will continue to evolve as different tools become more popular and research on social science insights and communication strategies continues to progress.

This program presents students with the opportunity to gain practical experience in an interdisciplinary, collaborative environment and equips them with communication skills that they can apply in their future endeavors. Moreover, this program provides numerous benefits to collaborating parks, specifically park-based materials to effectively communicate climate change impacts and adaptation strategies. The success and longevity of this program demonstrate its value to participating parks and indicate important opportunities that may stem from this program's model. As the program continues to operate in this region, interns will continue to develop innovative products that are beneficial to the National Park Service and all visitors.

References

- Groshong, Lisa, Sonja Wilhelm Stanis, and Mark Morgan. 2018. Climate change impacts in Missouri State Parks: Perceptions from engaged park users. *Journal of Outdoor Recreation and Tourism* 24 (December): 11–20. <https://doi.org/10.1016/j.jort.2018.09.002>.
- Hine, Donald W., Wendy J. Phillips, Ray Cooksey, Joseph P. Reser, Patrick Nunn, Anthony D. G. Marks, Natasha M. Loi, and Sue E. Watt. 2016. Preaching to different choirs: How to motivate dismissive, uncommitted, and alarmed audiences to adapt to climate change? *Global Environmental Change* 36 (January): 1–11. <https://doi.org/10.1016/j.gloenvcha.2015.11.002>.
- Jee, Benjamin, and Florencia Anggoro. 2012. Comic cognition: Exploring the potential cognitive impacts of science comics. *Journal of Cognitive Education and Psychology* 11 (June): 196–208. <https://doi.org/10.1891/1945-8959.11.2.196>.
- Leiserowitz, Anthony, Edward Maibach, Connie Roser-Renouf, and Nicholas Smith. 2011. Climate change in the American Mind: Americans' global warming beliefs and attitudes in May 2011. New Haven, CT: Yale University and George Mason University. <http://environment.yale.edu/climate/files/ClimateBeliefsMay2011.pdf>
- Monahan, William B., and Nicholas A. Fisichelli. 2014. Climate exposure of US national parks in a new era of change. *PLOS ONE* 9 (7): e101302. <https://doi.org/10.1371/journal.pone.0101302>.
- Monani, Salma, Sarah Principato, Dori Gorczyca, and Elizabeth Cooper. 2018. Loving Glacier National Park online: Climate change communication and virtual place attachment. In *Handbook of Climate Change Communication: Vol. 3: Case Studies in Climate Change Communication*, Walter Leal Filho, Evangelos Manolas, Anabela Marisa Azul, Ulisses M. Azeiteiro, and Henry McGhie, eds. Cham, Switzerland: Springer International, 63–83. https://doi.org/10.1007/978-3-319-70479-1_4.
- Myers, Teresa A., Matthew C. Nisbet, Edward W. Maibach, and Anthony A. Leiserowitz. 2012. A public health frame arouses hopeful emotions about climate change. *Climatic Change* 113(3): 1105–1112. <https://doi.org/10.1007/s10584-012-0513-6>.
- NOAA [National Oceanic and Atmospheric Administration]. 2013. Regional climate trends and scenarios for the US National Climate Assessment: Part 1: Climate of the Northeast US. Technical Report NESDIS 142-1. Washington, DC: NOAA, National Environmental Satellite, Data, and Information Service; Washington, DC. https://www.nesdis.noaa.gov/sites/default/files/asset/document/NOAA_NESDIS_Tech_Report_142-1-Climature_of_the_Northeast_US.pdf.
- NPS [National Park Service]. 2009. Wayside Exhibits: A Guide to Developing Outdoor Interpretive Exhibits (Wayside Guide). <https://www.nps.gov/subjects/hfc/upload/Wayside-Guide-First-Edition.pdf>.
- NPS. 2010. National Park Service Climate Change Response Strategy. Fort Collins, CO: National Park Service Climate Change Response Program.
- Roser-Renouf, Connie, Neil Stenhouse, Justin Rolfe-Redding, Edward Maibach, and Anthony Leiserowitz. 2014. Engaging diverse audiences with climate change: Message strategies for global warming's six Americas. SSRN preprint. <https://doi.org/10.2139/ssrn.2410650>.
- Scannell, Leila, and Robert Gifford. 2010. The relations between natural and civic place attachment and pro-environmental behavior. *Journal of Environmental Psychology* 30(3): 289–297. <https://doi.org/10.1016/j.jenvp.2010.01.010>.
- Schweizer, Sarah, Shawn Davis, and Jessica Thompson. 2013. Changing the conversation about climate change: A theoretical framework for place-based climate change engagement. *Environmental Communication: A Journal of Nature and Culture* 7 (March): 42–62. <https://doi.org/10.1080/17524032.2012.753634>.
- Thompson, Jessica, Shawn Davis, and Karina Mullen. 2013. Climate change communication campaign planning: Using audience research to inform design. *The George Wright Forum* 30(2): 182–189.