

iSWOOP 2018 in Review; 2019 Plans



iSWOOP, Interpreters and Scientists Working on Our Parks, had a stellar year. In May we dominated the STEM for All video showcase, reaching more than 30,000 views, giving voice to visitors, interpreters, scientists, and rangers commenting on the plight of monarch butterflies. In July we celebrated publication of several articles on partnerships by iSWOOP-affiliated authors in *Integrative and Comparative Biology* (Volume 58, Issue 1). Nonetheless, we are most excited by interpreters' successful efforts to engage 20,000 plus visitors in conversations about park-based science.

In 2018, iSWOOP featured new scientists (p. 4), and met new interpreters (p. 3). We witnessed the creative use of props (pp. 7-8), and heard provocative questions (see Wondering, p. 6). On the following pages we celebrate the enthusiasm for scientific research among NPS staff and visitors. We foreshadow plans for 2019. Most importantly, we express our gratitude for your interest and support! Happy New Year, Friends! *From Louise, Martha, and Nick*

A Few Statistics

- 5 Parks & 5 visual libraries**
- 12 Featured scientists & their stories**
- 105 Hours of in-person workshops**
- 121 Feedback forms submitted**
- 35 Observations**

Challenges & Opportunities

Interpreters at iSWOOP park sites rose to meet the challenge of being true to the science *and* conveying that science with memorable stories.

In post-implementation surveys from four parks (2017 and 2018, n = 48), 85% of participating interpreters reported that their understanding of scientific research taking place at their park had changed as a result of iSWOOP.

iSWOOP interpreters reported looking at visitor engagement differently. The techniques that the majority (n = 38) used most readily (i.e., used often or very often) included sharing

stories about specific researchers and their methods; using scientists' research questions, data collection strategies, and findings to explore how we know what we know; and showing visualizations related to scientists' questions and findings. Half reported that they often positioned themselves as learners and stakeholders in scientific research and often facilitated visitor discussions of the relevance of park-based research (Char Associates, Research Memo, 2018).

To understand a researcher's story gives you a buy-in. Puts a human face to something that seems abstract like charcoal or pollen. iSWOOP gives me a chance to get into researchers' lives and to see their stories.

— Acadia Ranger,
Mackette McCormack



Interpreters at work in Cowles Bog. Interpreters at iSWOOP parks valued spending time in the field with scientists (Finding from Char Associates). Credit: Czartorysky and Cearlev



Check the iSWOOP website for articles and reports.
<http://www.iswoopparks.com/about/reports/>

Trust the fact that people have lively minds. Science doesn't have to be stale; it's gripping. Especially when you're looking at mysteries, answering questions you don't know the answer to. Involving people in those mysteries and aha moments is entertaining. Visitors like to feel like they understand a place better than when they showed up.—Acadia National Park Interpreter, Anastasia Roy

iSWOOP's Model: Scientists' Perspectives

It was humbling and gratifying to see what interpreters are doing with the work and hear how public is interacting. ... I saw a ranger present a program that talks about my research. I am a character in the story!



—Caitlin McDonough MacKenzie, *iSWOOP* featured scientist at Acadia National Park



Bob Brodman, the first *iSWOOP* featured scientist at Indiana Dunes National Lakeshore, led interpreters and visitors in collecting data on amphibian abundance in Cowles Bog, June 2018. Credits: (Above) Czartorysky and Cearley, (left) Geneviève Talbert

Scientists bring interesting questions, cutting edge technology, and stories that can captivate people's attention. The time they spend with interpreters, exchanging ideas, working in the field, explaining points in subsequent emails are all valued by interpreters. For the collaboration to be sustainable, scientists have to benefit too.

Ten of the eleven scientists (91% of respondents who completed a questionnaire analyzed by Char Associates) indicated that they had gained something valuable:

- ⇒ an increased professional network of colleagues,
- ⇒ expanded repertoire of strategies for explaining their research,
- ⇒ new visuals they might use in teaching or outreach,
- ⇒ an increased understanding of working with parks and park interpreters,
- ⇒ a greater appreciation of visitor perspectives.

Eight out of 11 reported that the project had broadened their impact by reaching new or larger audiences for their work. (Findings are based on a survey sent to 12 scientists and analysis by Char Associates.)

To me, it seemed like a win-win—I get my message out there, and the park gets to tell stories about the “what” and “how” of science. It’s also important for people to know that parks aren’t just beautiful or fun; they’re also important natural resources, and a lot of research is happening in them ... —from Char, Evaluation Memo 2018

Preview: In 2019, we expect to publish findings on researchers' preferences for outreach and education. Nearly 350 scientists with research permits in 2016 answered an online survey. Overall, the scientists who responded rated reaching thousands of people or even advancing their own research as less important than inspiring others and influencing policy. Respondents indicated that funds for travel-related expenses limited their outreach efforts. Some rated lack of clarity about the process for initiating outreach in parks as limiting their outreach activities.

Perspectives from Interpreters New to iSWOOP

Supporting new staff—iSWOOP leaders saw interpreters' efforts to make the science intriguing, increase mentions of scientists' studies, and incorporate new technology. At Carlsbad Caverns, 15 permanent staff, including new supervisors Bill Barley and Jo Ann Garcia attended workshops with iSWOOP scientists Allen and Hristov. At Acadia NP, rangers Betty Lyle, Kate Petrie, Mackette McCormack, Jeanine Ferrence, Patrick Kark, and Anastasia Roy shared successful strategies with peers new to iSWOOP. Rangers shared highlights of their experience.



Interpreters said of their iSWOOP-influenced programs:
84% of the time they talked with visitors about the questions that drive research & 74% of the time they discussed how scientists know what they know.

iSWOOP did make me think more about asking questions of the visitor ... It really put me more in the mind of thinking of what visitors are going to ask as well, and what they are going to think about and how they think vs. just presenting the information.—Acadia Ranger, Jennifer Anderson

Having the personal relationship with some of our cave's researchers allows me to express in detail the work that they do--not only does it give me confidence in the information I'm giving, I think it gives the visitors confidence in the park Being able to talk about upcoming studies concerning oil drilling in the area gives me the knowledge to address touchy subjects like fracking.—Carlsbad Caverns Ranger

Making the science more intriguing. *I tell stories about Jacquelyn and Caitlin lugging stuff to the top of Sergeant Mountain. It's a lot of work. ... Vignettes make scientists like Jacquelyn Gill and the Brauns seem approachable vs. some remote person off somewhere. We often look at celebrities or scientists as people who exist, but we don't really have a connection with them. Once you tell stories people can relate to, hopefully that makes the science and the scientists more approachable and intriguing.—Acadia National Park Ranger Nate Parkinson*

I like using the iPad. We need to embrace technology, not to the exclusion of good interpretation, but to enhance good interpretation. Acadia National Park, Ranger Sardius Stalker



Top right: Ranger Jennifer talks with a visitor from Jamaica, a self-proclaimed science buff. Bottom: Ranger Nate asked visitors to work in groups to interpret a pollen graph. Interpreters documented 22 instances of specific predictions visitors made. About half were related to the impact of climate change, either on food availability or breeding timing. Credit: Knox

“There’s no reason it should swallow a person” —Erin Argyilan, Geologist

Rising 126 feet, Mount Baldy is one of the tallest lakefront dunes in the world and the most popular attraction at the Indiana Dunes National Lakeshore. Nevertheless, the Park Service closed Mt Baldy to the public for three years after Nathan Woessner was buried alive for several hours. The dune is still off-limits except during ranger-led walks. At local events and visitor centers, adults want to know: When will Mt. Baldy be open? What happened to that kid who fell in a hole there?

To answer those questions and many more, interpreters from Indiana Dunes National Lakeshore teamed up with geologist Erin Argyilan and geologists from the Indiana Geological & Water Survey (IGWS). Visitors participating in one of the ranger-led hikes handled 3D models of the shoreline from three time periods. Over the summer, interpreters fine-tuned their questions and the scientific information important to understanding why this dune on the Michigan shoreline behaves in unanticipated ways. JP Anderson, Bruce Rowe, Kim Swift, Kelly Caddell, Rafi Wilkerson, and other Indiana Dunes staff put iSWOOP principles in action:

- 1) Visitors’ questions led to the development of a science-rich program
- 2) Erin Argyilan, geologist and featured scientist, talked with rangers about geologists’ tools and questions, and shared stories. She modeled an enactment of the forces that have altered Mt Baldy
- 3) Interpreters clued the public in to park-based scientific research using Argyilan’s visualizations and instruments as a jumping off point for describing how we know what we know and science as a process of revision and refinement.
- 4) Visitors were invited to exchange ideas: is the dune manmade (because shoreline structures changed the way sand accumulates) or is it natural (a result of glacial action, deglaciation and wind)? What is our role in protecting this dune as it continues to move south toward the highway?

A highlight of the night was a kid that came up to the table and did not know anything about Mt. Baldy and hadn’t even been there with his family yet, but he became super interested in it after interacting with the models and making predictions about what was happening to Mt. Baldy from the models. He spent time looking at the sand/soil samples and seeing the differences between the soil/sand types. —Indiana Dunes National Lakeshore Interpreter, Grace Kruse

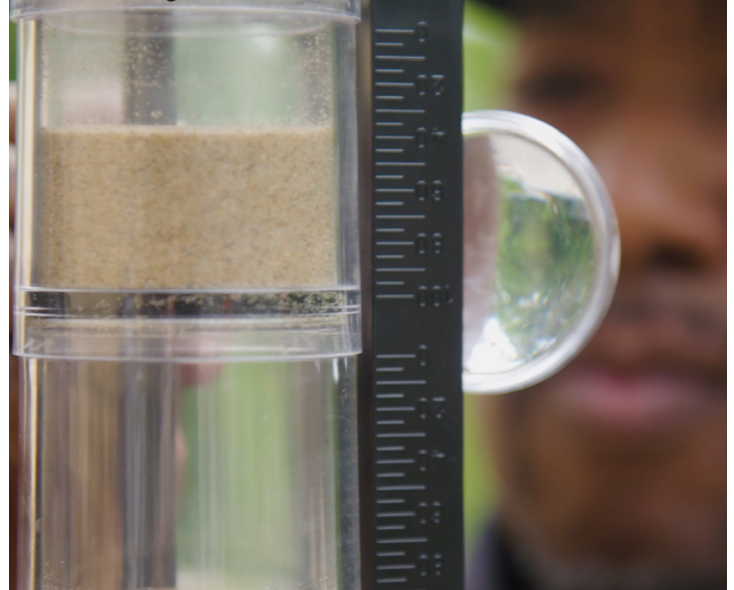
We asked visitors to describe what was happening in the models and where they they think Mt. Baldy would end up. Most visitors were able to comment how they saw Mt. Baldy getting flatter and moving toward Route 12. Other visitors pointed out how they saw the shifting of Mt. Baldy covering certain areas they were familiar with.—Indiana Dunes National Lakeshore Interpreter, Grace Kruse

Kateryna Czartorysky and Chandler Cearley, recent graduates of North Carolina School of the Arts, created short films introducing geologist Erin Argyilan and herpetologist Bob Brodman. We expect to release the films in concert with Indiana Dunes National Lakeshore. Like us on Facebook to receive updates. Credits: Czartorysky and Cearley

Adopting and Implementing iSWOOP

Preview: In 2019, iSWOOP expects to publish findings park leaders' perspectives on implementation. iSWOOP sites are varied on purpose: different visitor demographics, different science learning opportunities, different staffing patterns. With this diversity, we should be able to offer recommendations and guidance that can be customized to a number of NPS sites. Park leaders will pick iSWOOP components that make sense to them given their needs and strengths.

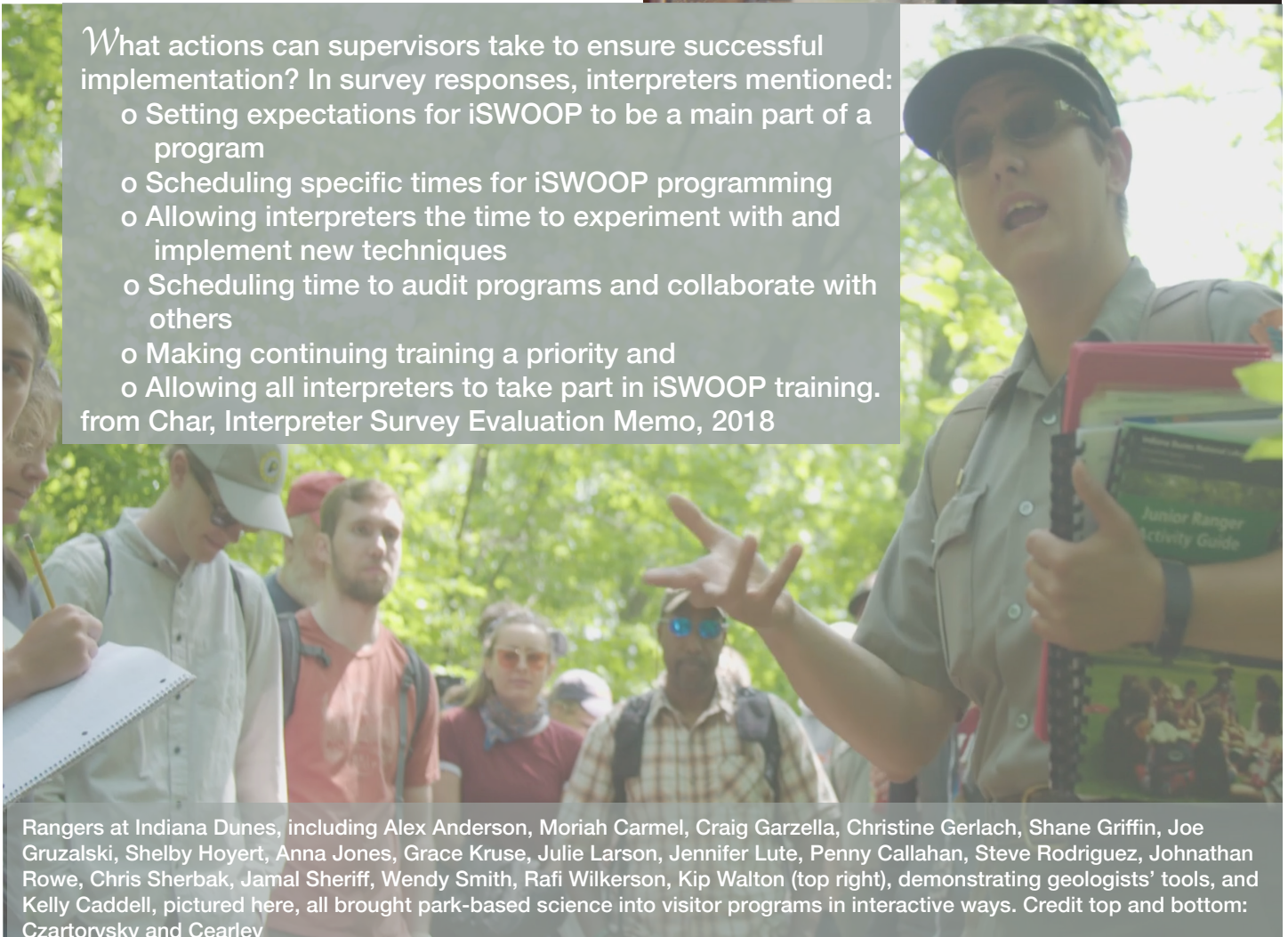
I feel like the training has been the most valuable. ... All of us interpreters, we learn good questioning techniques early on. As an educator you can ask questions, but what about asking the questions that make people think? Sometimes I have been amazed. iSWOOP asks the simplest questions in the world, but ones I would never have thought to ask. Usually when I am thinking of how to explain something scientific, I think I will have to ask a complex question to get to the heart of it.—Chief of Environmental Education, Indiana Dunes National Lakeshore, Kim Swift



What actions can supervisors take to ensure successful implementation? In survey responses, interpreters mentioned:

- o Setting expectations for iSWOOP to be a main part of a program
- o Scheduling specific times for iSWOOP programming
- o Allowing interpreters the time to experiment with and implement new techniques
- o Scheduling time to audit programs and collaborate with others
- o Making continuing training a priority and
- o Allowing all interpreters to take part in iSWOOP training.

from Char, Interpreter Survey Evaluation Memo, 2018



Rangers at Indiana Dunes, including Alex Anderson, Moriah Carmel, Craig Garzella, Christine Gerlach, Shane Griffin, Joe Gruzalski, Shelby Hoyert, Anna Jones, Grace Kruse, Julie Larson, Jennifer Lute, Penny Callahan, Steve Rodriguez, Johnathan Rowe, Chris Sherbak, Jamal Sheriff, Wendy Smith, Rafi Wilkerson, Kip Walton (top right), demonstrating geologists' tools, and Kelly Caddell, pictured here, all brought park-based science into visitor programs in interactive ways. Credit top and bottom: Czartorysky and Cearley

Wondering

At the cactus garden, one family DID question what happens when there ARE no more Yucca brevifolia (Joshua trees) within the boundaries of the park. We had a good discussion where I challenged them to come up with various possibilities. Also I compared [the situation at Joshua Tree] to another climate change affected park, Glacier, where they are having the same warming issues. It was a really fun discussion, and kids and adults really got it. What a program THAT would be.... what to do with parks that no longer have their own name-sake.—Joshua Tree Ranger, Keith Flood

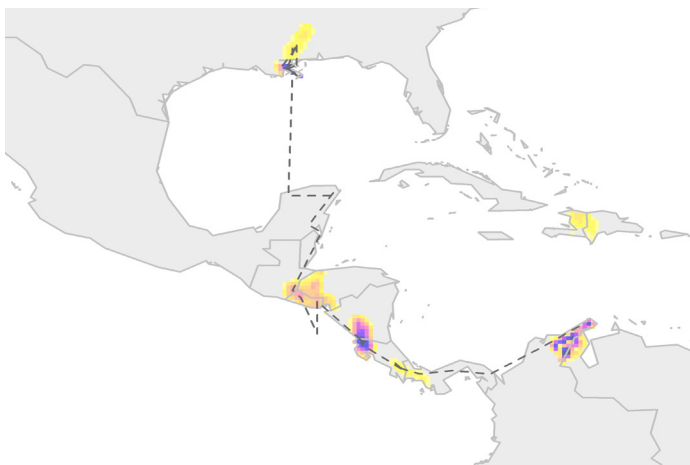
The idea is to invite curiosity. During iSWOOP professional development, interpreters practice using visualizations as a jumping off point for observation, prediction, and speculation. Looking at interpreters' reflections from 14 months of iSWOOP and 145 programs, interpreters mentioned 25 instances where visitors' questions aligned with the featured scientists' lines of inquiry, such as:

I wonder if the kids at my school will see the same plants in the future.

Visitors do wonder why other dunes are not doing the same thing as Mt. Baldy.

The visitors are always eager to learn about the research in the park and really like identifying plants. If anything, that keeps me learning more about the flora of Mt. Desert Island—just like Caitlin did!

Rangers at Barataria Preserve, in the New Orleans area, also capitalized on visitors' questions. *People were initially drawn into the station by the nest boxes. It was a great tool to have because they had often seen one on the trail and were wondering what they were. The two visuals I used the most were the picture of the birds on top of a nest box and the map of the migration route. A lot of people didn't know what a Prothonotary warbler looked like so that particular image hit a lot of the topics I was discussing. People were fascinated by the migration map.—Jean Lafitte NHPP Ranger Melinda McFarland*



Left: Migration map based on research by avian biologist Katie Percy (and her associates) was part of the visual library interpreters at Jean Lafitte NHPP used with visitors. Percy hopes that a better understanding of the birds' travel will reveal factors that are driving population declines. Map credit: Audubon Louisiana. Right: Percy adds nest boxes like the one above and the ones on the next page at heights and locations she and her research team can access. They can follow birds over multiple seasons and check their success in raising the next generation. Credit: Hartgerink

If You Were a Researcher ...

Katie Percy, Avian Biologist for Audubon Louisiana, shared her research on the migratory routes of Prothonotary warblers (PROW), the tiny, yellow bird known as the swamp canary. Local families and tourists took part in events like Science in the Swamp. Sabina Treja, Lea Schram von Haupt and Julie Ward were instrumental in introducing new Spanish-speaking audiences to Percy's research.

The visitors were very interested in the leftover nest boxes that Katie gave us, and were very receptive to these three questions: 1) What is migration, and where do you think PROW go from here? 2) If you were a researcher, how would you try and figure out exactly where south they are going 3) Why do the birds use these boxes, why are they designed like this?—Jean Lafitte NHPP Supervisory Ranger, Aleutia Scott



Props are a starting point for speculation: Why do the birds use these boxes, why are they designed like this?
Credit: Hristov



Rangers Kali Bunn, Lea Schram von Haupt (above with Katie Percy and Brendon Cahill), Melinda McFarland, Kristy Wallisch, Jack Henkels, Dave Fox, and Julie Whitbeck were among those who participated in professional development on Prothonotary warblers. Credit: Merson

The “child bird banding” activity that Melinda had put together was really successful. Kids loved getting their banding bracelets, getting their wingspan measured, taking their age and making up a species code from the first two letters of their first and last names - it really did give a sense of the types of info researchers actually collect on birds. —Jean Lafitte NHPP Supervisory Ranger, Aleutia Scott

One visitor said: “I am really excited to learn about the bird migrations. I didn’t know that animals migrated too! (as well as humans).”

Visitors seemed much less excited about the research description than actually seeing the birds ... However, if people saw the real bird, then they were more interested in the research. — Jean Lafitte NHPP Ranger, Dave Fox

Share It—iSWOOP Facebook Page and #parkscience welcome your content.

8/ “Everyone loves a silly ranger”: Use of Props at Joshua Tree

When Juniper Harrower, iSWOOP featured scientist at Joshua Tree National Park, met with interpreters, she acted out a Yucca moth intentionally pollinating Joshua trees. To make her point, Harrower illustrated the moth in action (image below of moth packing pollen into a Joshua tree blossom). Harrower also created a wearable moth mask, attaching flexible appendages to a pair of sunglasses (image right). Harrower studies the way Joshua trees at different elevations benefit from other species like moths or fungi in the soil. Rangers used a felt sleeve and filament to explain. Durable props were an attractive alternative to digital media displayed on a tablet in the glare of the Mojave Desert. Several Joshua Tree rangers have used props to reveal interspecies relationships, enchanting visitors, and triggering conversations about the prospects for Joshua trees survival.

Joshua Tree Interpreter, Cynthia Anderson, comments on different occasions ...

The glasses were a hit! The kids wanted to be part of the program so they were the flowers. Kids, aged approx 7 and 10, were very excited about the pollination story.

The glasses were a huge hit. The artist wanted to be the moth, so I was one of the flowers. The guy had so much fun with the glasses, and entertained the whole group during the pollination demo.



I also used the root and fungus props to illustrate mycorrhizal fungal networks. People had lots of questions. Some had heard of them before from Youtube videos and TED talks, but nobody knew that they were here in the desert. The four people that already knew about these networks (from the Pacific Northwest) contributed a lot to the conversation. I had them explain what they knew and how they learned about the networks to the rest of the group.—Joshua Tree Interpreter, Cynthia Anderson

Other connections for visitors included citizen science monitoring projects.

At Joshua Tree we also count and track (threatened) bats, tortoises, lichens. I ask if the visitors have ever been on a butterfly count or bird count. It's a good transition to Juniper's research.—Joshua Tree Interpreter, Keith Flood

Top: Sasha Travaligio models the Yucca moth face. As Cynthia Anderson said, everyone loves a silly ranger. Credit: Simmons

Right bottom: A moth delivers pollen. Credit: Harrower

Left: Detail from a painting by Juniper Harrower. The paint, oil, and fiber mimic the patterns of fungal networks. See Harrower's painting and scientific work at juniperharrower.com or at <https://artistsandclimatechange.com/2018/09/19/bringing-together-art-and-science-to-save-joshua-trees/>

Interviews & Research on Visitors' Interests



A dad uses iSWOOP visualizations to explain how glaciers form lakes. Credit: Knox

What we heard. Visitors expressed interest in outdoor recreation and in multi-sensory activities. This was true for national park visitors on an extended vacation and visitors to their local farm and nature center.

Examples of Interests

Recorded Summer 2018

Visitors mentioned hiking and exercise, opportunities to see wildlife and to explore:

Hiking without worrying about venomous snakes and alligators

I like the wilderness hiking a lot.

... Interested in getting exercise.

Run. Look for animals.

Lots of space to explore.

Hiking is good. Seeing wildlife.

When asked if and then how the park could support their interests, we heard examples of hands-on activities such as:

Cooking Abenaki style

Farm-to-table cooking class

More art to take home

Craft activities

Science volunteer opportunities geared for teens.

Why it matters. Research in and out of school has demonstrated that interest is a central component of learning. Interests motivate individuals to pay attention during an experience and to seek out new learning experiences. Interpreters strive to make their programs engaging and relevant—*What if there were a simple way for interpreters to elicit visitors' long-term interests, making it easier to plan and plant connections between park resources and visitors' longstanding interests?*

Scott Pattison (then of the Institute for Learning Innovation) and Martha Merson at TERC led the development of two activities and accompanying questions. One was a card sort (see sample cards below), the other involved voting with stickers. Instrument testers Forist, Jaumot-Pascual, Morales, and Wright found both versions met the goals for a process that would be short, engaging for visitors in multi-age groups to do together, and would elicit rich description of interests.

The voting activity was simpler to facilitate. Based on feedback, it has been revised and testing of a Spanish translation is planned for 2019.

Using visitors' interests. While many comments visitors make will be no surprise, their comments can affirm program choices and provide a lens for how to frame park-based science. For example, in Acadia, interpreters could tap into visitors' interest in hiking, opening with the story of a study that demanded hiking. An interpreter could use as a title or theme: hike in the footsteps of a scientist, connecting stories of park-based science to hiking. Visitors got a new perspective when they heard how two female scientists Jacquelyn Gill and Caitlin MacKenzie climbing Sargeant Mountain with heavy equipment and the raw material to construct a raft.

The iSWOOP team would love to be in touch with interpreters who want to experiment with the instrument. Contact: martha_merson@terc.edu.

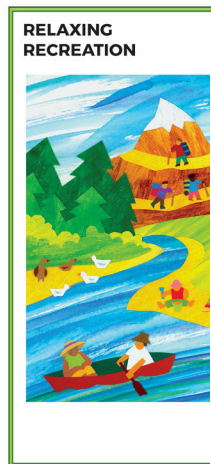
Examples of questions and images from the card sort activity

How do these pictures and words connect with what you like to do?

Why is this park a good place to explore what you like to do?

Do you think that rangers at this park could better connect with what you like to do or learn about?

If so, how could they do that?



Examples of images from the card sort activity

10/ Thank You to All Who Make Park-Based Research Come Alive



We extend thanks to scientists, rangers, and collaborators already mentioned, and to J. Gill, R. Brodman, J. Harrower, A. Scott, M. Verbeke, T. Watkins, and others who gave iSWOOP visibility at conferences, in talks, and interviews;

Interpreters, new and continuing, for sending impressions: Aubrey Brown, David Brumbaugh, Angelina Guerra, Emily Orvis, Andy Rankin, and Charlie Reed. We think of you, even if you have moved on to new parks and adventures: Cynthia Anderson, Steve Behrns, Christopher Bramblett, Christina Caparelli, John Davis, Mike Ellis, Jenn Evans, Joe Gruzalski, Georgina Jacquez, Melinda McFarland, Kristi Neilson, Josh and Toni Nelson, Alyssa Parker-Geisman, Nate Parkinson, Emily Prud'homme, Eric Riordan, Anastasia Roy, Paul Santellan, Lorna Shuman, Brad & Sarah Sutton, Lupe Zaragoza, James Zordan. Stay in touch!

(Left) The nitty gritty of active science comes to life in a performance of history. Ranger McKenzie portrayed Allen, wildlife biologist, as part of the annual Rock of Ages celebration of the history of Carlsbad Caverns. (Photo provided by Pawlak)

You keep us curious and learning!

Science consultants D. & R. Braun, J. Cornett, T. Hubel, G. Jacobs, S. Norton, W. Sadinski, M. Johnson, K. Russell, P.R. Sturgeon, & T. Thompson

Visual Experts Flora Lichtman, Gimlet Media; Carol Strohecker, Univ. of Minnesota; Betsy Towns, Center for Design Innovation; Chris Tullar; James Galdos, Grace Ackles and Crystal Garcia; Film Team, P. Brown, K. Czartorysky, M. Davis, G. Conversano, C. Cearley, R. Kapoor, N. Knox, R. Lebar, C. Mathews, T. Spivey; Mike Scott, and the 2018 ASAP New Media Services team: M. Byrnes, A. Haughten, L. Reading, and T. Scontras.

Invaluable advice-givers: Mike DeBacker, Jeanine Ferrence, Becky Lacome, Abe Miller-Rushing, Sara Melena, Phadrea Ponds, Wendy Smith, Rebecca Stanfield-McCown, and Tim Watkins of NPS; also Wyn Jennings, NSF; Brian Forist, IU; Sara Morales, NMSU, Andee Rubin, Gilly Puttick, Audrey Martinez-Gudapakkam; and Sabrina de los Santos at TERC; Selene González-Carrillo, Ecotapatío; and Cynthia Char, Brian Slattery of Char Associates.

Always helpful: NPS leaders and staff, in all divisions. Special thanks to J. Albrinck, N. Frakes, D. Larson, J. Rodgers, K. Turner, C. Bathe, M. Beer, J. Brackin, B. Connery, J. Hazen-Connery, R. Cole-Will, A. Florio, P. Super, D. Robertson-Thompson, G. Wagner, P. Cox, M. Larson and USFW staff: R. Drum, S. Marcum, S. Marquardt as well as D. Bronson, CA State Parks; CAISE staff; K. Cline, College of the Atlantic; George Wright Society staff; P. Caputo, NAI; A. Davis, A. Jones, and R. Paglierani, from NASA's Earth to Sky program; M. Storksdieck, OSU; and consultants M. O'Herron, K. Gill, J. Mishra, and Y.C. Wang.

Reliable enthusiasm J. Jewiss, J. Heimlich, K. Crowley



iSWOOP is made possible with support from Lisa Stack and others at Winston-Salem State University, Cynthia Char and Associates, Sarah Hill, Valerie Martin, Scott Pattison, Tracey Wright, and others at TERC, and from the National Science Foundation, DRL-1514776. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation. Credit: Merson

You get a deeper understanding when you let other people's curiosity and learning add to your own and guide the conversation. — Acadia Ranger Mackette McCormack