

Research Briefs through Interpreters' Eyes

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Abstract

Partnerships with trusted intermediaries are one way for scientists to communicate about their research in today's complex and politicized media landscape. Unfortunately, opportunities for interpreters and scientists to have extended conversations about park-based research studies are relatively rare. Therefore we have examined how the familiar and concise research brief can be a tool for interpretive park rangers dedicated to increasing the visibility of science research for the public at large. Our exploration of existing briefs and interpreters' perspectives on them has led us to recommend shifts in format and content. Recommendations for changes have the potential to influence rangers' confidence in communicating research findings and to increase interest in and readability of briefs.

Keywords: research briefs, interpretation, park-based science, science communication

Today widespread skepticism greets scientific research findings. Skepticism based on perceptions of corporate funders, biased media, and government more generally make partnerships with trusted institutions valuable and critical (Nesbit, 2014). Such institutions and their staff members, particularly the intermediaries working in informal, out-of-school settings, can make scientific research visible and place members of the public closer to the science process (National Research Council, 2009).

The National Park Service has a commitment to science communication, both to serve the public and to support its conservation mission (Outreach Technical Advisory Group, 2016). Funded by the National Science Foundation, Interpreters and Scientists Working on Our Parks (iSWOOP) project leaders, promote partnerships between scientists and National Park Service interpretive rangers. iSWOOP has created opportunities for interpreters to hear firsthand about scientific studies, give accounts of phenomena from their place-based observations, and exchange stories and questions with scientists. Because these sorts of opportunities are relatively rare (Char 2015; Macdonald 2013; Merson et al. 2017), we have examined how to adapt a relatively simple and well-known genre, the research brief, to be a more useful tool to increase the delivery and visibility of science research through trusted channels to the public at large.

The allure of a two-page research brief is strong. Their brevity appeals to time-strapped professionals. Those authoring condensed versions of published scientific articles may imagine a broad audience including policy makers, professionals like resource managers, members of the public, and, in the National Park Service context, interpretive rangers (Beer, personal communication, May 4, 2017; also O'Herron, 2009). In the National Park System (NPS), two-

page research briefs are readily available. We found them on many NPS websites and in some parks they are displayed in visitor centers. Project leaders of Interpreters and Scientists Working on Our Parks (iSWOOP) have been creating resources and experiences that equip park rangers dedicated to interpretation and education (hereafter called interpreters) to bring park-based science into the public eye and invite visitors to talk about its value. This NSF-supported, four-year project takes as its premise that interpreters can increase opportunities for STEM learning by being credible and competent conduits for the urgency and value of park-based scientific research. Face-to-face workshops and field experiences are highly valued, but not always possible to schedule and even when they are, primary and secondary sources such as research briefs are useful to interpreters designing programs. (See Allen, Char, Hristov, Wright, & Merson, 2018 for a description of the iSWOOP model and its reception.) A team of iSWOOP leaders and consultants analyzed features of more than 80 research briefs and conducted interviews with a convenience sample of interpreters to gauge their impressions of briefs. In our own conception of what makes a useful distillation of research, we have adopted certain practices and urge authors of research briefs to take into account the following considerations and recommendations (Table 1).

Considerations for authors	→ Recommendations to serve interpretation
Check for readability	Adopt active voice, shorten sentences, explain terms
Use questions	Encourage prediction, active reading
Name the source for high-res images	Provide credit and fair use information
Use photos that extend the experience of looking	Share what those in the field or lab see
Use photos that show the researcher in action	Add a sense of action and adventure
Add content that matches interpreters' needs	Hint at a story, offer impressive facts, images, or an intriguing question
Make suggestions for ongoing engagement	Hook and sustain the relationship with the park and the research
Answer why	Explain (or provide a link) to the back story: why this study, why the researcher took it on, what came before

iSWOOP project leaders understand the commitment of authors to accuracy and precision.

However, straying slightly from the format and content demanded by peer-reviewed journals and adopting subheadings and questions to strike a more conversational tone increase the chances of engaging with a wider audience. Ideally research briefs build interpreters' knowledge, but also support deliberation with others. Interpreters who facilitate interaction are increasing the likelihood that the public will not only learn of current research but will also discuss its relevance and their own stake in its funding and findings. The potential for interpreters to leverage briefs, thereby introducing STEM learning into conversations with tens of thousands annually, is exciting. With the shifts mentioned above, interpreters can more easily draw on briefs to instill

curiosity and increase the number of park visitors who see the value of parks as outdoor laboratories.

Revisiting a common format

A team of iSWOOP leaders and consultants analyzed features of more than 80 research briefs and conducted interviews with a convenience sample of interpreters in order to understand interpreters' impressions of the format and content of research briefs. The team asked interpreters to read through one of two versions of a research brief and to comment as they read (Nielsen, 2012). The interviewer then asked questions about engaging visitors' interests (a hook), and feelings of confidence in leading an interaction based on the information the brief presented. The goal was to arrive at a format that would be most supportive of interpreters' efforts to highlight the value and relevance of park-based research. iSWOOP interviewers presented interpreters with a research brief on amphibian breeding dates and abundance and climate change.

Amphibian Response to Climate Change at Indiana Dunes National Lakeshore

Importance

This study is part of the Terrestrial Wetland Global Change Research Network project coordinated by US Geological Survey Amphibian Research & Monitoring Initiative (USGS ARMI) to investigate the response of amphibian populations to climate change in the northern parts of North America. The research focuses on Wood Frogs (*Rana sylvatica*) and Blue-spotted Salamanders (*Ambystoma laterale*). These are the two species of amphibians that range the furthest north and are the most likely to be impacted by climate change and management approaches. Researchers asked: Does warming impact amphibians in north-west Indiana, including Indiana Dunes National Lakeshore?

Methods

In 2013 and 2014 data were collected in the Cowles Bog wetland complex (Figure 1). Amphibian communities are monitored in the field by surveying wetlands and surrounding forest habitat. Each site is surveyed at least once a month from March to June. Adult and larval amphibians, and eggs are surveyed in wetlands using visual searches, minnow traps, and dipnets. Researchers search for terrestrial adults and juveniles under logs and leaf cover. Song meters are mounted in boxes on trees at four sites to record frog calls. The digital recordings are sent to the USGS ARMI program for analysis. The call data can be used to identify species. Dates are added to a database on timing of breeding activities for each species. The amphibians collected are photographed and identified in the field and immediately returned to their site of collection.

Preliminary Results: Amphibian Abundance

Observations made in 2013, the year flooding ended the 2012 drought, revealed larger numbers of breeding amphibians, however, this was the first year that the research team did not observe any Four-toed Salamanders. Slimy Salamanders had become rare in recent years, and none was found in 2012 or 2013. Other herpetologists have observed similar declines. In 2013 data were collected during four survey visits and from one songmeter in Cowles Bog.



Figure 1. Researchers assessed abundance for baseline (2013), restoration activity (2014-2015), and post restoration (2016).

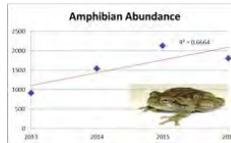


Figure 2. Amphibian trends are shown with red regression lines and R2 for amphibian abundance, diversity index, species richness, and salamander abundance for baseline (2013), restoration activity (2014-2015), and post restoration (2016).

Background on interpretation

The principles that guide these interpreters, the translators of park-based scientific research to park visitors, are well-established and tightly tied to the NPS mission articulated in the Organic Act of 1916: to preserve natural and cultural resources for the enjoyment, education, and inspiration of all Interpreters translate scientific research in order to reveal the meanings behind cultural and natural resources (Tilden, 2007; Larson, 2003; Ham, 1992, 2013).

Interpretive principles highlight the importance of “telling holistic stories; of practicing the art of revelation based on information, of provoking the audience to want to do something, whether it be to reflect more deeply or act upon new information” (Stern & Powell, 2013, p. 10).

Background on existing research briefs

To understand how varied existing briefs are, we sampled from the pool of briefs made available by the National Park Service’s Inventory and Monitoring (I&M) Regional websites and the websites of Regional Learning Centers (RLCs). Our total of 86 briefs includes two from nearly each of the 32 I&M Networks (one from Chihuahuan Desert Network and four from the National Capitol Region, which had just issued new briefs), and 22 from RLC websites. We sought out briefs on wildlife and charismatic plant species because of public interest in these topics.

However, the sample is diverse, including briefs on water and geological formations.

Of the eighty-six briefs reviewed, 73 of them scored “very difficult”, or “difficult” according the Flesch reading scale, which takes into account the average number of words in sentence and the average number of syllables per word. The median grade level (12.8) was nearly college level. Just 28 briefs explicitly addressed the “importance” of the topic or research efforts. Especially

for those who do not have a science background, research briefs require intense concentration. “A lot of times we get research like these [briefs]. We have to sit down. It’s like no one can talk to me for half hour,” one interpreter observed.

Images are a large part of most research briefs. Of 64 briefs on inventory and monitoring projects, authors typically gave 45-50% of the space on the page to images (including figures, maps, and photos). All but three briefs featured images, providing visual interest, illustrating text, or describing trends with photos, maps, and graphs. Although 11 briefs included 6-10 visual elements, the mode was two (24 briefs of 86).

We coded for images that presented something puzzling, rarely seen, or that included the researcher in action. However, we found very few of this sort. Of 245 total images and figures, just nine included the researcher. Thirteen showed some aspect of the resource that is rarely seen, and four presented an ambiguous image that might prompt a reader to wonder, “What am I looking at here?”

Interpreters’ Reactions

Interpreters commented that a recognizable format gave credibility to the information. They also commented that photos of wildlife signaled a document they would enjoy reading. Interpreters mentioned their professional responsibility, for example: “Because of my job, I’d go to this ... because there’s a graph on there, I’d be learning more science-y stuff that I could share with public.” They read with purpose. Looking through the briefs, they noted impressive facts, images, or an intriguing question they could imagine using with visitors to form or elicit

connections. "... We'll scan through resource information looking for catchy things we can use with the public," Johanna explained. Annie took a similarly purposeful approach:

I am wondering if I can get photos. ... I'm wondering in my head about the quality of photos.... I'm probably going to use those frog calls in my program. ... I'm going to key in on a few species, otherwise it's too overwhelming ... What can I get out of these researchers for my program? Can we get a Powerpoint?

Interpreters are reading to gain knowledge and understanding and to prepare for visitor interactions simultaneously. They are looking for visual material they can use freely. Confirming authors' impulse to include images and figures, interpreters commented positively on before and after photos of habitat restoration as well as wildlife, and most were interested in reading graphs. The iSWOOP team learned that though parks may have thousands of images in Instagram accounts, these are not all high-resolution and the restrictions and permissions are unclear.

Missed Opportunities

Because interpreters aim to foster connections and hook an audience, storytelling is a useful technique. Increasingly science communicators are relying on stories to convey research to public audiences (ElShafie, 2018; Olson, 2009). Although describing a study is a factual enterprise, it is possible to seed stories in a brief. Dynamic relationships among predators and prey or native and non-native species could be framed as an archetypal story with an underdog that survives in the face of adverse conditions. One sentence with evocative imagery can cue interpreters to look further for a story. Eastern Rivers & Mountains Network mentions in one brief that river rapids are known for "eating kayaks." In talking about a featured scientist with

the public, interpreters pass on vivid details, as examples: “This particular study cost less than \$10 because ...” or “Imagine--the researchers hiked up the mountain with all their gear including a raft they assembled.”

Though methods sections tend to be dry, they can be the place to flesh out details of what happens behind the scenes. Interpreters can shape vignettes for visitors, revealing how researchers go about their work, painstakingly counting pollen grains or testing the rump fat of a moose. The methods section is where readers could find amusing or inspiring stories of heroic risk-taking, of innovative researchers coming up with new solutions to collect data, improvising on existing technology. Rather than glossing over the details, iSWOOP has sought to foreground the amazing properties of gadgets and instruments. These are the moments to talk about how we know what we know (see, for example, Kark, 2017 and Merson, Allen, Cox, & Hristov, 2017).

Interpreters wanted to be prepared with suggestions for ongoing engagement. They looked for information that explained the value or application of the research. Sections labeled “Importance”, “Next Steps”, or “Help” drew their attention. Yet interpreters expressed disappointment in the accompanying text, which emphasized the park: “the park will make decisions ...” Excluding the visitor made little sense from these interpreters’ perspectives. Including a “call to action,” which lets visitors know how they and other members of the public can assist is vital to supporting stewardship, which is a goal of interpretation in parks.

Briefs Are a Starting Point

The interpreters interviewed expressed high levels of confidence (on a scale of 1-10) that they could lead impromptu conversations (less than 10 minutes in duration), based on what they had read in their research brief of choice. They expressed less confidence about designing a formal program with the research brief as their main source for content (giving their confidence a 4 or 5 on a scale from one to ten). Confidence is important for successful interpreter-visitor interactions (Stern and Powell, 2013).

To bolster their knowledge, experienced interpreters expressed an interest in learning more. They asked: “Why was the study a good idea? What were researchers seeing that motivated the funding and effort? Has it always been so?”. One said explicitly: “I want to know: what’s happening to the populations that made this an important research project; why are we doing it?”

Learning more is part of an interpreters’ process:

I want to get down and dirty and find out what’s going on first. ... I try to make sure it’s personal and I have something to add and that’s where we try to get involved with Resources. Okay, you guys are doing a survey or getting data, “Can we help you?” ... For me, that’s really where I connect: learn by doing. ... That really helps me a lot. —

I would want to dig more. This is a good start. If I’m going to do a program, I’m going to keep researching and talk to the people who are doing the studies. ... This is a great start.

I would want to do more. I want to have as much in my back pocket as possible. Do I have the knowledge beyond the narrow window of what I set out to talk about?

Thus, interviews with interpreters tell us that a brief can be a sufficient basis for informal interactions. However, even the most stellar brief will likely be one source among many in the development of a formal program. Like those quoted above, interpreters participating in iSWOOP professional development value direct contact with scientists (Char et al, 2018). With all they learn, interpreters can set up a suspenseful, memorable story of the research (Forist, 2019, forthcoming). As a seasoned science communicator wrote:

Ultimately, great work goes nowhere unless the story is told. ... No scientific paper can fire the imagination like a story; but we need both ... Working hand in hand with scientists, we can bring stories to the wider world that inspire curiosity, action and wonder (Pinnix, 2017).

Conclusion

Given inevitable obstacles to interactions about park-based research (bus tours with little time or school groups with a tight, standards-based focus), when possible, authors should seek to eliminate obstacles that would impede interpreters' use of briefs. In addition to simplifying language, we recommend responding to interpreters' needs by providing useable visual material, including or alluding to stories, attending to how we know what we know, and describing the importance of the research within and beyond park boundaries.

Documenting details in a scientifically rigorous way and writing to support interpreters' mission are not mutually exclusive. Ideally interpreters will draw on informative text and images in briefs, with confidence that they can reveal the significance of a park's natural resources to

science, inspire curiosity, spark new interests and connections, craft stories to shape new memories, and foster stewardship. Research briefs have the potential to be an invaluable resource, serving interpreters' priorities while communicating information.

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Literature Cited

- Allen, L., Char, C., Hristov, N., Wright, T., Merson, M. Beyond the Brown Bag: Designing Effective Professional Development for Informal Educators (2018). *Integrative and Comparative Biology*, 58(1), 77–84, <https://doi.org/10.1093/icb/icy026>
- Char C. 2015. To be more inquisitive in the natural world: Evaluation of the Interpreters and Scientists Working on Our Parks (iSWOOP) pathways project, 2015. http://iswoopcave.com/?page_id=32
- ElShafie, S. (2018). Making science meaningful for broad audiences through stories. *Integrative and Comparative Biology*, 58(6), 1213-1223. doi:10.1093/icb/icy103
- Ham, S. (1992). *Environmental interpretation: A practical guide for people with big ideas and small budgets*. North American Press.
- Ham, S. (2013). *Interpretation: Making a difference on purpose*. Fulcrum Publishing.
- Kark, P. (2017). Appreciating Acadia. *Legacy Magazine* 28(4), 26-27.
- Larson, D. (2003) Be relevant or become a relic: Meeting the public where they are. *Journal of Interpretation Research*, 7(1), 17-23.

- MacDonald B. 2013. Interpreting conservation: communicating about natural resources, scientific research, and critical environmental issues at Cape Cod National Seashore [thesis]. [Amherst (MA)]: University of Massachusetts.
- Merson, M., Allen, L., Cox, P., Hristov, N. (2016). Roving with a Digital Visual Library: Increased learning opportunities at Carlsbad Caverns National Park. *Journal of Interpretation* 21(1), 9-29.
- Merson M, Char C, Hristov N, Allen L. 2017. Seeking park-based science information: interpreters at the gate. *George Wright Forum*. 34(3): 368-380.
- National Academies of Sciences, Engineering, and Medicine. 2016. *Communicating Science Effectively: A Research Agenda*. Washington, DC: The National Academies Press. doi: 10.17226/23674.
- National Research Council. 2009. *Learning science in informal environments: People, places, and pursuits*. In *Informal Environments*. Philip Bell, Bruce Lewenstein, Andrew W. Shouse, and Michael A. Feder, Editors. Board on Science Education, Center for Education. Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.
- Nisbet MC. 2014. Engaging in science policy controversies: insights from the U.S. debate over climate change. In: Bucchi M, Trench B, editors. *Handbook of the public communication of science and technology*, 2nd ed. London (England): Routledge: 173-185.
- Nielsen, J. (2012, January 16). Thinking aloud: the #1 usability tool. Retrieved from <https://www.nngroup.com/articles/thinking-aloud-the-1-usability-tool/>
- O'Herron, M. (2009). *San Francisco Bay Area Network natural resources communication strategy*. (Natural Resource Report NPS/SFAN/NRR—2009/169). Fort Collins, CO: National Park Service.
- Olson, R. (2009). *Don't be such a scientist: Talking substance in an age of style*. Washington, DC: Island Press.
- Pinnix, J. (2017). Interpretation is not dumbing it down. *Legacy Magazine*, 28 (4), 9-11.
- Science Communication Framework. Outreach Technical Advisory Group. 2016. Washington D.C.: Natural Resource Stewardship and Sciences Directorate.
- Stern, M.J., & Powell, R.B. (2013). What leads to better visitor outcomes in live interpretation? *Journal of Interpretation Research*, 18(2), 9-44.
- Tilden, F. (2007). *Interpreting Our Heritage*. Chapel Hill, NC. The University of North Carolina Press. (Original work published 1957).

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