# iSWOOP Implementation in National Parks:
## Scientists' Perspectives

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Interpreters and Scientists Working on our Parks (iSWOOP) is a model program designed to build visitors' understanding of science at National Parks. It brings together educators, scientists and National Park Service (NPS) interpreters to incorporate site-based science into formal and informal interactions with the public. iSWOOP is led by principal investigators Martha Merson from TERC, and Nicholas Hristov and Louise Allen from Winston Salem State University.

Scientists conducting park-relevant scientific research constitute a critical partner of iSWOOP. iSWOOP-featured scientists have generously given of their time. They have met with interpreters to explain their lines of research and answered questions about how they came to their research questions, and donated photographs, provided figures, and pointed out sources for related research and visualizations that became part of iSWOOP's visual library. Scientists also consulted on the design of professional development sessions, and have led field work involving interpreters. This level of direct contact is unusual according to surveys with interpreters (Char, 2015; Merson, Char, Hristov, and Allen, 2017). Because scientists play an integral role in helping identify compelling and engaging storylines, visuals, and relevance of the research taking part within and outside of the park, they are critical to the project's success.

Through the initial project work in articulating a program model, core project staff have posited that to be sustainable, scientists should also benefit from their program participation in a variety of ways they deem beneficial. iSWOOP project leaders expected that possible benefits could include acquiring new ways to visualize their work, new techniques to communicate about their work in informal settings, and exposure to larger audiences than they could reach independently by leveraging the parks' extensive visitorship to build public understanding of scientific research. Scientists' perspectives are **essential in determining whether iSWOOP can offer a viable collaborative model for scientists and interpretive staff to work together that is realistic and sustainable**.

As a result, the evaluation team sought out ongoing program feedback on the project not only from iSWOOP NPS interpreters and park leaders (Char, 2019a, 2019b), but from scientists as well. This evaluation report presents findings from a multi-year survey study conducted by Char Associates with participating iSWOOP scientists.

Methods: Using a mixed methods approach which collects and analyzes both qualitative and quantitative data (Creswell and Plano Clark, 2007), the project evaluator and principal investigators have been studying the project's professional development (PD) at five national park units located in five different states in the northeast, southeast, midwest, southwest and west coast. In each park site, between eight and fifteen interpreters attended PD sessions along with interested others on staff (such as administrators, communications staff and resource managers). The groups gathered for roughly fifteen contact hours spanning several days. Scientists' attendance ranged from three hours to fifteen hours.

Char Associates designed a survey for the research scientists involved in the iSWOOP project team to learn about the reasons scientists might choose to become involved, the potential professional benefits and outcomes of the project, and suggestions of how the project model could be improved. The survey consisted of eight items: six open-ended questions, and two items featuring rating scales. Respondents were also asked to indicate their name, title/position, and institution.

Three of the six open-ended questions focused on participants' background, context, or motivation, and asked scientists to describe any prior experience working with NPS interpreters, the nature of their involvement with iSWOOP to date, and reasons they were interested in taking part in iSWOOP. A rating scale also gauged how important it was to them for iSWOOP to provide an interactive public forum for their scientific research.

Two open-ended questions focused on scientists' perceived outcomes and benefits from their program participation, regarding what they felt they gained from their work on iSWOOP, and whether participating in iSWOOP had influenced the ways they think about or approach science communication. The second rating scale item targeted perceived program outcomes, and featured seven different rating scale sub-items that had respondents assess the degree to which their participation in iSWOOP had resulted in a variety of professional benefits identified by project staff, such as expanding the audiences for their work, or adding to their repertoire of teaching strategies and materials.

The final open-ended question solicited formative feedback on the project, concerning such areas as the time commitment entailed, suggestions to make their involvement more rewarding or efficient, or voicing any concerns they might have.

The instrument was co-developed by the evaluator and iSWOOP project staff to ensure that the customized questionnaire obtained formative feedback and program impact information needed for, and appropriate to, the project. The questionnaire was administered to a total of twelve scientists who had participated in iSWOOP (eight scientists in Fall 2017 and four scientists in Fall/Winter 2018).

Quantitative data yielded from the rating scales were analyzed using frequency distributions. Prose responses to open-ended questions were coded by a member of the evaluation team, using a grounded theory approach (Charmaz, 2006; Patton, 2002) using thematic categories aligned with the main features and goals of the project.

Sample: The questionnaire was sent to twelve different research scientists who have been involved in the iSWOOP project, each working with one of the five National Parks actively using iSWOOP. All twelve scientists (100% return rate) responded to the questionnaire. The set of scientists was quite diverse, representing seven different universities and one non-profit organization, and a variety of scientific departments (e.g., biology, geology, paleoecology, earth/climate sciences, environmental science) and positions (two assistant professors, three associate professors, three retired (emeritus) professors, one research fellow, one post-doc, one PhD candidate, and one staff scientist.)

The scientists' respective roles and levels of participation in the iSWOOP project also varied considerably. Participation ranged from mainly being involved in presenting at a training workshop and giving input and feedback to the visual library (3 scientists), to attending planning meetings, assuming an active role in training, and having their research featured in the visual library (7 scientists), to serving as one of the co-principal investigators of the project and being heavily involved in professional development training, development of the visual library, ongoing communication with parks and park staff, and other aspects of the project's management and implementation (2 scientists).

Nine of the twelve scientists had some previous experience working with NPS interpreters and the particular park they were paired with for iSWOOP, while three had no prior experience working with the NPS. Of the nine with prior NPS experience, much of that experience involved giving talks and presentations at the park, with four also leading field trips or fieldwork with interpreters, or serving as a resident scientist at the park.

**Results**

Motivation for involvement: Scientists offered a variety of reasons for why they were attracted to iSWOOP and were taking the time to be part of it. The three retired scientists residing locally near the park cited the positive nature of their already existing relationship with the park. They described their respect for the park and staff there, their interest in supporting the park staff, visitors and surrounding communities with up-to-date geological information on the park, and enjoyment of opportunities to use their scientific background and research findings to understand the landscapes at the park.

The eight scientists whose research was featured more prominently both in the professional development training workshops and in the iSWOOP visual library described their interest in greater public outreach of their research, as well as heightening the public's understanding of research taking place in the parks. Scientists also were interested in further developing their own science communication skills. As six of the scientists expressed,

> *I love the idea of increasing the accessibility of my science with the public, but I also love the idea of highlighting science that is going on in our parks right now. To me, it seemed like a win-win – I get to 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 on an active basis. I also appreciated the opportunity to have visualizations of my research made.*

> *I am always interested in communicating the scientific information about this site to the public. Most importantly I am interested in correcting misconceptions about [the park site's major feature]. I would like the interpreters to feel confident that they understand the extent of the scientific information that we have about this site so they can better communicate with the public. This is especially important since our site hosts potential risks for park visitors.*

> *I've been involved in outreach and interested in improving communication of science to the public for quite a while. So when [my colleague at the park] asked if I would be interested, it was a good fit for me, and at this point in my career I was ready to try something like this. Plus, I was so honored to have been asked to profile my research in Park Service programs, how could I say no?*

*I thought it was a good idea to bridge the gap between scientists and public. I am generally very open to outreach, but aware that the number of people I can reach is limited. I also thought it was a good opportunity to further develop my skills to translate my research for non-academics.*

*I saw iSWOOP as an incredible opportunity to have our research reach/educate more people than I could ever manage to reach without the help of park interpreters. Furthermore, I was seeking the guidance and expertise of the iSWOOP team and park interpreters to improve my own communication skills, as well as ideas for how to have meaningful and impactful interactions with the public.*

*I enjoy working with iSWOOP to be connected to the great team of people involved, to get feedback on my visual storytelling approaches, to better connect my research to the public, and to be more closely connected to park personnel, which leads to a better understanding of park goals and space for collaboration.*

The two scientists serving as the project's co-principal investigators described their enjoyment in working with interpreters, and interest in exploring a new model of scientists working with and in national parks.

*I really enjoy interacting with interpreters. They are some of the most satisfying students to work with and are always eager to "get it right".*

*The [initial] idea was driven by the realization that there is room for much more in the relationship between scientists/researchers and the parks where the work often happened, the scientists/researchers and the interpreters, between the interpreters and the public and between the public and the park resources/experiences. Ten years after the first seeds of iSWOOP were planted, the project continues to offer fresh thinking about public learning, about cutting-edge technology and new relationships and experiences.*

Eight of the scientists (8 out of 11; 73%) reported that they found it extremely important that iSWOOP provides an interactive public forum for their scientific research, while two additional scientists said it was moderately important. (The two scientists who either did not respond to this item or felt that it was important only "a little" were both retired scientists.)

*Table 1: How important is it to you that iSWOOP provides an interactive public forum for your scientific research?*

| Not at all | A little | Somewhat | Moderately | Extremely |
|---|---|---|---|---|
| 0 | 1 | 0 | 2 | 8 |

(n = 11; Comment only (1))

One of the scientists who rated it as extremely important said,

*[It's] great, because I have someone else that promotes my research and makes it accessible to the public that does not involve me on a daily basis.*

Perceived Benefits for Scientists: Eleven of the twelve scientists (92%) indicated that they had gained something professionally valuable from the project. Benefits described by the scientists included: improved communication skills, including story telling and visual techniques (6

scientists), an increased professional network of scientist colleagues and park settings (4), a deeper understanding of working with parks and park interpreters (4), and greater appreciation of visitor perspectives and the importance of out-of-school learning (4).

> *I was interested in improving my communications skills. As a scientist, it can be difficult to gauge the knowledge people bring to the table and iSWOOP gave me the opportunity to interact with people who had very good basic knowledge about science and were keen to learn more.*

> *[I've gained an] Understanding of some of the misperceptions/misunderstandings about my research. An understanding about how important story is for getting the public to care about science. I have learned a lot from my interactions with the informal STEM education experts and have "borrowed" much of what I have learned and used it in my higher ed classrooms.*

> *Humbling and gratifying to see what the Interps are doing with the work and hear how the public is interacting. [During] this summer's training I saw [one ranger] present the program that talks about my research. I am a character in the story! -- How do I approach this? How do I do in bringing my role to audiences? -- I appreciated how much work goes into scientific communication. So I see how to use these strategies with the public.*

> *[I have gained] So much! Conversation with the folks at iSWOOP have led to more interesting visual concepts for my work, professional development opportunities, and an extended network through [the] National Park.*

> *I've gained a better understanding of the challenges parks face in terms of what interpreters are able to do, and the kinds of interactions they can have with the public. I've also developed a better relationship with [the park] overall, and with programs on campus doing really interesting work.*

> *I have a closer relationship with park staff and interpreters and I am extremely grateful for their continued assistance with public outreach and education, as it relates to my research.*

> *I enjoyed learning about the collaboration between interpreters and scientists achieved by iSWOOP. I have long promoted and engaged in these relationships, but iSWOOP makes it possible for the information to move beyond my personal participation and makes it more available for the public and for long-term educational programs.*

> *It is difficult to package the importance and culture-changing influence that iSWOOP has had on me as a scientist, researcher, designer, educator, mentor, park visitor and advocate. I think about science communication, about conversations, about engagement, equality, fair place in a dialog, letting go of things before gaining others (e.g. control vs. trust, proximity, authenticity) etc. I am a different and much better, I would like to think, teacher in the classroom and a ferocious advocate for importance of learning outside of it.*

For the three retired scientists with more limited roles in the project, two reported that they had either gained more substantial scientific knowledge about the park as part of their preparation for the project, or that the park was now more aware of how they [the scientists] could be helpful in training new naturalists. The third retired scientist did not feel he had necessarily gained anything from the project.

Scientists were also asked for their views on whether iSWOOP had specifically influenced the ways they think about or approach science communication. Seven of the twelve (58%) felt they

had been so influenced, while five felt they had not. Of the five who felt their thinking or approach to science communication had been influenced only minimally, three were the retired scientists who had had more limited involvement in the project.

Of those who cited their science communication being influenced by iSWOOP, scientists talked about efforts and strategies to make their research more accessible and interesting -- often through stories -- and through more natural, interactive exchanges with visitors. Scientists described how these new presentational techniques were valuable in their outreach and dissemination efforts with the public and scientific audiences, and in their own teaching with students.

> It certainly helped and gave me some ideas about how to break down my research to digestible levels, relating it to everyday experiences that make it more understandable, fun and interesting.

> It made me appreciate the idea of a HOOK and how you start the story and get people interested in hearing more. How do I start off presentations? Even to scientific audiences. If you open with a question or visual or thought that's interesting, that will draw them in for a more meaningful engaging interaction. The visual library made me appreciate good figures. Even in papers, [it's good to have visuals that are] more accessible and able to stand on their own. And to get more of story out of it. For a Garden Club talk I gave, I opened with an obituary of a plant as the first slide. People were into it. Usually I give an overview. It made a big difference in terms of energy in room.

> The story telling workshop was very useful in my classes as well as outreach. Faculty often tell stories, but now I think more about the story structure and make sure that I talk about how I got interested and why I think that the projects are important.

> Absolutely [influenced my science communication]. I was given critical feedback on design development and narrative that help me to better consider teaching and explaining my research.

> I definitely think more about my story and the science story. Unless I'm presenting at a strictly scientific conference, I try to include some coverage of the highs and lows of scientific research. I also really try to communicate the relevancy to everyday people. I am getting better at that part; I believe that is a result of my work with iSWOOP.

> [Did iSWOOP influence my science communication?] Yes! Deeply!! When it happens, at what level, through what mechanism, the importance of it, how to assess it; its benefits and outcomes. I have learned to trust the public participant and how giving [a] little here and there via carefully designed and presented information can offer much more over time than forcing much or everything that we know in an unnatural, non-sensible way.

Responses appeared to be related to the scientists' specific project roles and level of involvement, with the project's influence on science communication being seen as higher by those scientists who had played a more active role in the professional development training workshops and ongoing work with the development in the iSWOOP visual library.

Of the five scientists who felt their thinking or approach to science communication had been influenced only minimally, four were involved during an early phase of the project when science storytelling techniques and visual library resources emphasized in iSWOOP professional development were still fairly modest. Three of these scientists were retired scientists with

limited roles in the project; the fourth scientist regarded contact with the project team as having been somewhat minimal, and that she already had a solid background in science communication.

> *I already do a lot of science communication, and iSWOOP is really not about me talking with the public...I really felt more like I was a resource for park interpreters, for them to ask questions or get visualizations that they needed.*

The fifth scientist who felt that iSWOOP had not influenced how she approached science communication felt that her communication methods already were similar to those encouraged by the project, yet expressed enthusiasm for the project.

> *iSWOOP aligns with my methods of scientific communication. It is exciting to be part of this opportunity for [my local National Park].*

In another survey item, scientists were presented with a set of seven potential professional benefits that might be accrued through project participation. They were asked to reflect upon to what degree their participation in iSWOOP had yielded those benefits, using a 5-point rating scale (Not at all, A little, Somewhat, Moderately, Extremely; respondents could also indicate Not sure).

Three-fourths (8 out of 12) of the scientists identified three different areas in which they reported the project had impacted them either "moderately" or "extremely". These areas were: 1) broadening their impact by reaching new or larger audiences for their work; 2) changing how they see visitors' or interpreters' perspectives on their work, and 3) increasing the ways they will work with the National Park Service (NPS) or interpreters in the future.

*Table 2: Scientists' Views of iSWOOP's Professional Benefits*

| | Not at all/A little/Not sure | Somewhat | Moderately/ Extremely |
|---|---|---|---|
| Broaden your impact by reaching new or larger audiences for your work | 3 | 1 | 8 |
| Change how you see visitors' or interpreters' perspectives on your work | 1 | 3 | 8 |
| Increase the ways you will work with NPS or interpreters in the future | 3 | 1 | 8 |
| Add to your repertoire of teaching strategies | 3 | 2 | 7 |
| Add to your repertoire of strategies for explaining your research | 4 | 2 | 6 |
| Enrich the visual language you use to illustrate your work | 4 | 2 | 6 |
| Add to a shared bank of visuals you might use in teaching or outreach | 5 | 1 | 6 |

(n = 12)

Half or slightly more than half (6 out of 12 (50%) or 7 out of 12 (58%)) the scientists reported the project had impacted them either "moderately" or "extremely" in the four remaining areas: adding to the repertoire of strategies in their teaching or for explaining their research, and enriching the visual language they use to illustrate their work and adding to a shared bank of visuals they might use in teaching or outreach.

The lower rating related to the shared visuals may be due in part to the visual library not being as fully developed or shared with scientists as had been originally intended by project staff during the early phases of the project, given challenges with the development process.

Over half of the lower ratings (17 of the 28 "not at all", "a little", or "not sure" ratings across the seven items) were produced by four scientists all involved solely in an early phase of the project and who had lower levels of involvement in the project. These were the three retired professors and the one scientist who had expressed that they had received limited feedback and communication as to how their research was actually incorporated into the visual library or used by interpreters in the park.

Most of the positive ratings (44 out of the 49 "moderately" or "extremely" ratings across the seven items) were produced by the eight scientists (including the two PI's) who had higher levels of involvement in the project, including a more sustained role in the professional development sessions, and were more fully aware of how their scientific research had been featured in the project's visual library and utilized by interpreters.

<u>Suggested Areas for Program Consideration</u>:  The main project feedback offered by the scientists suggested greater attention to three different areas, which were to some extent, intertwined.  The first concerned **time**.  When asked about the time commitment involved in the project, close to half of the scientists (5 out of 12) expressed the considerable demands placed upon scientists' time (e.g., to prepare workshop presentations, contribute to the development of the visual library, build relationships with staff in the park) which they attributed, in part, to the early stages of the project and development of the iSWOOP model.  Others felt that the time commitment had been reasonable, but would have been less challenging if they had received clearer communication early on regarding their expected roles and time table for their involvement, or had more concrete evidence or work products supporting their academic careers that they could use to justify their time. One of the principal investigators also spoke about the importance of the model evolving to take more strategic use of scientists' time at certain optimal points in the design and training process, to make more effective and efficient use of their time.

The second area concerned **better project communication** between the various project partners (project staff, scientists, visual library developers, park staff), expressed by most of the scientists (8 out of 12).  Scientists requested a better orientation to the project, such as its goals, recommended styles of facilitating the learning of interpreters in professional development (e.g., using more highly interactive, and hands-on formats, rather than more traditional lecturing or presentations) and clearer communication surrounding their expected roles and ongoing contributions to the project and to their park.  Scientists also recommended greater communication following training, so that they had better sense of the types of visuals that ended up being produced for the visual library, how their research was utilized by interpreters in visitor programs and how visitors responded, and a chance to review dissemination materials that portrayed their research.  One principal investigator underscored the importance of clearly identifying the possible benefits from these science/park relationships and to be upfront about how partners can benefit in the best way (e.g. visualizations, new pedagogical experiences/ideas, access to new sites/relationships, higher visibility of the work) while acknowledging that the tangible fruits of their labors may take some time to materialize.

Scientists involved in later project phases of iSWOOP also expressed wanting more information and contact with rangers so that they could see how their research was being incorporated and modeled in visitor programs, and feedback, suggestions and stories from interpreters about their interactions with park visitors. Two scientists who were able to see their research being used by incorporated into programs expressed that this was one of the highlights of the project for them, while a third requested ways to videotape the programs for later viewing since she couldn't be on-site.

Third, scientists – particularly those early in their careers - spoke of ways in which they could get greater "credit" or **recognition for their involvement** and contributions to the program, by being able to point to specific work products or other evidence of their scholarly and service contributions. One scientist underscored the importance of outreach and impact in grant applications and the value of having their research have a presence on the iSWOOP webpage, which in turn was linked to a National Park web page.

**Conclusion**

In summary, scientists were motivated to become involved in iSWOOP for a variety of reasons, such as their interest in greater public outreach of their research, in heightening the public' understanding of research taking place in the parks and in developing their own science communication skills, as well as their respect for the National Park Service and the work it does. They indicated they have gained something professionally valuable from the project, including improved science communication skills and an increased professional network of scientist colleagues and park settings, and had achieved a broader impact by reaching new and larger audiences for their research. Greater benefits were noted by those scientists who had participated at higher levels and in more varied capacities for the project.

To increase iSWOOP's viability as a sustainable collaborative model for scientists and interpretive staff, scientists emphasized that project staff take into account the time demands requested of scientists and that the model evolve to take more strategic use of the scientists' time, as well as strengthen project communication between project partners regarding roles and expectations. To maximize the benefits to scientists, the project should provide greater follow-up in sending scientists final versions of visuals produced, information and feedback on the ways their research had been utilized by interpreters and received by the public, and develop clear ways that participating scientists could receive greater professional recognition for their contributions to the project.

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